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A Bibliography

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U.S. DEPARTMENT OF ENERGY

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THE OFFICE OF ENVIRONMENTAL MANAGEMENT TECHNICAL REPORTS

ABOUT THIS BIBLIOGRAPHY

The Office of Environmental Management's (EM) technical reports bibliography is an annual publication that contains information on scientific and technical reports sponsored by the Office of Environmental Management added to the Energy Science and Technology Database from July 1, 1995 – that were published from October 1, 1996–September 30, 1997. This information is divided into the following categories: Miscellaneous, Focus Areas and Crosscutting Programs. Support Programs, Technology Integration and International Technology Exchange, are now included in the Miscellaneous category. EM's Office of Science and Technology sponsors this bibliography. Questions regarding the content of the publication should be addressed to Diana Krop, Communications Program Manager, at 301-903-7918 or **Diana.Krop@em.doe.gov**

PROGRAM ACTIVITIES

The Office of Environmental Management within the Department of Energy (DOE) is responsible for environmental restoration, waste management, technology development and facility transition and management. This Office was created in 1989 to consolidate responsibility within DOE for environmental management activities. EM develops DOE policies and plans related to environmental restoration and waste management and is working to foster open communication with the public.

The Office of Science and Technology (OST) was established to conduct an aggressive, national program of applied research, development, demonstration, testing, and evaluation for environmental cleanup solutions that are safe and more time- and cost-effective than those currently available. OST brings together experts from academia, the Federal government, and private industry to conduct a wide range of research and development. Through these unique partnerships, OST leverages resources to develop equipment and methods to render waste management technologies less expensive, safe, and commercially applicable around the globe. In doing so, OST seeks to achieve the twin goals of sustaining our environment and creating economic prosperity.

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http://www.doe.gov/html/em/emtrd.html

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Sample Citations

Report

18494 (DOE/ER/40438–T1) **[Development of a hydrogen and deuterium polarized gas target for application in storage rings]: Progress report.** Haeberli, W. Phys. VI collaboration. Wisconsin Univ., Madison (USA). Dept. of Physics. [1989]. 12p. Sponsored by DOE Energy Research. DOE Contract FG02-88ER40438. Order Number DE89007246. Available from NTIS, PC A03/MF A01 - OSTI; GPO Dep.

This paper briefly discusses the Wisconsin test facility for storage cells; results of target tests; the new UHV...

Report Analytic

18500 (INIS-SU—69, pp. 30-32) **Transition energies in Ne-like ions. Correlation effects.** Vainshtejn, L.A. AN SSSR, Moscow. Fizicheskij Inst. 1988. (In Russian). In *Experimental and theoretical physics. Collection.* Order Number DE89780060. Available from NTIS (US Sales Only), PC A03/MF A01; INIS.

Kratkie Soobshcheniya po Fizike.; no. 6.

SILVER IONS/energy-level transitions; XENON IONS/energy-level transitions; CORRELATIONS; D STATES; E STATES;...

54 (DOE/ER/60888-1-Vol.1, pp. 115-117) **Investigation of air pollution in house due to use of various fuels.** Luo, Dayu (Chengdu Sanitation (China)). Canada Mortgage and Housing Corp., Ottawa, ON (Canada). 1990. (CONF-900724-Vol.1: Indoor Air '90: 5th international conference on indoor air quality and climate, Toronto (Canada), 29 Jul - 3 aug 1990). In Indoor air '90: The fifth international conference on indoor air quality and climate. Volume 1: Final report. 786p. Order Number DE90017786. Source: NTIS.

Air pollution in houses caused by combustion of coal is more serious than that by combustion of natural gas and methane (primarily by SO_2 and NO_2). The gas concentration after cooking is higher than that before cooking, and it is higher in kitchen than in bedroom and outdoor. There were mutations in the extract from TSP in 30m^2 air in the bedroom, kitchen and outdoor, where coal and natural gas were used. The supernatant saliva activity of children whose family uses coal is significantly lower than that of pumping streams.

How To Use the Indexes

Two indexes are provided for approaching the content of *The Office of Environmental Management Technical Reports.* Descriptions of entries in these indexes follow.

Corporate Author Index

The corporation, organization, or institution responsible for the issuance of the document is listed in this index. The entries are arranged alphabetically and provide the title and citation number of the reference. For example, the listing for the "Report" sample citation would appear as shown at right.

Wisconsin Univ., Madison (USA). Dept. of Physics
[Development of a hydrogen and deuterium polarized gas target for application in storage rings]: Progress report, 15:18494 (R;US)

Wisconsin Univ., Madison (USA). Lab. of Genetics
Organization of the R chromosome region in maize: Final progress report, June 1, 1983–May 31, 1986, 15:18255 (R;US)

Personal Author Index

Each author's name listed on a document cited in this issue is indexed. An index entry provides title and citation number; for secondary and other names, a cross-reference is given to the primary author name where the full index entry is located.

Hadley, D.L., *See* Lee, A.D., 15:17651

Haeberli, W., [Development of a hydrogen and deuterium polarized gas target for application in storage rings]: Progress report, 15:18494 (R;US)

Environmental Management Technical Reports

MISCELLANEOUS

Refer also to citation(s) 426

1
(ANL–97/4)
Ultrasonic methods for measuring liquid viscosity and volume percent of solids. Sheen, S.H.; Chien, H.T.; Raptis, A.C. Argonne National Lab., IL (United States). Feb 1997. 28p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97006049. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes two ultrasonic techniques under development at Argonne National Laboratory (ANL) in support of the tank-waste transport effort undertaken by the U.S. Department of Energy in treating low-level nuclear waste. The techniques are intended to provide continuous on-line measurements of waste viscosity and volume percent of solids in a waste transport line. The ultrasonic technique being developed for waste-viscosity measurement is based on the patented ANL viscometer. Focus of the viscometer development in this project is on improving measurement accuracy, stability, and range, particularly in the low-viscosity range (<30 cP). A prototype instrument has been designed and tested in the laboratory. Better than 1% accuracy in liquid density measurement can be obtained by using either a polyetherimide or polystyrene wedge. To measure low viscosities, a thin-wedge design has been developed and shows good sensitivity down to 5 cP. The technique for measuring volume percent of solids is based on ultrasonic wave scattering and phase velocity variation. This report covers a survey of multiple scattering theories and other phenomenological approaches. A theoretical model leading to development of an ultrasonic instrument for measuring volume percent of solids is proposed, and preliminary measurement data are presented.

2
(ANL–97/15)
Radiation effects in moist-air systems and the influence of radiolytic product formation on nuclear waste glass corrosion. Wronkiewicz, D.J. (Argonne National Lab., IL (United States). Chemical Technology Div.); Bates, J.K.; Buck, E.C.; Hoh, J.C.; Emery, J.W.; Wang, L.M. Argonne National Lab., IL (United States). Jul 1997. 251p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98001143. Source: OSTI; NTIS; INIS; GPO Dep.

Ionizing radiation may affect the performance of glass in an unsaturated repository site by interacting with air, water vapor, or liquid water to produce a variety of radiolytic products. Tests were conducted to examine the effects of radiolysis under high gas/liquid ratios. Results indicate that nitrate is the predominant radiolytic product produced following both gamma and alpha radiation exposure, with lesser amounts of nitrite and carboxylic acids. The formation of nitrogen acids during exposure to long-lived, alpha-particle-emitting transuranic elements indicates that these acids may play a role in influencing nuclear waste form reactions in a long-term unsaturated disposal scenario. Experiments were also conducted with samples that simulate the composition of Savannah River Plant nuclear waste glasses. Radiolytic product formation in batch tests (340 m^{-1}, 90 C) resulted in a small increase in the release rates of many glass components, such as alkali and alkaline earth elements, although silicon and uranium release rates were slightly reduced indicating an overall beneficial effect of radiation on waste form stability. The radiolytic acids increased the rate of ion exchange between the glass and the thin film of condensate, resulting in accelerated corrosion rates for the glass. The paragenetic sequence of alteration phases formed on both the irradiated and nonirradiated glass samples reacted in the vapor hydration tests matches closely with those developed during volcanic glass alteration in naturally occurring saline-alkaline lake systems. This correspondence suggests that the high temperatures used in these tests have not changed the underlying glass reaction mechanism relate to that which controls glass reactions under ambient surficial conditions.

3
(ANL/CMT/CP–88453)
Application of spent fuel treatment technology to plutonium immobilization. McPheeters, C.C; Ackerman, J.P.; Gay, E.C., Johnson, G.K. Argonne National Lab., IL (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9606116–19: Annual meeting of the American Nuclear Society (ANS), Reno, NV (United States), 16-20 Jun 1996). Order Number DE96009133. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the electrometallurgical treatment technology being developed at Argonne National Laboratory (ANL) is to convert certain spent nuclear fuels into waste forms that are suitable for disposal in a geological repository for nuclear waste. The spent fuels of interest are those that cannot be safely stored for a long time in their current condition, and those that cannot be qualified for repository disposal. This paper explores the possibility of applying this electrometallurgical treatment technology to immobilization of surplus fissile materials, primarily plutonium. Immobilization of surplus fissile materials by electrometallurgical treatment could be done in the same facilities, at the same time. and in the same equipment as the proposed treatment of the present inventory of spent nuclear fuel. The cost and schedule savings of this simultaneous treatment scheme would be significant.

4
(ANL/CMT/CP–88456)
Measurement of the glass dissolution rate in the presence of alteration phases. Ebert, W.L. (Argonne National

Lab., Idaho Falls, ID (United States)); Bakel, A.J.; Brown, N.R. Argonne National Lab., Idaho Falls, ID (United States); Pacific Northwest Lab., Richland, WA (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960804–40: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96012694. Source: OSTI; NTIS; INIS; GPO Dep.

The dissolution rate of LD6-5412 glass was measured at 90oC in the presence of its alteration phases with the Product Consistency Test (PCT) Method B, the Vapor Hydration Test (VHT), and the Accelerated Dissolution Test (ADT). Alteration phases formed during the PCTs and VHTs, but variations in the time required for their nucleation resulted in large uncertainties in the measured rates. The alteration phases are generated separately for use in the SDTs, so the measured rates are not affected by the kinetics of alteration phase nucleation. The rates measured in the PCTs, VHTs, and ADTs were 0.4 g/(m^2•d) (a lower bound), 2 g/(m^2•d) (extrapolated from the results of tests run at high temperatures), and 1.4 g/(m^2•d), respectively. The solution pHs were about 12 in all the tests.

5
(ANL/CMT/CP–89567)
Chemical effects of lanthanides and actinides in glasses determined with electron energy loss spectroscopy. Fortner, J.A.; Buck, E.C.; Ellison, A.J.G.; Bates, J.K. Argonne National Lab., IL (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9608108–3: 30. annual meeting of Microbeam Analysis Society, Minneapolis, MN (United States), 11-15 Aug 1996). Order Number DE96012708. Source: OSTI; NTIS; INIS; GPO Dep.

Chemical and structural environments of f-electron elements in glasses are the origin of many of the important properties of materials with these elements; thus oxidation state and chemical coordination of lanthanides and actinides in host materials is an important design consideration in optically active glasses, magnetic materials, perovskite superconductors, and nuclear waste materials. We have made use of the line shapes of Ce to determine its oxidation state in alkali borosilicate glasses being developed for immobilization of Pu. Examination of several prototype waste glass compositions with EELS shows that the redox state of Ce doped to 7 wt% could be varied by suitable choice of alkali elements. EELS for a Pu-doped glass illustrate the small actinide N_4/N_5 intensity ratio and show that the Pu-$N_{4,5}$ white line cross section is comparable to that of Gd $M_{4,5}$.

6
(ANL/DIS/CP–89084)
Waste management facility accident analysis (WASTE ACC) system: software for analysis of waste management alternatives. Kohout, E.F.; Folga, S.; Mueller, C.; Nabelssi, B. Argonne National Lab., IL (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31-109-ENG-38. (CONF-960212–32: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006913. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes the Waste Management Facility Accident Analysis (WASTE_ACC) software, which was developed at Argonne National Laboratory (ANL) to support the US Department of Energy's (DOE's) Waste Management (WM) Programmatic Environmental Impact Statement (PEIS). WASTE_ACC is a decision support and database system that is compatible with Microsoft® Windows™. It assesses potential atmospheric releases from accidents at waste management facilities. The software provides the user with an easy-to-use tool to determine the risk-dominant accident sequences for the many possible combinations of process technologies, waste and facility types, and alternative cases described in the WM PEIS. In addition, its structure will allow additional alternative cases and assumptions to be tested as part of the future DOE programmatic decision-making process. The WASTE_ACC system demonstrates one approach to performing a generic, systemwide evaluation of accident risks at waste management facilities. The advantages of WASTE_ACC are threefold. First, the software gets waste volume and radiological profile data that were used to perform other WM PEIS-related analyses directly from the WASTE_MGMT system. Second, the system allows for a consistent analysis across all sites and waste streams, which enables decision makers to understand more fully the trade-offs among various policy options and scenarios. Third, the system is easy to operate; even complex scenario runs are completed within minutes.

7
(ANL/EA/CP–87799)
Potential waste-clearance strategy for U.S. Department of Energy waste processed at treatment, storage, and disposal facilities. Stevens, L. (Dept. of Energy, Germantown, MD (United States). Office of Environmental Restoration and Waste Management); Chen, S.Y.; Pfingston, M. Argonne National Lab., IL (United States). 1996. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960212–40: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006730. Source: OSTI; NTIS; INIS; GPO Dep.

Past practices at U.S. Department of Energy (DOE) field facilities may have resulted in the presence of minute amounts of radioactive contamination in some hazardous wastes shipped from these facilities. In May 1991, the DOE Office of Waste Operations issued a nationwide moratorium on shipping potentially mixed waste from DOE facilities to commercial treatment, storage, and disposal (TSD) facilities. A potential waste-clearance strategy was developed to address the DOE mixed-waste moratorium issues, which had resulted from a lack of existing regulations regarding volume contamination. A radiological assessment model was developed on the basis of the detailed radiological assessment performed for eight commercial hazardous waste TSD facilities. The model incorporates waste- and site-specific data to estimate potential radiological doses to on-site workers and the off-site public from waste-handling operations at a TSD facility. The described waste-clearance strategy would provide both DOE and commercial TSD facilities with a rapid and cost-effective methodology for assessing potential human exposures from the processing of chemical wastes contaminated with trace amounts of radionuclides. This

strategy also has important potential applications for establishing site clearance limits to ensure that worker and public risks would remain well below regulatory limits. The clearance strategy issues pertaining to current free-release practice, dose limits, data requirements, and conservatism are discussed.

8
(ANL/EA/CP–88164)
Facilitating relative comparisons of health impacts from postulated accidents in environmental impact statements. Mueller, C.J. Argonne National Lab., IL (United States). [1996]. 12p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960648–5: 21. annual conference of the National Association of Environmental Professionals: practical environmental directions - a changing agenda, Houston, TX (United States), 2-6 Jun 1996). Order Number DE96010794. Source: OSTI; NTIS; INIS; GPO Dep.

Current US Department of Energy (DOE) guidance on the performance of accident analyses supported an environmental impact statement (EIS) stresses a graded approach that emphasizes the most important risks, calls for the evaluation of frequencies as well as consequences for severe accident scenarios, and discourages the use of bounding analyses that confound risk comparisons among EIS alternatives. This paper discusses methods in probabilistic risk analysis that were developed and applied in defining accidents and generating radiological source terms for the DOE Draft Waste Management Programmatic Environmental Impact Statement (WM PEIS); publication of the Final WM PEIS is due in late summer 1996. The strengths and shortcomings of the cited probabilistic risk analysis methods used to evaluate facility accidents are addressed, both as they relate to the WM PEIS and as they relate to more general EIS applications. Key guidance is discussed that was developed by DOE and used in shaping the techniques cited herein for application in an EIS. Related perceptions on accidents observed from the public comment process for the WM PEIS are cited. Finally, recommendations are made on the basis of needs as well as lessons learned in implementing the accident analysis for the WM PEIS.

9
(ANL/EA/CP–88442)
RISKIND: An enhanced computer code for National Environmental Policy Act transportation consequence analysis. Biwer, B.M.; LePoire, D.J.; Chen, S.Y. Argonne National Lab., IL (United States). 1996. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960212–39: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006896. Source: OSTI; INIS; NTIS (documentation only); ESTSC (complete software package), P.O. Box 1020, Oak Ridge, TN 37831-1020 (United States); GPO Dep.

The RISKIND computer program was developed for the analysis of radiological consequences and health risks to individuals and the collective population from exposures associated with the transportation of spent nuclear fuel (SNF) or other radioactive materials. The code is intended to provide scenario-specific analyses when evaluating alternatives for environmental assessment activities, including those for major federal actions involving radioactive material transport as required by the National Environmental Policy Act (NEPA). As such, rigorous procedures have been implemented to enhance the code's credibility and strenuous efforts have been made to enhance ease of use of the code. To increase the code's reliability and credibility, a new version of RISKIND was produced under a quality assurance plan that covered code development and testing, and a peer review process was conducted. During development of the new version, the flexibility and ease of use of RISKIND were enhanced through several major changes: (1) a Windows™ point-and-click interface replaced the old DOS menu system, (2) the remaining model input parameters were added to the interface, (3) databases were updated, (4) the program output was revised, and (5) on-line help has been added. RISKIND has been well received by users and has been established as a key component in radiological transportation risk assessments through its acceptance by the U.S. Department of Energy community in recent environmental impact statements (EISs) and its continued use in the current preparation of several EISs.

10
(ANL/EA/CP–88577)
Efficient data exchange: Integrating a vector GIS with an object-oriented, 3-D visualization system. Kuiper, J. (Argonne National Lab., IL (United States)); Ayers, A.; Johnson, R.; Tolbert-Smith, M. Argonne National Lab., IL (United States). [1996]. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960164–2: 3. international conference/workshop on integrating GIS and environmental modeling, Santa Fe, NM (United States), 21-25 Jan 1996). Order Number DE96006755. Source: OSTI; NTIS; INIS; GPO Dep.

A common problem encountered in Geographic Information System (GIS) modeling is the exchange of data between different software packages to best utilize the unique features of each package. This paper describes a project to integrate two systems through efficient data exchange. The first is a widely used GIS based on a relational data model. This system has a broad set of data input, processing, and output capabilities, but lacks three-dimensional (3-D) visualization and certain modeling functions. The second system is a specialized object-oriented package designed for 3-D visualization and modeling. Although this second system is useful for subsurface modeling and hazardous waste site characterization, it does not provide many of the, capabilities of a complete GIS. The system-integration project resulted in an easy-to-use program to transfer information between the systems, making many of the more complex conversion issues transparent to the user. The strengths of both systems are accessible, allowing the scientist more time to focus on analysis. This paper details the capabilities of the two systems, explains the technical issues associated with data exchange and how they were solved, and outlines an example analysis project that used the integrated systems.

11
(ANL/EA/CP–88945)
A comparative review of accident studies from recent environmental impact statements. Mueller, C.; Folga, S.; Nabelssi, B. Argonne National Lab., IL (United States). 1996. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9606114–7: 6. annual Energy Facility Contractors Group (EFCOG) safety analysis workshop on doing the right thing, Knoxville,

TN (United States), 5-7 Jun 1996). Order Number DE96009413. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE) has recently prepared or is in the process of preparing a number of programmatic and site-specific environmental impact statements (EISs). This study was conducted for the purpose of reviewing the self-consistency of programmatic alternatives, associated relative impacts, and supporting data, methods, and assumptions in EISs prepared for related activities. The following EISs, which deal with waste management issues, are reviewed in this paper (the parenthetical acronyms are referred to in Table 1): (1) Final Environmental Impact Statement, Savannah River Site Waste Management, DOE/EIS-0217, Vol. II, July 1995. (SRS WM-EIS), (2) Draft Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste, DOE/EIS-0200-D, Vol. IV, Aug. 1995. (WM PEIS), (3) Final Environmental Impact Statement, Interim Management of Nuclear Materials at the Savannah River Site. DOE/EIS-0220, Oct. 1995. (IMNM EIS), (4) Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement, DOE/EIS-0203-F, April 1995. (INEL Site-Wide-EIS), (5) Draft Environmental Impact Statement, Disposition of Surplus Highly Enriched Uranium, DOE/EIS-0240-D, Oct. 1995. (HEU Disposition EIS), (6) Final Environmental Impact Statement, Safe Interim Storage of Hanford Tank Wastes, Hanford Site, Richland, Washington, DOE/EIS-0212, Oct. 1995. (SIS EIS). This study compares the facility accident analysis approaches used in these EISs vis-a-vis the National Environmental Policy Act (NEPA) guidance developed by DOE (Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements, Office of NEPA Oversight). The purpose of the comparative review of these approaches with NEPA guidance is to identify potential preferred paths for future EISs.

12
(ANL/EA/CP–89877)
A review of the radiological treatment. Mueller, C.J.; Folga, S.; Nabelssi, B.; Kohout, E. Argonne National Lab., IL (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960804–43: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96012700. Source: OSTI; NTIS; INIS; GPO Dep.

The Draft Waste Management Programmatic Environmental Impact Statement (WM PEIS) was released by the U.S. Department of Energy (DOE) for public comment on September 22, 1995. Prepared in accordance with the National Environmental Policy Act (NEPA), the Final WM PEIS is currently scheduled for release in late summer 1996. The Draft WM PEIS was published after about 3 years of effort to select and evaluated the best alternatives for treating, storing, and disposing of the 50-year legacy of radioactive and chemically hazardous wastes existing within the DOE complex. The evaluation examined the potential health and environmental impacts of integrated waste management alternatives for five categories of waste types at 54 DOE sites. A primary consideration as a potential source of human health impacts at all sites is that of radiological releases resulting from postulated accidents involving facilities used to treat radioactive wastes. This paper first provides a brief, updated summary of the approach used to define and perform treatment facility accident analyses in the Draft WM PEIS. It reviews the selection of dominant sequences for the major sites most affected by the preferred waste management alternatives and highlights the salient accident analysis results. Finally, it summarizes and addresses key public and state and federal agency comments relating to accident analysis that were received in the public comment process.

13
(ANL/EA/CP–90139)
A risk-based waste clearance concept for the D&D program. Chen, S.Y.; Bhattacharyya, S.K. Argonne National Lab., IL (United States). [1996]. 5p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31-109-ENG-38. (CONF-961103–30: Winter meeting of the American Nuclear Society (ANS) and the European Nuclear Society (ENS), Washington, DC (United States), 10-14 Nov 1996). Order Number DE97003879. Source: OSTI; NTIS; INIS; GPO Dep.

Recycling and reusing radioactively contaminated metals could be a viable alternative to D&D (decontamination and decommissioning) waste minimization. Release of such metals under the current international dose guideline would result in annual public risk levels of less than 10^{-6} for an individual and 10^{-2} for society. Methodology and data are available to strongly support a conservative yet practical analysis. It is feasible, therefore, to address the issues and to derive risk-based standards for the unrestricted release of radioactive scrap metal that are designed to prevent undue risk to the public.

14
(ANL/EA/CP–90879)
Approaches to accident analysis in recent US Department of Energy environmental impact statements. Mueller, C.; Folga, S.; Nabelssi, B. Argonne National Lab., IL (United States). 1996. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-961105–19: 1996 international mechanical engineering congress and exhibition, Atlanta, GA (United States), 17-22 Nov 1996). Order Number DE97003882. Source: OSTI; NTIS; INIS; GPO Dep.

A review of accident analyses in recent US Department of Energy (DOE) Environmental Impact Statements (EISs) was conducted to evaluate the consistency among approaches and to compare these approaches with existing DOE guidance. The review considered several components of an accident analysis: the overall scope, which in turn should reflect the scope of the EIS; the spectrum of accidents considered; the methods and assumptions used to determine frequencies or frequency ranges for the accident sequences; and the assumption and technical bases for developing radiological and chemical atmospheric source terms and for calculating the consequences of airborne releases. The review also considered the range of results generated with respect to impacts on various worker and general populations. In this paper, the findings of these reviews are presented and methods recommended for improving consistency among EISs and bringing them more into line with existing DOE guidance.

15
(ANL/EAD/TM–18)
Risk assessment for the on-site transportation of radioactive wastes for the U.S. Department of Energy Waste Management Programmatic Environmental Impact Statement. Biwer, B.M. (Argonne National Lab., IL (United States). Environmental Assessment Div.); Monette, F.A.; Chen, S.Y. Argonne National Lab., IL (United States). Dec 1996. 72p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000254. Source: OSTI; NTIS; INIS; GPO Dep.

This report documents the risk assessment performed for the on-site transportation of radioactive wastes in the US Department of Energy (DOE) Waste Management Programmatic Environmental Impact Statement (WM PEIS). Risks for the routine shipment of wastes and the impacts from potential accidental releases are analyzed for operations at the Hanford Site (Hanford) near Richland, Washington. Like other large DOE sites, hanford conducts waste management operations for all wastes types; consequently, the impacts calculated for Hanford are expected to be greater than those for smaller sites. The risk assessment conducted for on-site transportation is intended to provide an estimate of the magnitude of the potential risk for comparison with off-site transportation risks assessed for the WM PEIS.

16
(ANL/EAD/TM–21)
Risk assessment for the off-site transportation of high-level waste for the U.S. Department of Energy waste management programmatic environmental impact statement. Monette, F.A. (Argonne National Lab., IL (United States). Environmental Assessment Div.); Biwer, B.M.; LePoire, D.J.; Chen, S.Y. Argonne National Lab., IL (United States). Dec 1996. 112p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98001958. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the human health risk assessment conducted for the transportation of high-level waste (HLW) in support of the US Department of Energy Waste Management Programmatic Environmental Impact Statement (WM PEIS). The assessment considers risks to collective populations and individuals under both routine and accident transportation conditions for truck and rail shipment modes. The report discusses the scope of the HLW transportation assessment, describes the analytical methods used for the assessment, defines the alternatives considered in the WM PEIS, and details important assessment assumptions. Results are reported for five alternatives. In addition, to aid in the understanding and interpretation of the results, specific areas of uncertainty are described, with an emphasis on how the uncertainties may affect comparisons of the alternatives.

17
(ANL/EAD/TM–30)
WASTE_MGMT: A computer model for calculation of waste loads, profiles, and emissions. Kotek, T.J. (Argonne National Lab., IL (United States). Environmental Assessment Div.); Avci, H.I.; Koebnick, B.L. Argonne National Lab., IL (United States). Dec 1996. 44p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000742. Source: OSTI; NTIS; INIS; GPO Dep.

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Waste_MGMT is a computational model developed to provide waste loads, profiles, and emissions for the US Department of Energy's Waste Management Programmatic Environmental Impact Statement (WP PEIS). The model was developed to account for the considerable variety of waste types and processing alternatives evaluated for the WM PEIS. The model is table-driven, with three types of fundamental waste management data defining the input: (1) waste inventories and characteristics; (2) treatment, storage, and disposal facility characteristics; and (3) alternative definition. The primary output of the model consists of tables of waste loads and contaminant profiles at facilities, as well as contaminant air releases for each treatment and storage facility at each site for each waste stream. The model is implemented in Microsoft® FoxPro® for MS-DOS® version 2.5 and requires a microcomputer with at least a 386 processor and a minimum 6 Mbytes of memory and 10 Mbytes of disk space for temporary storage.

18
(ANL/EAD/TM–52)
WASTE-ACC: A computer model for analysis of waste management accidents. Nabelssi, B.K.; Folga, S.; Kohout, E.J.; Mueller, C.J.; Roglans-Ribas, J. Argonne National Lab., IL (United States). Dec 1996. 78p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000958. Source: OSTI; NTIS; INIS; GPO Dep.

In support of the U.S. Department of Energy's (DOE's) Waste Management Programmatic Environmental Impact Statement, Argonne National Laboratory has developed WASTE-ACC, a computational framework and integrated PC-based database system, to assess atmospheric releases from facility accidents. WASTE-ACC facilitates the many calculations for the accident analyses necessitated by the numerous combinations of waste types, waste management process technologies, facility locations, and site consolidation strategies in the waste management alternatives across the DOE complex. WASTE-ACC is a comprehensive tool that can effectively test future DOE waste management alternatives and assumptions. The computational framework can access several relational databases to calculate atmospheric releases. The databases contain throughput volumes, waste profiles, treatment process parameters, and accident data such as frequencies of initiators, conditional probabilities of subsequent events, and source term release parameters of the various waste forms under accident stresses. This report describes the computational framework and supporting databases used to conduct accident analyses and to develop source terms to assess potential health impacts that may affect on-site workers and off-site members of the public under various DOE waste management alternatives.

19
(ANL/EAD/TM–53)
Supplemental analysis of accident sequences and source terms for waste treatment and storage operations and related facilities for the US Department of

Energy waste management programmatic environmental impact statement. Folga, S.; Mueller, C.; Nabelssi, B.; Kohout, E.; Mishima, J. Argonne National Lab., IL (United States). Dec 1996. 134p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98001123. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents supplemental information for the document Analysis of Accident Sequences and Source Terms at Waste Treatment, Storage, and Disposal Facilities for Waste Generated by US Department of Energy Waste Management Operations. Additional technical support information is supplied concerning treatment of transuranic waste by incineration and considering the Alternative Organic Treatment option for low-level mixed waste. The latest respirable airborne release fraction values published by the US Department of Energy for use in accident analysis have been used and are included as Appendix D, where respirable airborne release fraction is defined as the fraction of material exposed to accident stresses that could become airborne as a result of the accident. A set of dominant waste treatment processes and accident scenarios was selected for a screening-process analysis. A subset of results (release source terms) from this analysis is presented.

20
(ANL/EAD/TM–65)
Dose calculations for the concrete water tunnels at 190-C Area, Hanford Site. Kamboj, S. (Argonne National Lab., IL (United States). Environmental Assessment Div.); Yu, C. Argonne National Lab., IL (United States). Jan 1997. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97003654. Source: OSTI; NTIS; INIS; GPO Dep.

The RESRAD-BUILD code was used to calculate the radiological dose from the contaminated concrete water tunnels at the 190-C Area at the Hanford Site. Two exposure scenarios, recreationist and maintenance worker, were considered. A residential scenario was not considered because the material was assumed to be left intact (i.e., the concrete would not be rubbleized because the location would not be suitable for construction of a house). The recreationist was assumed to use the tunnel for 8 hours per day for 1 week as an overnight shelter. The maintenance worker was assumed to spend 20 hours per year working in the tunnel. Six exposure pathways were considered in calculating the dose. Three external exposure pathways involved penetrating radiation emitted directly from the contaminated tunnel floor, emitted from radioactive particulates deposited on the tunnel floor, and resulting from submersion in airborne radioactive particulates. Three internal exposure pathways involved inhalation of airborne radioactive particulates; inadvertent direct ingestion of removable, contaminated material on the tunnel floor; and inadvertent indirect ingestion of airborne particulates deposited on the tunnel floor. The gradual removal of surface contamination over time and the ingrowth of decay products were considered in calculating the dose at different times. The maximum doses were estimated to be 1.5 mrem/yr for the recreationist and 0.34 mrem/yr for the maintenance worker.

21
(ANL/EAD/TM–74)
RISKIND verification and benchmark comparisons. Biwer, B.M.; Arnish, J.J.; Chen, S.Y.; Kamboj, S. Argonne National Lab., IL (United States). Aug 1997. 246p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000883. Source: OSTI; NTIS (documentation only); ESTSC (complete software package), P.O. Box 1020, Oak Ridge, TN 37831-1020 (United States); INIS; GPO Dep.

This report presents verification calculations and benchmark comparisons for RISKIND, a computer code designed to estimate potential radiological consequences and health risks to individuals and the population from exposures associated with the transportation of spent nuclear fuel and other radioactive materials. Spreadsheet calculations were performed to verify the proper operation of the major options and calculational steps in RISKIND. The program is unique in that it combines a variety of well-established models into a comprehensive treatment for assessing risks from the transportation of radioactive materials. Benchmark comparisons with other validated codes that incorporate similar models were also performed. For instance, the external gamma and neutron dose rate curves for a shipping package estimated by RISKIND were compared with those estimated by using the RADTRAN 4 code and NUREG-0170 methodology. Atmospheric dispersion of released material and dose estimates from the GENII and CAP88-PC codes. Verification results have shown the program to be performing its intended function correctly. The benchmark results indicate that the predictions made by RISKIND are within acceptable limits when compared with predictions from similar existing models.

22
(ANL/EMO/CP–90484)
Solvent usage and recycling potential in a research and development setting. Vivio, F.; Thuot, J.R.; Peters, R.W. Argonne National Lab., IL (United States). [1996]. 3p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960741–12: Pollution prevention conference, Chicago, IL (United States), 9-11 Jul 1996). Order Number DE96012758. Source: OSTI; NTIS; INIS; GPO Dep.

Argonne National Laboratory utilizes thousands of gallons of chemicals each year. Laboratory wastes can be broadly characterized as coming from three focus areas: (1) restoration and decommissioning associated wastes generate larger quantities of waste on a one-time basis. The wastes may be non-hazardous to highly toxic and the quantities are variable. (2) Laboratory operations generate approximately 50% of all waste disposed. Operational waste can be characterized as less hazardous, reasonably consistent in nature, generally in larger quantities. (3) the final waste stream is small quantities of many different materials coming from many different waste streams. This waste stream is at the center of ANL's pollution prevention program. The research areas have implemented many pollution prevention techniques. Solvent substitution has been effective in reducing hazardous cleaning wastes, scintillation cocktail wastes, and other chlorinated wastes. Micro chemistry is effective at minimizing certain chemical process wastes, developing new analytical chemistry procedures has reduced and eliminated other waste forms. New instrumentation has provided

first level reductions in many waste streams. Despite these new techniques solvent usage remains the largest research related waste stream. The present solvents are generated from instruments such as electrophoresis and high pressure liquid chromatographs (HPLC), solvent extractions, biological staining and cleaning practices. ANL recognizes the significant role recycling this waste stream is in Pollution Prevention Program implementation. ANL initiated a study to quantify solvent usage, characterization of the waste solvent, and match the purity requirements exploring all opportunities to substitute and recycle.

23
(ANL/EMO/CP–90642)
Airlie House Pollution Prevention Technology Transfer pilot projects. Thuot, J.R.; Myron, H.; Gatrone, R.; McHenry, J. Argonne National Lab., IL (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960741–22: Pollution prevention conference, Chicago, IL (United States), 9-11 Jul 1996). Order Number DE96013614. Source: OSTI; NTIS; GPO Dep.

The projects were a series of pilot projects developed for DOE with the intention of transferring pollution prevention technology to private industry. The concept was to develop small technology transfer initiatives in partnership with the private sector. Argonne National Laboratory developed three projects: the microscale chemistry in education program, the microscale cost benefit study, and the Bethel New Life recycling trainee program. The two microscale chemistry projects focused on introducing microscale chemistry technologies to secondary and college education. These programs were inexpensive to develop and received excellent evaluations from participants and regulators. The recycle trainee project provided training for two participants and identified recycling and source reduction opportunities in Argonne's solid waste stream. The pilot projects demonstrated that technology transfer initiatives can be developed and implemented with a small budget and within a short period of time. The essential components of the pilot projects were identification of target technologies that were already available, identification of target audiences, and a focus of effort to achieve a limited but defined objective.

24
(ANL/ER/CP–89080)
Pollution prevention in the analytical laboratory–Microscale and other techniques do add up. Erickson, M.D.; Alvarado, J.S.; Lu, C.-S.; Peterson, D.P.; Silzer, J. Argonne National Lab., IL (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960741–5: Pollution prevention conference, Chicago, IL (United States), 9-11 Jul 1996). Order Number DE96012689. Source: OSTI; NTIS; INIS; GPO Dep.

The principles of pollution prevention in the analytical laboratory have not been addressed sufficiently. Although the amount of reagent used per sample is often only a few milliliters, the aggregate of many routine test each day in thousands of laboratories becomes significant. Current recycling practices are not practical with small streams. Therefore, we have adopted the principles of microscale chemistry, along with other modern analytical approaches, to develop routine analytical methods that significantly curtail waste but still maintain acceptable analytical figures of merit and achieve cost savings through reduced reagent consumption and reduced labor cost.

25
(ANL/ET/CP–91518)
Measurement of shear impedances of viscoelastic fluids. Sheen, Shuh-Haw; Chien, Hual-Te; Raptis, A.C. Argonne National Lab., IL (United States). Energy Technology Div. [1996]. 17p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9611113–3: Ultrasonics symposium, San Antonio, TX (United States), 3-6 Nov 1996). Order Number DE97001392. Source: OSTI; NTIS; GPO Dep.

Shear-wave reflection coefficients from a solid/fluid interface are derived for non-Newtonian fluids that can be described by Maxwell, Voigt, and power-law fluid models. Based on model calculations, we have identified the measurable effects on the reflection coefficients due to fluid non-Newtonian behavior. The models are used to interpret the viscosity data obtained by a technique based on shear impedance measurement.

26
(ANL/SPO/CP–88566)
Lessons from the private sector on performance-based management. Stoeckle, K.E. (USDOE (United States). Office of Waste Management); Kolster, W.G.; Shangraw, R.F. Argonne National Lab., IL (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960212–34: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006700. Source: OSTI; NTIS; GPO Dep.

Implementation of the Government Performance and Results Act of 1993 (GPRA) has provided a unique challenge for Federal Agencies, such as the Department of Energy (DOE) Office of Waste Management (OWM). While performance measurement, as required by GPRA, is new to Federal Agencies, private industry has applied it at all organizational levels to better manage their operations for some time. There has been significant discussion about how the private sector uses performance measures, but there have been very few empirical studies systematically examining their use. To gather information on comparable private industry practices, waste management industry firms were surveyed through questionnaires and follow-on interviews. Questionnaires were sent to 75 waste management firms throughout the United States and Canada. Twenty-four percent of the firms responded to the questionnaire and participated in the follow-on interviews. The questionnaires were typically completed by vice-presidents or senior financial officers. Information collected from the questionnaire and follow-on interviews provided valuable insight into industry practices in the area of performance measurement. This paper discusses the study results and how they can be incorporated in the DOE OWM performance measures and influence the character of the "critical few" metrics used by senior DOE managers.

27
(APT/PDO–97-10)
Waste management plan for the APT. England, J.L. Westinghouse Savannah River Co., Aiken, SC (*United States*).

22 Aug 1997. 15p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98051507. Source: OSTI; NTIS; INIS; GPO Dep.

This revision of the APT Waste Management Plan details the waste management requirements and issues specific to the APT plant for design considerations, construction, and operation. The APT Waste Management Plan is by its nature a living document and will be reviewed at least annually and revised as required.

28
(BHI–00283-Rev.2)
Bechtel Hanford, Inc. Implementation Plan for US Department of Energy Order 5480.24. Revision 2. Curry, L.R. Bechtel Hanford, Inc., Richland, WA (United States). Mar 1997. 21p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052817. Source: OSTI; NTIS; INIS; GPO Dep.

This implementation plan describes the Bechtel Hanford, Inc., approach for the identification of Environmental Restoration Contractor activities that require compliance with the requirements of U.S. Department of Energy Order 5480.24. Although a number of structures and waste sites are contaminated with radioactive material, only a few contain fissionable material in quantities that require consideration of criticality safety.

29
(BHI–00725)
100-N pilot project: Proposed consolidated groundwater monitoring program. Borghese, J.V.; Hartman, M.J.; Lutrell, S.P.; Perkins, C.J.; Zoric, J.P.; Tindall, S.C. Bechtel Hanford, Inc., Richland, WA (United States). Nov 1996. 186p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97051691. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents a proposed consolidated groundwater monitoring program for the 100-N Pilot Project. This program is the result of a cooperative effort between the Hanford Site contractors who monitor the groundwater beneath the 100-N Area. The consolidation of the groundwater monitoring programs is being proposed to minimize the cost, time, and effort necessary for groundwater monitoring in the 100-N Area, and to coordinate regulatory compliance activities. The integrity of the subprograms requirements remained intact during the consolidation effort. The purpose of this report is to present the proposed consolidated groundwater monitoring program and to summarize the process by which it was determined.

30
(BHI–00781-Rev.2)
Operation and maintenance manual for the temporary septic holding tank at the 100-D remedial action support facility. Revision 2. Kelty, G.G. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 25p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050579. Source: OSTI; NTIS; INIS; GPO Dep.

This manual was prepared to provide detailed information for the operation and maintenance of the sanitary wastewater holding system at the 100-D Remedial Action Support Facility located in the 100-DR-1 Operable Unit at the Hanford Site. This document describes operations, including the type and frequency of required maintenance, and system failure response procedures.

31
(BHI–00782-Rev.2)
Temporary septic holding tank at the 100-D remedial action support facility – Engineering report. Revision 2. Kelty, G.G. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 137p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050581. Source: OSTI; NTIS; INIS; GPO Dep.

The primary mission of the Hanford Site from 1943 to 1990 was to produce nuclear materials for the national defense. Waste disposal activities associated with this mission resulted in the creation of more than 1,000 waste sites contaminated with radioactive and chemical constituents. Investigation and remediation of the wastes sites is governed by the Tri-Party Agreement. This agreement grouped the waste sites into 78 operable units, each of which was to be investigated and remediated separately. Once actual remediation activities begin at the waste sites, a central support facility will be required at each of the reactor areas (100-B/C, 100-D, and 100-H). These facilities will provide office and work space for the supervisors, engineers, and technicians engaged in the field work. The central facilities will be temporary, modular buildings sized to accommodate the anticipated staff, which in turn is determined by the scope of the planned remediation activities. The paper describes the project location, geology and flooding potential, design criteria, operation, and maintenance.

32
(BHI–00814-02)
Environmental restoration contract radiological controls performance indicator report for 2nd quarter '96. Shea, K.R.; Shockley, V.E. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050582. Source: OSTI; NTIS; GPO Dep.

This report documents Environmental Restoration Contractor Team performance as measured by selected performance indicators for the second quarter of Calendar Year '96 and includes comparison data from the second, third, and fourth quarters of Calendar Year '95, and first quarter of Calendar Year '96. The decreasing trend of collective dose indicates the results of effective work planning and extensive dose reduction techniques. Planning of work, especially high dose rate work, has helped reduce collective dose and meet As Low As Reasonably Achievable (ALARA) expectations.

33
(BHI–00825)
High exposure rate hardware ALARA plan. Nellesen, A.L. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC

(United States). DOE Contract AC06-93RL12367. Order Number DE97050583. Source: OSTI; NTIS; INIS; GPO Dep.

This as low as reasonably achievable review provides a description of the engineering and administrative controls used to manage personnel exposure and to control contamination levels and airborne radioactivity concentrations. HERH waste is hardware found in the N-Fuel Storage Basin, which has a contact dose rate greater than 1 R/hr and used filters. This waste will be collected in the fuel baskets at various locations in the basins.

34
(BHI–00837)
Final hazard classification and auditable safety analysis for the 105-C Reactor Interim Safe Storage Project. Rodovsky, T.J.; Larson, A.R.; Dexheimer, D. Bechtel Hanford, Inc., Richland, WA (United States). Dec 1996. 75p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97051702. Source: OSTI; NTIS; INIS; GPO Dep.

This document summarizes the inventories of radioactive and hazardous materials present in the 105-C Reactor Facility and the operations associated with the Interim Safe Storage Project which includes decontamination and demolition and interim safe storage of the remaining facility. This document also establishes a final hazard classification and verifies that appropriate and adequate safety functions and controls are in place to reduce or mitigate the risk associated with those operations.

35
(BHI–00840)
103-B, 1701-BA, and 1714-C demolition <90 day storage supplemental information to the Hanford Facility Contingency Plan. Snider, P.M. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050585. Source: OSTI; NTIS; INIS; GPO Dep.

The 103-B, 1701-BA, and 1714-C < 90 Day Storage Area stores characteristic wastes generated in the demolition of the 103-B, 1701-BA, and 1714-C Complex. Wastes (lead-based painted components) are packaged and stored in vendor shipment containers. This document is to be used to demonstrate compliance with the contingency plan requirements in Washington Administrative Code 173-303 for certain Resource Conservation, and Recovery Act of 1976 waste management units.

36
(BHI–00842)
<90 day storage training plan for the 103-B, 1701-BA, AND 1714-C buildings. Snider, P.M. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 15p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050587. Source: OSTI; NTIS; INIS; GPO Dep.

The 103-B, 1701-BA, and 1714C < 90 Day Storage Area stores characteristic wastes generated in the demolition of the 103-B, 1701-BA, and 1714-C Complex. Wastes (lead-based painted components) are packaged and stored in vendor shipment containers. This is the Environmental Restoration Contractor team training plan for the 103-B, 1701-BA, and 1714-C subgrade demolition < 90 Day Storage of Hazardous Waste. This document is intended to meet the requirements of Washington Administrative Code 173-303-330 and the Hanford Dangerous Waste Permit. Training unrelated to compliance with WAC 173-303-330 is not addressed in this training plan. WAC 173-303-330(1)(d)(2, 5, 6) requires that personnel be familiarized, where applicable, with waste feed cut-off systems, response to ground-water contamination incidents, and shutdown of operations. These are not applicable to 103-B, 1701-BA, and 1714-C Subgrade Demolition < 90 Day Storage, and therefore are not covered in this training plan.

37
(BHI–00844-Rev.1-Vol.1)
Application for approval of derived authorized limits for the release of the 190-C trenches and 105-C process water tunnels at the Hanford Site: Volume 1 - dose assessment and results. Denham, D.H.; Winslow, S.L.; Moeller, M.P.; Kennedy, W.E. Jr. Bechtel Hanford, Inc., Richland, WA (United States). Mar 1997. 36p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052707. Source: OSTI; NTIS; INIS; GPO Dep.

As part of environmental restoration activities at the Hanford Site, Bechtel Hanford, Inc. is conducting a series of evaluations to determine appropriate release conditions for specific facilities following the completion of decontamination and decommissioning projects. The release conditions, with respect to the residual volumetric radioactive contamination, are termed authorized limits. This report presents the summary of the supporting information and the final application for approval of derived authorized limits for the release of the 190-C trenches and the 105-C process water tunnels. This document contains two volumes; this volume (Vol. 1) contains a brief description of the facilities; a summary of the source term determination (found in detail in Vol. 2); a description of the radiation exposure scenarios for estimating individual radiation doses; a summary of the calculated doses; and a discussion of the as low as reasonably achievable groundwater protection, and other considerations.

38
(BHI–00844-Rev.1-Vol.2)
Application for approval of derived authorized limits for the release of the 190-C trenches and 105-C process water tunnels at the Hanford Site: Volume 2 - source term development. Denham, D.H.; Winslow, S.L.; Moeller, M.P.; Kennedy, W.E. Jr. Bechtel Hanford, Inc., Richland, WA (United States). Mar 1997. 48p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052708. Source: OSTI; NTIS; INIS; GPO Dep.

As part of environmental restoration activities at the Hanford Site, Bechtel Hanford, Inc. is conducting a series of evaluations to determine appropriate release conditions for specific facilities following the completion of decontamination and decommissioning projects. The release conditions, with respect to the residual volumetric radioactive contamination, are termed authorized limits. This report presents the summary of the supporting information and the final application for approval of derived authorized limits for the release

of the 190-C trenches and the 105-C process water tunnels. This document contains two volumes; this volume (Vol. 2) contains the radiological characterization data, spreadsheet analyses, and radiological source terms.

39
(BHI–00846)
Release plan for Big Pete. Edwards, T.A. Bechtel Hanford, Inc., Richland, WA (United States). Nov 1996. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050649. Source: OSTI; NTIS; INIS; GPO Dep.

This release plan is to provide instructions for the Radiological Control Technician (RCT) to conduct surveys for the unconditional release of "Big Pete," which was used in the removal of "Spacers" from the N-Reactor. Prior to performing surveys on the rear end portion of "Big Pete," it shall be cleaned (i.e., free of oil, grease, caked soil, heavy dust). If no contamination is found, the vehicle may be released with the permission of the area RCT Supervisor. If contamination is found by any of the surveys, contact the cognizant Radiological Engineer for decontamination instructions.

40
(BHI–00874)
Mitigation action plan for the 100-KR-4, 100-HR-3 pump and treat. Weiss, S.G. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 22p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050647. Source: OSTI; NTIS; INIS; GPO Dep.

This project involves drilling 22 wells, improving access roads to existing new wells, laying connecting pipes, and constructing groundwater treatment facilities in the 100-KR-4 and 100-HR-3 Operable Units. These facilities are located at the Hanford Site in Richland, Washington. The drilling is expected to be completed by October 1996, but the treatment operations will continue for approximately 10 years. Thirteen of the new wells are to be placed in the 100-K Area, five in the 100-H Area, and four in the 100-D Area. A 4 km (2.5 mi) pipeline will run from the wells at the 100-D Area to the treatment facility at the 100-H Area. The 116-K-2 Trench received reactor effluents from 1955 to 1971. It is 1,460 m long by 16.4 m wide by 5.5 m deep with spoil pits at the surface on both sides. Washouts occurred during operation, causing several surface contamination areas between the trench and river that were covered with a few feet of soil.

41
(BHI–00884)
Mitigation action plan for 300-FF-1 remedial action. Weiss, S.G. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 18p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050648. Source: OSTI; NTIS; INIS; GPO Dep.

A record of decision was issued (dated July 1996), for remediation of waste sites in the 300-FF-1 Operable Unit in the 300 Area of the Hanford Site. The selected remedies for the 300-FF-1 and 300-FF-5 waste sites include selective excavation and disposal of contaminated soil and debris from the process waste units, excavation and removal of the 618-4 Burial Ground, and institutional controls for groundwater. This mitigation action plan explains how cultural resources will be managed and how revegetation for these remedial activities will be planned.

42
(BHI–00910-Rev.1)
N Area Project Manager's Implementing Instructions (PMII). Revision 1. Greenidge, M.E.; Logan, T.E. Bechtel Hanford, Inc., Richland, WA (United States). Apr 1997. 41p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052818. Source: OSTI; NTIS; INIS; GPO Dep.

These Project Manager's Implementing Instructions provide the performance standards required of all N Area Project personnel in the performance of their duties during field activities (operations) and administrative aspects of the Environmental Restoration Contractor N Area Deactivation and N Basin Cleanout Projects. Strong emphasis is placed on technical competency, work place discipline and personal accountability to ensure the achievement of a high level of safety and performance during all activities.

43
(BHI–00921-Rev.1)
Temporary septic holding tank at the 100-C remedial action restroom facility – Engineering report. Revision 1. Jackson, G.J. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 35p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050650. Source: OSTI; NTIS; INIS; GPO Dep.

The primary mission of the Hanford Site from 1943 to 1990 was to produce nuclear materials for national defense. Waste disposal activities associated with this mission resulted in the creation of more than 1,000 waste sites contaminated with radioactive and chemically hazardous constituents. Investigation and remediation of these waste sites is governed by the Tri-Party Agreement. The 100-C Remedial Action Restroom Trailer Facility will be required near the 105-C Reactor to support the 105-C Interim Storage Project. This project is part of the decommissioning of the eight surplus reactor buildings along the Columbia River in the 100 Area. This facility will be a temporary, modular building sized to provide restroom facilities for the supervisors, engineers, technicians, and raft personnel assigned to the project and engaged in the associated field work. This paper describes the geology and flooding potential, design criteria, operations, and maintenance.

44
(BHI–00924)
Operations and maintenance manual for the temporary septic holding tank at the 300-FF-1 Remedial Action Support Facility. Gilkeson, D.E.; Jackson, G.J. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 31p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052372. Source: OSTI; NTIS; INIS; GPO Dep.

This document provides detailed information regarding the operations and maintenance of the septic holding tank

system at the 300-FF-1 Remedial Action Support Facility, located in the 300 Area. This document includes the type and frequency of requirement maintenance, failure response procedures, and reporting requirements. Sanitary wastewater and raw sewage will enter the holding tank via a sloped 102 mm polyvinyl chloride (PVC) line from the office trailers. The septic holding tank will be emptied, as required, by system demands. During normal usage, it is estimated that the tank will require pumping every 3 working days. Approximately 834 gallons of sanitary wastewater and raw sewage will be disposed of into the septic system during this time.

45
(BHI–00927)
200-ZP-1 operable unit borehole summary report for FY 1995 and FY 1996. Darrach, M.E. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 313p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050596. Source: OSTI; NTIS; INIS; GPO Dep.

This document details the well construction, sampling, analyses, and geologic character of the Ringold Formation fluvial unit E gravels as encountered in 16 boreholes in the 200-ZP-1 Operable Unit. These boreholes were drilled by Water Development Hanford Corporation during fiscal years 1995 and 1996. Two of the sixteen boreholes were abandoned; the remaining 14 boreholes were completed as functioning production and compliance wells. The borehole logs and well summary sheets included as Appendices A and B of this document, respectively, depict and describe the vadose zone stratigraphic units encountered during the course of drilling. Appendix C contains the results of sieve analyses conducted on samples obtained via resonant sonic coring and standard split-spoon methods. The sieve analyses were the driver behind the majority of the well designs. Also, for completeness, Appendices D and E contain the well design calculations and the well development process.

46
(BHI–00930)
Data quality objectives summary report for 105-N Basin sediment disposition. Pisarcik, D.J. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 207p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050598. Source: OSTI; NTIS; INIS; GPO Dep.

During stabilization of the 105-N Basin, sediments that have accumulated on basin surfaces will be vacuumed, collected in the North Cask Pit of the basin complex, and eventually removed. The environmental assessment for the deactivation of the N Reactor Facilities describes two potential disposition paths for the 105-N Basin sediment: transfer in slurry form to a double-shell tank if determined to be a transuranic waste, or disposal in solid form as a low-level waste. Interim storage of the sediments may be required if a transfer to the Tank Waste Remediation System cannot meet scheduled milestones. Selection of a particular alternative depends on the final characterization of the accumulated sediment, regulatory requirements, cost/benefit analyses, and 105-N Stabilization Project schedule requirements. The 105-N Basin Sediment Process is being conducted in two phases. The scope of the first phase includes identification of the sampling requirements, and the specific analyses required to support evaluation of the sediment disposition options. The objectives of the first phase of the 105-N Basin Sediment DQO Process include the following: identify the relevant acceptance criteria for each of the disposition options; and develop a sampling and analysis plan (SAP) sufficiently through to allow evaluation of sediment analysis results against each set of acceptance criteria.

47
(BHI–00931)
Site-specific waste management instruction for the Onsite Measurements Services Organization. Parker, D.L. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050599. Source: OSTI; NTIS; INIS; GPO Dep.

This Site-Specific Waste Management Instruction provides guidance for the management of waste generated as a result of field screening measurements performed by the Onsite Measurements Services Organization. Because this report is not project specific, it is not possible to designate waste streams through this document, other than to assess whether the analyses themselves will cause a waste stream to be designated. Generally, field screening methodologies that do not create dangerous waste are employed instead of those that create dangerous waste. The analyses within the scope of this SSWMI are as follows: VOC analyses of water samples using aqueous headspace analyses; VOC analyses of air samples using soil gas analytical techniques; total uranium analyses of water samples using kinetic phosphorescence analyses; chromate analyses of water samples is using a colorimetric method based on "AccuVac" ampuls manufactured by the Hach Company; nitrate analyses of water samples using paper test strips; conductivity analyses of water samples using electrodes; and sulfate analyses of water samples using a colorimetric method based on "AccuVac" ampuls.

48
(BHI–00932)
1996 Phase 2 soil sampling at the 183-H Solar Evaporation Basin site. Kramer, C.D. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 421p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050600. Source: OSTI; NTIS; INIS; GPO Dep.

This report consolidates 1996 soil sampling data collected from the 183-H Solar Evaporation Basin Site. This report is intended to be a data reference and does not make comparisons or conclusions regarding specific regulatory criteria. Chemical and radiological data were collected to support cleanup activities at the Hanford Site; soil sampling occurred beneath and next to the former basin structures. The 183-H Solar Evaporation Basins, which consisted of four adjoining concrete basins, were located in the 100 Area of the Hanford Site, north of the retired 105-H Reactor. Originally, the basins were built as part of the 100-H water treatment structures. The four basins were inactive from the mid-1960's until 1973 when radioactive and dangerous (mixed) waste from the 300 Area Fuel Fabrication Facility was shipped to the basins for storage and treatment. The basins were used for solar evaporation of the waste. The last shipment of

waste to the 183-H Basins took place in November 1985. Decontamination of the cement structure took place in 1995. The structure has subsequently been dismantled and disposed. Chapters 2.0 through 4.0 present summary information about sampling (1) beneath the loading ramp and berm piles, (2) in shallow soils beneath the former basin floor, and (3) deep vadose soils. Detailed data are provided in the appendices.

49
(BHI–00946)
105-N Fuel Storage Basin dewatering conceptual plan. Schilperoort, D.L. Bechtel Hanford, Inc., Richland, WA (United States). Nov 1996. 23p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050640. Source: OSTI; NTIS; INIS; GPO Dep.

This conceptual plan discusses the processes that will be used for draining and disposing of water from the 105-N Fuel Storage Basin (N Basin), and includes a description of the activities to control surface contamination and potential high dose rates encountered during dewatering. The 105-N Fuel Storage Basin is located in the 100-N Area of the Hanford Site in Richland, Washington. The processes for water disposal include water filtration, water sampling and analysis, tanker loading and unloading, surface decontamination and sealing, and clean out and disposal of residual debris and sediments during final pumping to remove the N Basin water. Water disposal is critical for the deactivation of N Reactor. A Memorandum of Understanding (MOU) between the US Department of Energy (DOE) Environmental Restoration (ER) Program and DOE Waste Management (WM) Program establishes the 200 East Effluent Treatment Facility (ETF) as the final treatment and disposal site for N Basin water and identifies pre-treatment requirements. This MOU states that water delivery will be completed no later than October 31, 1996, and will require a revision due to the current dewatering schedule date. The current MOU requires four micron filtration prior to shipment to ETF. The MOU revision for delivery date extension seeks to have the filtration limit increased to five microns, which eliminates the need for a second filter system and simplifies dewatering. For the purposes of this plan, it will be assumed that five micron filtration will be used.

50
(BHI–00950)
Throughput capacity of the Asbestos Conversion Unit. Hyman, M.H. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 29p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050646. Source: OSTI; NTIS; INIS; GPO Dep.

An engineering assessment is presented for factors that could significantly limit the throughput capacity of the Asbestos Conversion Unit. The assessment focuses mainly on volumetric throughput capacity (and related mass rate and feed density), and energy input. Important conclusions that were reached during this assessment are that the throughput is limited by feed densification capability and that the design energy input rating appears to be adequate.

51
(BHI–00951)
200-UP-1 groundwater pump-and-treat phase I annual report, FY 1996. Myers, D.A.; Denslow, C.W.; Erb, D.B.; Gustafson, F.W.; Green, J.W. Jr.; McMahon, W.J. Bechtel Hanford, Inc., Richland, WA (United States). Nov 1996. 63p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97051693. Source: OSTI; NTIS; INIS; GPO Dep.

A groundwater pump-and-treat system is being operated in the 200-UP-1 Groundwater Operable Unit under the authority of the Hanford Federal Facility Agreement and Consent Order . The purpose of the pump-and- treat system is to accomplish the following: Contain and treat elevated concentrations of uranium and technetium-99 in the groundwater in the 200-UP-1 Groundwater Operable Unit Provide data for evaluation of the aquifer response as a result of the pump-and- treat operations. The 200-UP-1 pump-and-treat site is located on the north side of the 216-U-17 Crib in the 200 West Area of the Hanford Site, located in Richland, Washington. This report summarizes and evaluates treatment, hydrologic, and hydrochemistry data collected for the annual reporting period of 200-UP-1 Phase I pump-and-treat operations (9/25/95 through 9/30/96). Section 2.0 discusses the treatment system performance, Section 3.0 discusses the hydraulic and contaminant response of the aquifer, and Section 4.0 provides recommendations for modifications to the current well configuration and the treatment system.

52
(BHI–00953)
Well summary report: 100-HR-3 and 100-KR-4 interim remedial action wells. Johnson, V.M.; Mehlhorn, M.; Myers, D.A.; Walker, L.D. Bechtel Hanford, Inc., Richland, WA (United States). Dec 1996. 550p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97051696. Source: OSTI; NTIS; INIS; GPO Dep.

The 23 wells described in this summary report were drilled to support interim actions associated with the 100-HR-3 and 100-KR-4 Operable Units. This document provides a summary of data obtained from the wells drilled to support the interim actions. An additional well was added to the scope of the work; that well addresses the recently discovered chromium 'hot spot' in the 100-D Area. Also included are geologic cross-sections ad detailed test data and field logs

53
(BHI–00955)
Readiness evaluation report – High-exposure rate hardware removal resumption of activities. Volkman, C.L. Bechtel Hanford, Inc., Richland, WA (United States). Nov 1996. 103p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050638. Source: OSTI; NTIS; INIS; GPO Dep.

In August 1996, N Basin Project Management proactively ceased activities in the N Basin after noting several radiological control anomalies occurring during the performance of the high exposure rate hardware removal activity. The HERH is one of several activities that will be accomplished to complete deactivation of N Basin. Three project critiques

were performed to identify causes and several corrective actions were identified. To ensure the true causes of the events were identified the N Basin Project Manager requested that a root cause analysis be performed for the events covered by the three critiques. The intent was to identify recurring events and evaluate the effectiveness of corrective action implementation. These three review elements were used by the project to develop a corrective action plan (CAP) which consisted of both project unique and programmatic items. The N Basin Project is using this BHI Readiness Evaluation (RE) process as a mechanism to independently verify that corrective actions identified from the CAP have been completed and that no changes have been made during the stand down that affect the resumption of the HERH activities. A readiness evaluation (RE) plan (Attachment 3) was prepared. The completed Readiness Evaluation Records which documents the results of the team member evaluations are in attachment 1. The independent readiness evaluation team identified 5 deficiencies of which two are post startup and three are pre startup. All deficiencies are in the area of training. These findings are explained in detail in Attachment 2.

54
(BHI–00957)
Environmental restoration contractor facility safety plan – MO-561 100-D site remediation project. Donahoe, R.L. Bechtel Hanford, Inc., Richland, WA (United States). Nov 1996. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050639. Source: OSTI; NTIS; INIS; GPO Dep.

This safety plan is applicable to Environmental Restoration Contractor personnel who are permanently assigned to MO-561 or regularly work in the facility. The MO-561 Facility is located in the 100-D Area at the Hanford Site in Richland, Washington. This plan will: (a) identify hazards potentially to be encountered by occupants of MO-561; (b) provide requirements and safeguards to ensure personnel safety and regulatory compliance; (c) provide information and actions necessary for proper emergency response.

55
(BHI–00961-Rev.1)
Facility transition instruction. Revision 1. Morton, M.R. Bechtel Hanford, Inc., Richland, WA (United States). Mar 1997. 68p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052819. Source: OSTI; NTIS; INIS; GPO Dep.

The Bechtel Hanford, Inc. facility transition instruction was initiated in response to the need for a common, streamlined process for facility transitions and to capture the knowledge and experience that has accumulated over the last few years. The instruction serves as an educational resource and defines the process for transitioning facilities to long-term surveillance and maintenance (S@amp;M). Generally, these facilities do not have identified operations missions and must be transitioned from operational status to a safe and stable configuration for long-term S@amp;M. The instruction can be applied to a wide range of facilities–from process canyon complexes like the Plutonium Uranium Extraction Facility or B Plant, to stand-alone, lower hazard facilities like the 242B/BL facility.

56
(BHI–00962)
Remedial action and waste disposal project – 300-FF-1 remedial action readiness assessment plan. April, J.G.; Carlson, R.A.; Greif, A.A.; Johnson, C.R.; Orewiler, R.I.; Perry, D.M.; Plastino, J.C.; Roeck, F.V.; Tuttle, B.G. Bechtel Hanford, Inc., Richland, WA (United States). Apr 1997. 81p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052815. Source: OSTI; NTIS; INIS; GPO Dep.

This Readiness Assessment Plan presents the methodology used to assess the readiness of the 300-FF-1 Remedial Action Project. Remediation involves the excavation, treatment if applicable, and final disposal of contaminated soil and debris associated with the waste sites in the 300-FF-1 Operable Unit. The scope of the 300-FF-1 remediation is to excavate, transport, and dispose of contaminated solid from sites identified in the 300-FF-1 Operable Unit.

57
(BHI–00968)
Final hazard classification and auditable safety analysis for the N basin segment. Kloster, G.; Smith, R.I.; Larson, A.R.; Duncan, G.M. Bechtel Hanford, Inc., Richland, WA (United States). Dec 1996. 143p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97051697. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to provide the following: To serve as the auditable safety analysis (ASA) for the N Basin Segment, including both the quiescent state and planned intrusive activities. The ASA is developed through the realistic evaluation of potential hazards that envelope the threat to personnel. The ASA also includes the specification of the programmatic, baseline, and activity- specific controls that are necessary for the protection of workers. To determine and document the final hazard classification (FHC) for the N Basin Segment. The FHC is developed through the use of bounding accident analyses that envelope the potential exposures to personnel. The FHC also includes the specification of the special controls that are necessary to remain within the envelope of those accident analyses.

58
(BHI–00990)
Auditable safety analysis for the surveillance and maintenance of the REDOX complex. Cuneo, V.J. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 183p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052428. Source: OSTI; NTIS; INIS; GPO Dep.

The Reduction-Oxidation (REDOX) Complex is an inactive surplus facility that contains two former fuel processing facilities (the 202-S Canyon Building and the 233-S Plutonium Concentration Facility) and a number of ancillary support structures. Deactivation started in 1967 and was completed in 1969 when the plant was transferred to surveillance and maintenance (S&M). This document provides the auditable safety analysis (ASA) for the post-deactivation, long-term S&M phase of the above grade structures of the REDOX Complex. The S&M phase is conducted for the following reasons: (1) Maintain confinement of *residual inventories* of

radioactive materials and other contaminants until the facility is ultimately dispositioned, (2) Prevent deterioration of confinement structures, (3) Respond to potential accident conditions requiring response and mitigation, (4) Provide for the safety of workers involved in the S&M phase, and (5) Provide the basis for evaluation and selection of ultimate disposal alternatives. The ability of the existing facilities to withstand the effects of natural phenomena hazard events is evaluated and the active support systems used to maintain ventilation and/or prevent the spread of contamination are described. This auditable safety analysis document evaluates the routinely required S&M activities (i.e., the S&M of facility barriers, equipment, structures, and postings [including repair and upgrade]; measures to identify, remove, or repair damaged asbestos; measures to identify, remove, or appropriately manage existing containers of hazardous substances; and the performance of spill response measures as needed). For the REDOX Complex, the movement of cell cover blocks is also evaluated, as D-cell cover block was removed a number of years ago and should be replaced. The type and nature of the hazards presented by the REDOX Complex and the REDOX-specific controls required to maintain these hazards to acceptable levels are also discussed.

59
(BHI–00991)
Auditable safety analysis for the surveillance and maintenance of U plant. Cuneo, V.J. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 127p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052427. Source: OSTI; NTIS; INIS; GPO Dep.

This document provides the auditable safety analysis for the post-deactivation, long-term surveillance and maintenance (S&M) phase of the U Plant. The U Plant is an inactive, surplus facility constructed in 1944 as one of three original chemical separations plants. However, U-Plant was never used for its original purpose and was eventually transferred to S&M. In 1957 it was converted to the tributyl phosphate process to recover uranium from the bismuth phosphate process waste. In 1958 it was placed on standby and was used to store inoperable and contaminated equipment from other facilities.This document evaluates the ability of the U Plant to withstand the effects of natural phenomena hazard events and describes the active support systems used to maintain ventilation and/or prevent the spread of contamination. This document also evaluates S&M activities that are routinely required (i.e., the S&M of facility barriers, equipment, structures, and postings [including repair and upgrade]; measures to identify, remove, or repair damaged asbestos; measures to identify, remove, or appropriately manage existing containers of hazardous substances; the performance of spill response measures as needed; and perform nondestructive assaying, waste characterization, and sampling). This document identifies the type and nature of the hazards presented by the U Plant and the specific controls that are required to maintain these hazards at acceptable levels.

60
(BHI–00992)
Auditable safety analysis for the surveillance and maintenance of the 224-B building. Cuneo, V.J. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 103p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052426. Source: OSTI; NTIS; INIS; GPO Dep.

The Plutonium Concentration Facility (224-B Building) is an inactive, surplus facility that operated from 1945 until 1976. This document provides the auditable safety analysis (ASA) for the post-deactivation, long-term surveillance and maintenance phase of the abovegrade structures of the 224-B Building. In this ASA, the ability of the existing facilities to withstand the effects of natural phenomena hazard events is evaluated and the support systems used to maintain ventilation and/or prevent the spread of contamination are described. The purpose of the S&M phase is as follows: Maintain confinement of residual inventories of radioactive materials and other contaminants until the facility is ultimately dispositioned; Prevent deterioration of confinement structures; Respond to potential accident conditions requiring response and mitigation; Provide for the safety of workers involved in the S&M phase; and Provide the basis for evaluation and selection of ultimate disposal alternatives. In this ASA, the ability of the existing facilities to withstand the effects of natural phenomena hazard (NPH) events is evaluated and the support systems used to maintain ventilation and/or prevent the spread of contamination are described. This document also evaluates S&M activities that are routinely required (i.e., the S&M of facility barriers, equipment, structures, and postings [including repair and upgrade]; measures to identify, remove, or repair damaged asbestos; measures to identify, remove, or appropriately manage existing containers of hazardous substances; nondestructive assay, waste characterization and sampling; and the performance of spill response measures as needed). The type and nature of the hazards presented by the 224-B Building and specific controls that are required to maintain these hazards to acceptable levels are also identified.

61
(BHI–01002)
Release survey plan for electrical transformers from 202-S. Shea, K.R. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052430. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this survey plan is to provide direction for the radiological release of electrical transformers No. C2465-E and No. C2466-E oil tanks only, located at the 202-S Canyon Building. This plan does not apply to the switch gear cabinets of each transformer. The transformers are located on the back side of the Reduction Oxidation Plant, on the north side.

62
(BNL–52384(Rev.10/96))
Thermal degradation of concrete in the temperature range from ambient to 315° C (600° F). Revision 10/96. Kassir, M.K.; Bandyopadhyay, K.K.; Reich, M. Brookhaven National Lab., Upton, NY (United States). Oct 1996. 58p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC02-76CH00016. Order Number DE97002782. Source: OSTI; NTIS; INIS; GPO Dep.

This report is concerned with determining the effect of elevated temperatures on the behavior of concrete. Emphasis is placed on quantifying the degree of potential degradation of the physical properties of concrete in high-level waste storage tanks. The temperature elevation range of interest is from ambient to 315 C (600 F). The literature has been reviewed to examine the applicable experimental data and quantify the degradation in the concrete and reinforcing steel. Since many variables and test conditions control the results in the data base, upper and lower bounds of the degraded properties at temperatures applicable to the environments of the storage tanks are summarized and presented in explicit forms. For properties with large data bases, a normal logarithmic distribution of the data is assumed and a statistical analysis is carried out to find the mean and 84% values of the degraded property in the temperature range of interest. Such results are useful in assessing the effect of elevated temperatures on the structural behavior of the tanks. In addition, the results provide the technical basis for a parametric study that may be necessary to investigate the thermal aspects of the structural integrity of the tanks. 50 refs., 23 figs.

63
(BNL–52502)
Dynamic response of cantilever retaining walls. Veletsos, A.S.; Younan, A.H.; Bandyopadhyay, K. Brookhaven National Lab., Upton, NY (United States). Oct 1996. 48p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC02-76CH00016. Order Number DE97002507. Source: OSTI; NTIS; GPO Dep.

A critical evaluation is made of the response to horizontal ground shaking of flexible cantilever retaining walls that are elastically constrained against rotation at their base. The retained medium is idealized as a uniform, linear, viscoelastic stratum of constant thickness and semi-infinite extent in the horizontal direction. The parameters varied include the flexibilities of the wall and its base, the properties of the retained medium, and the characteristics of the ground motion. In addition to long-period, effectively static excitations, both harmonic base motions and an actual earthquake record are considered. The response quantities examined include the displacements of the wall relative to the moving base, the wall pressures, and the associated shears and bending moments. The method of analysis employed is described only briefly, emphasis being placed on the presentation and interpretation of the comprehensive numerical solutions. It is shown that, for realistic wall flexibilities, the maximum wall forces are significantly lower than those obtained for fixed-based rigid walls and potentially of the same order of magnitude as those computed by the Mononobe-Okabe method.

64
(BNL–52519)
Dynamic response of flexible retaining walls. Younan, A.H.; Veletsos, A.S.; Bandyopadhyay, K. Brookhaven National Lab., Upton, NY (United States). Jan 1997. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC02-76CH00016. Order Number DE97003600. Source: OSTI; NTIS; GPO Dep.

Making use of an extension of a recently proposed, relatively simple, approximate method of analysis, a critical evaluation is made of the response to horizontal ground shaking of flexible walls retaining a uniform, linear, viscoelastic stratum of constant thickness and semiinfinite extent in the horizontal direction. Both cantilever and top-supported walls are examined. Following a detailed description of the method and of its rate of convergence, comprehensive numerical solutions are presented that elucidate the action of the system and the effects of the various parameters involved. The parameters varied include the flexibility of the wall, the condition of top support, and the characteristics of the ground motion. The effects of both harmonic base motions and an actual earthquake record are examined. Special attention is paid to the effects of long-period, effectively static excitations. A maximum dynamic response is then expressed as the product of the corresponding static response and an appropriate amplification or deamplification factor. The response quantities examined include the displacements of the wall relative to the moving base, the dynamic wall pressures, and the total wall force, base shear and base moment.

65
(BNL–63030)
Consideration of kinematic interaction in determining seismic responses of underground structures. Xu, J. (City Univ. of New York, NY (United States)); Bandyopadhyay, K.K.; Miller, C.A. Brookhaven National Lab., Upton, NY (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC02-76CH00016. (CONF-960706–20: American Society of Mechanical Engineers (ASME) pressure vessels and piping conference, Montreal (Canada), 21-26 Jul 1996). Order Number DE96010691. Source: OSTI; NTIS; INIS; GPO Dep.

This paper investigates the effect of kinematic interaction on the seismic responses of underground structures through a parametric study. A buried concrete, cylindrical tank, typical of those found in DOE high-level waste sites, was analyzed for the seismic response using the computer program SASSI. The key response parameters were evaluated to identify the potential effects of kinematic interactions The results of the study are presented in this paper.

66
(BNL–63874)
Optimization of radiation protection: a bibliography. Tang, G.R.; Khan, T.A.; Sullivan, S.G. Brookhaven National Lab., Upton, NY (United States). Oct 1996. 52p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC02-76CH00016. Order Number DE97002844. Source: OSTI; NTIS; INIS; GPO Dep.

This document provides a bibliography of radiation protection optimization documents. Abstracts, an author index, and a subject index are provided.

67
(BNL–64613)
Evaluation of selected environmental decision support software. Sullivan, T.M. (Brookhaven National Lab., Upton, NY (United States)); Moskowitz, P.D.; Gitten, M. Brookhaven National Lab., Upton, NY (United States). Jun 1997. 44p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC02-76CH00016. Order Number DE97008741. Source: OSTI; NTIS; INIS; GPO Dep.

Decision Support Software (DSS) continues to be developed to support analysis of decisions pertaining to environmental management. Decision support systems are computer-based systems that facilitate the use of data, models, and structured decision processes in decision making. The optimal DSS should attempt to integrate, analyze, and present environmental information to remediation project managers in order to select cost-effective cleanup strategies. The optimal system should have a balance between the sophistication needed to address the wide range of complicated sites and site conditions present at DOE facilities, and ease of use (e.g., the system should not require data that is typically unknown and should have robust error checking of problem definition through input, etc.). In the first phase of this study, an extensive review of the literature, the Internet, and discussions with sponsors and developers of DSS led to identification of approximately fifty software packages that met the preceding definition.

68
(CONF-960212–74)
Effective use of risk assessments and the public comment process to achieve acceptable remediation goals for mercury-contaminated sites. Miller, J.Q.; Barnett, M. Lockheed Martin Energy Systems, Inc., Oak Ridge, TN (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment; Tucson, AZ (United States); 25-29 Feb 1996. Order Number DE96008680. Source: OSTI; NTIS; INIS; GPO Dep.

As a result of recalculating risk levels using new information, the remediation goals and cleanup strategy for the Lower East Fork Poplar Creek floodplains have been significantly changed to reflect an important reduction in cleanup costs while ensuring protectionof human health and the environment. This project and its stakeholders have made the risk assessment more effective by better defining the contaminant and adjusting assessment parameters. As a result, the remediation goal initially set at 50 ppM Hg has been changed to 400 ppM, resulting in significant reductions in both the destruction of the floodplain landscape and project costs. Volume of soils to be excavated has been decreased from 1 million cubic yards to 25,000 cubic yards, and the cost has been reduced from about $1 billion to less than $20 million. The Record of Decision for Lower East Fork Poplar Creek was approved in August 1995.

69
(CONF-960212–90)
The waste isolation pilot plant regulatory compliance program. Mewhinney, J.A. (U.S. Dept. of Energy, Carlsbad, NM (United States)); Kehrman, R.F. Westinghouse Electric Corp., Carlsbad, NM (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-86AL31950. From Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment; Tucson, AZ (United States); 25-29 Feb 1996. Order Number DE96010277. Source: OSTI; NTIS; INIS; GPO Dep.

The passage of the WIPP Land Withdrawal Act of 1992 (LWA) marked a turning point for the Waste Isolation Pilot Plant (WIPP) program. It established a Congressional mandate to open the WIPP in as short a time as possible, thereby initiating the process of addressing this nation's transuranic (TRU) waste problem. The DOE responded to the LWA by shifting the priority at the WIPP from scientific investigations to regulatory compliance and the completion of prerequisites for the initiation of operations. Regulatory compliance activities have taken four main focuses: (1) preparing regulatory submittals; (2) aggressive schedules; (3) regulator interface; and (4) public interactions

70
(CONF-960271–2)
Disposition of the fluoride fuel and flush salts from the Molten Salt Reactor experiment at Oak Ridge National Laboratory. Peretz, F.J. Oak Ridge National Lab., TN (United States). [1996]. 16p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From American Institute of Chemical Engineers (AIChE) spring meeting; New Orleans, LA (United States); 26-29 Feb 1996. Order Number DE96006708. Source: OSTI; NTIS; INIS; GPO Dep.

The Molten Salt Reactor Experiment (MSRE) is an 8 MW reactor that was operated at Oak Ridge National Laboratory (ORNL) from 1965 through 1969. The reactor used a unique liquid salt fuel, composed of a mixture of LIF, BeF_2, ZrF_4, and UF_4, and operated at temperatures above 600°C. The primary fuel salt circulation system consisted of the reactor vessel, a single fuel salt pump, and a single primary heat exchanger. Heat was transferred from the fuel salt to a coolant salt circuit in the primary heat exchanger. The coolant salt was similar to the fuel salt, except that it contains only LiF (66%) and BeF, (34%). The coolant salt passed from the primary heat exchanger to an air-cooled radiator and a coolant salt pump, and then returned to the primary heat exchanger. Each of the salt loops was provided with drain tanks, located such that the salt could be drained out of either circuit by gravity. A single drain tank was provided for the non-radioactive coolant salt. Two drain tanks were provided for the fuel salt. Since the fuel salt contained radioactive fuel, fission products, and activation products, and since the reactor was designed such that the fuel salt could be drained immediately into the drain tanks in the event of a problem in the fuel salt loop, the fuel salt drain tanks were provided with a system to remove the heat generated by radioactive decay. A third drain tank connected to the fuel salt loop was provided for a batch of flush salt. This batch of salt, similar in composition to the coolant salt, was used to condition the fuel salt loop after it had been exposed to air and to flush the fuel salt loop of residual fuel salt prior to accessing the reactor circuit for maintenance or experimental activities. This report discusses the disposition of the fluoride fuel and flush salt.

71
(CONF-9602110–Summ.)
LLW Forum meeting report, February 13–16, 1996. Afton Associates, Inc., Washington, DC (United States). [1996]. 57p. Sponsored by USDOE, Washington, DC (United States). From Low level radioactive waste meeting; San Diego, CA (United States); 13-16 Feb 1996. Order Number DE96013268. Source: OSTI; NTIS; INIS; GPO Dep.

The Low-Level Radioactive Waste Forum (LLW Forum) is an association of state and compact representatives, appointed by governors and compact commissions, established to facilitate state and compact implementation of the Low-Level Radioactive Waste Policy Act of 1980 and the

Low-Level Radioactive Waste Policy Amendments Act of 1985 and to promote the objectives of low-level radioactive waste regional compacts. The LLW forum provides an opportunity for state and compact officials to share information with one another and to exchange views with officials of federal agencies and other interested parties. This report details activities at the meeting held February 13-16, 1996.

72
(CONF-9603137–2)
An experimental investigation of the reaction of hydrogen chloride with lead oxide under simulated hazardous waste incineration conditions. Shor, J.T. (Oak Ridge National Lab., TN (United States)); Frazier, G.C. Oak Ridge National Lab., TN (United States). 1996. 16p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From Western States section meeting; Tempe, AZ (United States); 11-12 Mar 1996. Order Number DE96008664. Source: OSTI; NTIS; GPO Dep.

To simulate the behavior of lead during hazardous waste incineration, pellets of sintered lead oxide were treated with hydrogen chloride at concentrations of 2000 and 4000 ppm in air in a laboratory tube furnace. The chemical reaction kinetics and mass transfer properties of the solid-gas and solid-liquid reactions were examined at temperatures between 260 and 680°C. Lead dichloride was found to form and became more volatile at elevated temperatures. At temperatures above 300°C, chemical reaction kinetic limitations were absent and mass transfer resistance in the developing liquid lead oxide, lead dichloride eutectic phases were controlling. Above 590°C, a curious anomaly occurred: The observed global reaction rate appeared to increase slightly while the volatilization of lead dichloride dropped during the initial stages of the reaction. A thick film of a lead oxychloride compound was found which displayed low lead dichloride activity. Below 590°C, a different lead oxychloride compound was identified by x-ray diffraction in which lead dichloride activity was high, and this compound was much more volatile than the oxychloride formed above 5900°C.

73
(CONF-9603148–1)
The ORNL Basemapping and Imagery Project: Data collection, processing and dissemination. Tuttle, M.; Pace, P. Oak Ridge National Lab., TN (United States). 1996. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From Geographic Information System (GIS) enviromental management conference; Reno, NV (United States); 13 Mar 1996. Order Number DE96008802. Source: OSTI; NTIS; INIS; GPO Dep.

Over the past three years, the GIS and Computer Modeling (GCM) Group at Oak Ridge National Laboratory (ORNL), has been engaged in creating a very comprehensive geospatial data base for Department of Energy (DOE) installations managed by the DOE Oak Ridge Operations Office (DOE-ORO). This effort encompasses topographic, planimetric, land use/land cover, flood plain, digital elevation, and digital imagery data for the Oak Ridge Reservation (ORR) and surrounding areas. The ORR covers approximately 34,800 acres and includes ORNL, the K-25 Site and the Y-12 Plant. The geographic extent of the Base Mapping and Imagery Project covers the ORR and surrounding area and two other DOE plants (Portsmouth, Ohio and Paducah, Kentucky) for a total of 166,000 acres. The resulting data represent a major improvement in the spatial accuracy and currency of data which are used as a foundation for environmental restoration, facility studies, and other GIS data applications. A GIS data server was also created in order to store and disseminate the new basemapping data. This paper describes the history of the Base Mapping and Imagery Project with emphasis on the logistical aspects of data quality assessment. data tracking, and data product work flow for a large comprehensive spatial data base. The paper then describes the evolution of the GIS data server including its design from an FTP server to a NetScape-based World Wide Web interface. This combination of data and data access provides the ORR environmental community with a carefully configured and managed GIS dataset.

74
(CONF-960477–7)
A new approach to interpretation of airborne magnetic and electromagnetic data. Traynin, P. (Utah Univ., Salt Lake City, UT (United States). Dept. of Geology and Geophysics); Zhdanov, M.; Nyquist, J.; Beard, L.; Doll, W. Oak Ridge National Lab., TN (United States). [1996]. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From 9. annual symposium on the application of geophysics to engineering and environmental problems; Denver, CO (United States); 15 Apr - 1 May 1996. Order Number DE96010641. Source: OSTI; NTIS; INIS; GPO Dep.

The airborne geophysical survey carried out at the Oak Ridge Reservation has shown that AEM can be used in evaluating details of waste areas. However, detection of small objects requires a flight altitude of 10-15 m which is impossible due to natural obstacles present in the Oak Ridge area. In these types of cases, data processing in the downward continuation allows to improve the survey resolution and a normalized gradient provides an additional information about the depth of buried objects.

75
(CONF-960539–2)
Relating groundwater and sediment chemistry to microbial characterization at a BTEX-contaminated site. Pfiffner, S.M. (Oak Ridge National Lab., TN (United States)); Palumbo, A.V.; McCarthy, J.F.; Gibson, T. Oak Ridge National Lab., TN (United States). 1996. 22p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From 18. symposium on biotechnology for fuels and chemicals; Gatlinburg, TN (United States); 5-9 May 1996. Order Number DE96012081. Source: OSTI; NTIS; INIS; GPO Dep.

The National Center for Manufacturing Science is investigating bioremediation of petroleum hydrocarbon at a site in Belleville, Michigan. As part of this study we examined the microbial communities to help elucidate biodegradative processes currently active at the site. We observed high densities of aerobic hydrocarbon degraders and denitrifiers in the less-contaminated sediments. Low densities of iron and sulfate reducers were measured in the same sediments. In contrast, the highly-contaminated sediments showed low densities of aerobic hydrocarbon degraders and denitrifiers and high densities of iron and sulfate reducers. Methanogens were also found in these highly-contaminated sediments. These contaminated sediments also showed a higher biomass, by phospholipid fatty acids, and greater ratios of phospholipid fatty acids which indicate stress within

the microbial community. Aquifer chemistry analyses indicated that the more-contaminated area was more reduced and had lower sulfate than the less-contaminated area. These conditions suggest that the subsurface environment at the highly-contaminated area had progressed into sulfate reduction and methanogensis. The less-contaminated area, although less reduced, also appeared to be progressing into primarily iron- and sulfate-reducing microbial communities. The proposed treatment to stimulate bioremediation includes addition of oxygen and nitrate. Groundwater chemistry and microbial analyses revealed significant differences resulted from the injection of dissolved oxygen and nitrate in the subsurface. These differences included increases in pH and Eh and large decreases in BTEX, dissolved iron, and sulfate concentrations at the injection well.

76
(CONF-9605200–Summ.)
LLW Forum meeting report. Afton Associates, Inc., Washington, DC (United States). [1996]. 70p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. From Low level radioactive waste forum meeting; Annapolis, MD (United States); 29-31 May 1996. Order Number DE96013267. Source: OSTI; NTIS; INIS; GPO Dep.

This report summarizes the Low-Level Radioactive Waste Forum (LLW Forum) meeting on May 29 through May 31, 1996.The LLW Forum is an association of state and compact representatives, appointed by governors and compact commissions, established to facilitate state and compact implementation of the Low-Level Waste Policy Act of 1980 and the Low-Level Radioactive Waste Policy Amendments Act of 1985 and to promote the objectives of low-level radioactive waste regional compacts. The LLW forum provides an opportunity for state and compact officials to share information with one another and to exchange views with officials of federal agencies and other interested parties.

77
(CONF-960648–3)
Factors favorable to public participation success. Peelle, E.; Schweitzer, M.; Munro, J.; Carnes, S.; Wolfe, A. Oak Ridge National Lab., TN (United States). [1996]. 15p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From 21. annual conference of the National Association of Environmental Professionals: practical environmental directions - a changing agenda; Houston, TX (United States); 2-6 Jun 1996. Order Number DE96009635. Source: OSTI; NTIS; INIS; GPO Dep.

Categories of factors linked to successful public participation (PP) program outcomes include PP process, organizational context, sociopolitical context, strategic considerations and unique (special circumstances) factors. We re-order the long list factors according to how essential, important, and unique they are and discuss their significance and interrelationships. It is argued that bureacratic structure and operational modes are basically in conflict with features of successful PP programs (openness, two-way education, communication with nonexpert outsiders). If this is so, then it is not surprising that the factors essential for PP success in bureacracies involve extraordinary management efforts by agencies to bypass, compensate for, or overcome structural constraints. We conclude by speculating about the long-term viability of PP practices in the agency setting as well as the consequences for agencies that attempt the problematic task of introducing PP into their complex, mission-oriented organizations.

78
(CONF-960706–9)
Operations of the LR56 radioactive liquid cask transport system at U.S. Department of Energy sites. Davidson, J.S. (Lockheed Martin Energy Systems, Oak Ridge, TN (United States)); Hornstra, D.J.; Sazawal, V.K.; Clement, G. Lockheed Martin Energy Systems, Inc., Oak Ridge, TN (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From American Society of Mechanical Engineers (ASME) pressure vessels and piping conference; Montreal (Canada); 21-26 Jul 1996. Order Number DE96009102. Source: OSTI; NTIS; INIS; GPO Dep.

The LR56 cask system is licensed for use in France under Certificate of Compliance F/309/B(U)F for transport of 4,000-liter volumes of radioactive liquids. Three LR56 cask systems (with modifications for use at Department of Energy (DOE) sites) have been purchased for delivery at the Hanford Site, Oak Ridge National Laboratory (ORNL), and Savannah River Site (SRS). The LR56 cask systems will be used for on-site transfers of Type B quantities of radioactive liquid waste. The ORNL unit will also be used as a Type A packaging for transfers of radioactive liquids between DOE sites. This paper discusses LR56 operating features and the use of the cask system at the three DOE sites.

79
(CONF-960741–2)
Applying a life cycle decision methodology to Fernald waste management alternatives. Yuracko, K.L. (Oak Ridge National Lab., TN (United States)); Gresalfi, M.; Yerace, P. Oak Ridge National Lab., TN (United States). 1996. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From Pollution prevention conference; Chicago, IL (United States); 9-11 Jul 1996. Order Number DE96011932. Source: OSTI; NTIS; INIS; GPO Dep.

During the past five years, a number of U.S. Department of Energy (DOE) funded efforts have demonstrated the technical efficacy of converting various forms of radioactive scrap metal (RSM) into useable products. From the development of large accelerator shielding blocks, to the construction of low-level waste containers, technology has been applied to this fabrication process in a safe and stakeholder supported manner. The potential health and safety risks to both workers and the public have been addressed. The question remains: can products be fabricated from RSM in a cost efficient and market competitive manner? This paper presents a methodology for use within DOE to evaluate the costs and benefits of recycling and reusing some RSM, rather than disposing of this RSM in an approved burial site. This life cycle decision methodology, developed by both the Oak Ridge National Laboratory (ORNL) and DOE Fernald, is the focus of the following analysis.

80
(CONF-960741–Absts.)
DOE pollution prevention in the 21st century. Argonne National Lab., IL (United States); USDOE Assistant Secretary for Environmental Management, Washington, DC (United States); USDOE Chicago Operations Office, Argonne, IL (United States). [1996]. 159p. Sponsored by

USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. From Pollution prevention conference; Chicago, IL (United States); 9-11 Jul 1996. Order Number DE96013953. Source: OSTI; NTIS; INIS; GPO Dep.

This document presents abstracts of the topics covered in the DOE Pollution Prevention in the 21st Century conference held July 9-11, 1996. These topics include: model facilities; Federal/NEPA/stake- holders; microchemistry; solvents and reduction; education and outreach; return on investments; energy management; decontamination and decommissioning; planning and regulations; environmental restoration; recycling; affirmative procurement in the executive branch; construction and demolition; materials exchange; and ISO 2000.

81
(CONF-9607107–2)
Streamlined environmental remediation characterization using remote sensing techniques: Case studies for the US Department of Energy, Oak Ridge Operations. Carden, D.M. (Department of Energy (DOE), TN (United States). Oak Ridge Operations); Smyre, J.L.; Evers, T.K.; King, A.L. Oak Ridge National Lab., TN (United States). 1996. 13p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From 18. international Society for Photogrammetry and Remote Sensing's congress; Vienna (Austria); 9-19 Jul 1996. Order Number DE96012146. Source: OSTI; NTIS; INIS; GPO Dep.

This paper provides an overview of the DOE Oak Ridge Operations Remote Sensing Program and discusses how data from this program have assisted the environmental restoration program in streamlining site-characterization activities. Three case studies are described where remote sensing imagery has provided a more focused understanding of site problems with a resultant reduction in the need for costly and time-consuming, ground-based sampling approaches.

82
(CONF-9607123–5)
A confirmatory holding time study for purgeable VOCs in water samples. West, O.R. (Oak Ridge National Lab., TN (United States)); Bayne, C.K.; Siegrist, R.L.; Holden, W.H.; Bottrell, D.W. Oak Ridge National Lab., TN (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). From 12. annual waste testing and quality assurance symposium; Washington, DC (United States); 22-24 Jul 1996. Order Number DE96014694. Source: OSTI; NTIS; INIS; GPO Dep.

Analyte stability during pre-analytical storage is essential to the accurate quantification contaminants in environmental samples. This is particularly true for volatile organic compounds (VOCS) which can easily volatilize and/or degrade during sample storage. Recognizing this, regulatory agencies require water samples be collected in vials without headspace and stored at 4 degrees C, and that analyses be conducted within 14 days, 2048 even if samples are acid-preserved. Since the selection of a 14-day holding time was largely arbitrary, the appropriateness of this requirement must be re-evaluated. The goal of the study described here was to provide regulatory agencies with the necessary data to extend the maximum holding time for properly preserved VOC water samples to 28 days.

83
(CONF-960804–11)
Recent experience in planning, packaging and preparing non-commercial spent fuel for shipment within the United States. Johnson, P.E. (Oak Ridge National Lab., TN (United States)); Shappert, L.B.; Turner, D.W. Oak Ridge National Lab., TN (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From SPECTRUM '96: international conference on nuclear and hazardous waste management; Seattle, WA (United States); 18-23 Aug 1996. Order Number DE96009395. Source: OSTI; NTIS; INIS; GPO Dep.

US DOE orders dictate that the aluminium clad fuels now stored at ORNL will be shipped to the Savannah River Site. A number of activities had to be carried out in order to ready the fuel for shipping, including choosing a cask capable of transporting the fuel, repackaging the fuel, developing a transportation plan, identifying the appropriate routes, and carrying out a readiness self assessment. These tasks have been successfully completed and are discussed herein.

84
(CONF-960804–12)
Potential benefits and impacts on the CRWMS transportation system of filling spent fuel shipping casks with depleted uranium silicate glass. Pope, R.B.; Forsberg, C.W.; DeHart, M.D.; Childs, K.W.; Tang, J.S. Oak Ridge National Lab., TN (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From SPECTRUM '96: international conference on nuclear and hazardous waste management; Seattle, WA (United States); 18-23 Aug 1996. Order Number DE96009394. Source: OSTI; NTIS; INIS; GPO Dep.

A new technology, the Depleted Uranium Silicate COntainer Fill System (DUSCOFS), is proposed to improve the performance and reduce the uncertainties of geological disposal of spent nuclear fuel (SNF), thus reducing both radionuclide release rates from the waste package and the potential for repository nuclear criticality events. DUSCOFS may also provide benefits for SNF storage and transport if it is loaded into the container early in the waste management cycle. Assessments have been made of the benefits to be derived by placing depleted uranium silicate (DUS) glass into SNF containers for enhancing repository performance assessment and controlling criticality over geologic times in the repository. Also, the performance, benefits, and impacts which can be derived if the SNF is loaded into a multi-purpose canister with DUS glass at a reactor site have been assessed. The DUSCOFS concept and the benefits to the waste management cycle of implementing DUSCOFS early in the cycle are discussed in this paper.

85
(CONF-9609234–2)
Magnetic flocculation and filtration. Yiacoumi, Sotira (Georgia Inst. of Tech., Atlanta, GA (United States). School of Civil and Environmental Engineering); Chin, Ching-Ju; Yin, Tung-Yu; Tsouris, C., DePaoli, D.W.; Chattin, M.R.; Spurrier, M. Oak Ridge National Lab., TN (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From American Chemical Society special symposium on Industrial & engineering chemistry; Birmingham, AL (United States); 9-12 Sep 1996. Order Number DE96014597. Source: OSTI; NTIS; GPO Dep.

A model is available in predicting flocculation frequencies between particles of various properties under the influence of a magnetic field. This model provides a basic understanding of fundamental phenomena, such as particle-particle and particle-collector interactions, occurring in HGMF (high gradient magnetic field), and will be extended to describe experimental data of particle flocculation and filtration and predict the performance of high- gradient magnetic filters. It is also expected that this model will eventually lead to a tool for design and optimization of magnetic filters for environmental, metallurgical, biochemical, and other applications.

86
(CONF-961089–1)
ELIPGRID-PC and INRADS©: Tools for reducing costs and optimizing data collection on sites contaminated with NORM. Egidi, P.V. Oak Ridge National Lab., Grand Junction, CO (United States). [1996]. 8p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. From Beneficial Reuse '96: 4. annual conference on the recycle and reuse of radioactive scrap metal; Knoxville, TN (United States); 22-24 Oct 1996. Order Number DE97001363. Source: OSTI; NTIS; INIS; GPO Dep.

Oak Ridge National Laboratory (ORNL), Environmental Technology Section (ETS), located in Grand Junction, Colorado has more than ten years experience in radiological surveying and more than twenty years as part of the ongoing Formerly Utilized Sites Remedial Action Project surveys conducted by ORNL Health Sciences Research Division. As part of our mission, ETS researchers develops and applies innovative technologies to share with private industry. The ELIPGRID-PC software and INRADS multidetector radiologic survey instrument are works in progress are discussed. ELIPGRID-PC is a tool that aids in survey design, and the INRADS system automates and increases the amount of data collected.

87
(CONF-961103–19)
Nuclear criticality safety modeling of an LEU deposit. Haire, M.J.; Elam, K.R.; Jordan, W.C.; Dahl, T.L. Oak Ridge National Lab., TN (United States). 1996. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From Winter meeting of the American Nuclear Society (ANS) and the European Nuclear Society (ENS); Washington, DC (United States); 10-14 Nov 1996. Order Number DE97000026. Source: OSTI; NTIS; INIS; GPO Dep.

The construction of the Oak Ridge Gaseous Diffusion Plant (now known as the K-25 Site) began during World War H and eventually consisted of five major process buildings: K-25, K-27, K-29, K-31, and K-33. The plant took natural (0.711% ^{231}U) uranium as feed and processed it into both low-enriched uranium (LEU) and high-enriched uranium (HEU) with concentrations up to ~93% ^{231}U. The K-25 and K-27 buildings were shut down in 1964, but the rest of the plant produced LEU until 1985. During operation, inleakage of humid air into process piping and equipment caused reactions with gaseous uranium hexafluoride (UF_6) that produced nonvolatile uranyl fluoride (UO_2F_2) deposits. As part of shutdown, most of the uranium was evacuated as volatile UF_6. The UO_2F_2 deposits remained. The U.S. Department of Energy has mitiated a program to unprove nuclear criticality safety by removing the larger enriched uranium deposits.

88
(CONF-961113–12)
A fieldable instrument for waterborne radionuclide detection. Barshick, C.M. (Oak Ridge National Lab., TN (United States)); Turner, M.L.; Smith, D.H.; Patch, K.D. Oak Ridge National Lab., TN (United States); Thermo Power Corp., Waltham, MA (United States). Tecogen Div. [1996]. 12p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464 ; AR21-95MC32088. From Photonics East '96: International Society for Optical Engineering (SPIE) conference and exhibition on photonic sensors and controls for commercial applications; Boston, MA (United States); 19-21 Nov 1996. Order Number DE97001370. Source: OSTI; NTIS; GPO Dep.

In monitoring effluent leaving its sites, US DOE assays for alpha- emitting radionuclides (U, transuranics) to ensure compliance with regulatory limits. Because alpha emissions can only by detected over a short range in water (~40μm), the conventional approach is to collect samples for processing in a central laboratory; a time-consuming and cost procedure ensues to separate and measure the radionuclides. Because of the sporadic nature of sampling processes, there is the possibility that a release may go undetected. We are addressing this issue by a developing a real-time, field- deployable instrument which incorporates a proprietary film that selectively binds radionuclides from dilute aqueous samples. By combining the film with an appropriate alpha spectrometer, we have developed a fieldable system that can operate as an autonomous monitor in a batch or continuous manner. Laboratory results to date have been encouraging. Positive identification of U and Pu has been made by resolving the energy spectrum of emitted alphas. Sensitivity for U is at the 10 part per trillion level (15 femtocuries per liter).

89
(CONF-9611157–)
Pacific Basin conference on hazardous waste: Proceedings. Argonne National Lab., IL (United States). [1996]. 706p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States);Environmental Protection Agency, Washington, DC (United States). DOE Contract W-31109-ENG-38. From 1996 Pacific Basin conference on hazardous waste; Kuala Lumpur (Malaysia); 4-8 Nov 1996. Order Number DE97009015. Source: OSTI; NTIS; GPO Dep.

This conference was held November 4–8, 1996 in Kuala Lumpur, Malaysia. The purpose of this conference was to provide a multidisciplinary forum for exchange of state-of-the-art information on the problems of hazardous waste. Topics of discussion deal with pollution prevention, waste treatment technology, health and ecosystem effects research, analysis and assessment, and regulatory management techniques. Individual papers have been processed separately for inclusion in the appropriate data bases.

90
(CONF-970148–2)
Development and testing of spheroidal inorganic sorbents. Collins, J.L.; Egan, B.Z.; Anderson, K.K. Oak Ridge National Lab., TN (United States). 3 Dec 1996. 8p. Sponsored by USDOE Office of Environmental Restoration and

Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. From Efficient Separations and Processing (ESP) Crosscutting Program FY 1997 technical exchange meeting; Gaithersburg, MD (United States); 28-30 Jan 1997. Order Number DE97001738. Source: OSTI; NTIS; INIS; GPO Dep.

Objective was to develop sodium titanate (ST) microspheres, made by the HMTA (hexamethylenetetramine) internal gelation process, to remove radionuclides and heavy metals from waste streams at DOE sites. to determine the optimum amount of ST that can be embedded in hydrous Ti oxide (HTO) microspheres, batches of 9.2 to 23.3% ST in HTO were prepared. Crush strength of the air-dried microspheres was found to be highest. Sr was removed from simulated supernatant by all composite microspheres; 13.2% ST/HTO worked best.

91
(DOE/AL/62350–24F-REV.1-ATTACH.4)
Water resources protection strategy: Revision 1, Attachment 4. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). 10 Dec 1996. 98p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97002321. Source: OSTI; NTIS; INIS; GPO Dep.

The US Department of Energy (DOE) must provide a demonstration of compliance with the final US Environmental Protection Agency (EPA) ground water protection standards for inactive mill sites pursuant to 40 CFR Part 192. This plan outlines the proposed strategy to demonstrate compliance with the ground water standards at the Maybell, Colorado, Uranium Mill Tailings Remedial Action (UMTRA) Project site. This demonstration consists of (1) the ground water protection standard, (2) a performance assessment, (3) a closure performance demonstration, and (4) a performance monitoring and corrective action program.

92
(DOE/AL/62350–187-COMM.)
Comment and response document for the long-term surveillance plan for the Falls City disposal site, Falls City, Texas. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Nov 1996. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97001632. Source: OSTI; NTIS; INIS; GPO Dep.

This is the Comment and Response Document dated November 1996 for the Long-Term Surveillance Plan for the Falls City Disposal Site in Falls City, Texas. The site is part of the U.S. DOE's Uranium Mill Tailings Remedial Action Project (UMTRA). Several comments regarding the hydrology and surface erosion described in the Long-Term Surveillance Plan are addressed in this document.

93
(DOE/AL/62350–207-Rev.2(6/97))
Long-term surveillance plan for the Mexican Hat disposal site Mexican Hat, Utah. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Jun 1997. 50p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE98000108. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Mexican Hat, Utah, disposal site. This LSTP describes the long-term surveillance program the DOE will implement to ensure the Mexican Hat disposal site performs as designed and is cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed for custody and long-term care, the Nuclear Regulatory Commission (NRC) requires the DOE to submit such a site-specific LTSP.

94
(DOE/AL/62350–222-Rev.2)
Long-term surveillance plan for the Gunnison, Colorado, disposal site. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Apr 1997. 62p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97007528. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Gunnison disposal site in Gunnison County, Colorado. The U.S. Nuclear Regulatory Commission (NRC) has developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites will be cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the Gunnison disposal site. The general license becomes effective when the NRC concurs with the DOE's determination of completion of remedial action for the Gunnison site and the NRC formally accepts this LTSP. This LTSP describes the long-term surveillance program the DOE will implement to ensure that the Gunnison disposal site performs as designed. The program is based on two distinct activities: (1) site inspections to identify threats to disposal cell integrity, and (2) ground water monitoring to demonstrate disposal cell performance. The LTSP is based on the UMTRA Project long-term surveillance program guidance and meets the requirements of 10 CFR §40.27(b) and 40 CFR §192.03.

95
(DOE/AL/62350–228-Rev.2)
Long-term surveillance plan for the South Clive disposal site Clive, Utah. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Sep 1997. 35p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE98000107. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project South Clive disposal site in Clive, Utah. This LSTP describes the long-term surveillance program the DOE will implement to ensure the South Clive disposal site performs as designed and is cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed for custody and long-term care, the

Nuclear Regulatory Commission (NRC) requires the DOE to submit such a site-specific LTSP.

96
(DOE/AL/62350–236(3/97))
Long-term surveillance plan for the Burro Canyon disposal cell Slick Rock, Colorado. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Mar 1997. 35p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97006377. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Burro Canyon disposal cell in San Miguel County, Colorado. The U.S. Nuclear Regulatory Commission (NRC) developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites are cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the Burro Canyon disposal cell. The general license becomes effective when the NRC concurs with the DOE's determination that remedial action is complete at the Burro Canyon disposal cell and the NRC formally accepts this LTSP. Attachment 1 contains the concurrence letters from NRC. This LTSP describes the long-term surveillance program the DOE has implemented to ensure that the Burro Canyon disposal cell performs as designed. The program is based on site inspections to identify threats to disposal cell integrity. Ground water monitoring will not be required at the Burro Canyon disposal cell because the ground water protection strategy is supplemental standards based on low yield from the uppermost aquifer. The LTSP is based on the UMTRA Project's long-term surveillance program guidance and meets the requirements of 10 CFR 40.27(b) and 40 CFR 192.03.

97
(DOE/AL/62350–236(8/97))
Long-term surveillance plan for the Burro Canyon disposal cell Slick Rock, Colorado. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Aug 1997. 43p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE98000106. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Burro Canyon disposal cell in San Miguel County, Colorado. This LSTP describes the long-term surveillance program the DOE will implement to ensure the Burro Canyon disposal cell performs as designed and is cared for in a manner that protects the public health and safety and the environment. The program is based on site inspections to identify threats to disposal cell integrity. Before each disposal cell is licensed for custody and long-term care, the Nuclear Regulatory Commission (NRC) requires the DOE to submit such a site-specific LTSP.

98
(DOE/AL/62350–237)
1996 monitoring report for the Gunnison, Colorado, wetlands mitigation plan. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Dec 1996. 71p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97001793. Source: OSTI; NTIS; INIS; GPO Dep.

The US Department of Energy (DOE) administers the Uranium Mill Tailings Remedial Action (UMTRA) Project to clean up uranium mill tailings and other surface contamination at 24 abandoned uranium mill sites in 10 states. One of these abandoned mill sites was near the town of Gunnison, Colorado. Surface remediation was completed at the Gunnison site in December 1995. Remedial action resulted in the elimination of 4.3 acres of wetlands and mitigation of this loss is through the enhancement of 17.8 acres of riparian plant communities in six spring-fed areas on US Bureau of Land Management mitigation sites. A five-year monitoring program was then implemented to document the response of vegetation and wildlife to the exclusion of livestock. This report provides the results of the third year of the monitoring program.

99
(DOE/AL/62350–240-Rev.1)
Final audit report of remedial action construction at the UMTRA project site Rifle, Colorado. Rev. 1. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Jan 1997. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97007529. Source: OSTI; NTIS; INIS; GPO Dep.

This final audit report summarizes the assessments performed by the U.S. Department of Energy (DOE) Environmental Restoration Division (ERD) and its Technical Assistance Contractor (TAC) of remedial action compliance with approved plans, specifications, standards, and 40 CFR Part 192 at the Rifle, Colorado, Uranium Mill Tailings Remedial Action (UMTRA) Project site. Remedial action construction was directed by the Remedial Action Contractor (RAC).

100
(DOE/AL/62350–242)
Wildlife mitigation and monitoring report Gunnison, Colorado, site. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Apr 1997. 40p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97007527. Source: OSTI; NTIS; INIS; GPO Dep.

The Uranium Mill Tailings Remedial Action (UMTRA) Project is administered by the U.S. Department of Energy (DOE); its purpose is to cleanup uranium mill tailings and other contaminated material at 24 UMTRA Project sites in 10 states. This report summarizes the wildlife mitigation and monitoring program under way at the Gunnison UMTRA Project, Gunnison, Colorado. Remedial action at the Gunnison site was completed in December 1995 and is described in detail in the Gunnison completion report. The impacts of this activity were analyzed in the Gunnison environmental assessment (EA). These impacts included two important

game species: the pronghorn antelope (Antilocapra americans) and sage grouse (Wentrocerus urophasianus). Haul truck traffic was predicted to limit antelope access to water sources north of the Tenderfoot Mountain haul road and that truck traffic along this and other haul roads could result in antelope road kills. Clearing land at the disposal cell, haul road and borrow site activities, and the associated human activities also were predicted to negatively impact (directly and indirectly) sage grouse breeding, nesting, loafing, and wintering habitat. As a result, an extensive mitigation and monitoring plan began in 1992. Most of the monitoring studies are complete and the results of these studies, written by different authors, appear in numerous reports. This report will: (1) Analyze existing impacts and compare them to predicted impacts. (2) Summarize mitigation measures. (3) Summarize all existing monitoring data in one report. (4) Analyze the effectiveness of the mitigation measures.

101
(DOE/AL/62350–243(7/97))
Long-term surveillance plan for the Cheney disposal site near Grand Junction, Colorado. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Jul 1997. 43p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE98000110. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Cheney Disposal Site near Grand Junction, Colorado. This LSTP describes the long-term surveillance program the DOE will implement to ensure the Cheney Disposal Site performs as designed and is cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed for custody and long-term care, the Nuclear Regulatory Commission (NRC) requires the DOE to submit such a site-specific LTSP.

102
(DOE/AL/62350–243(8/97))
Interim long-term surveillance plan for the Cheney disposal site near, Grand Junction, Colorado. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Aug 1997. 42p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE98000109. Source: OSTI; NTIS; INIS; GPO Dep.

This interim long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Cheney Disposal Site in Mesa County near Grand Junction, Colorado. This LSTP describes the long-term surveillance program the DOE will implement to ensure the Cheney disposal site performs as designed and is cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed for custody and long-term care, the Nuclear Regulatory Commission (NRC) requires the DOE to submit such a site-specific LTSP.

103
(DOE/AL/62350–T12-Rev.1)
Comment and response document for the long-term surveillance plan for the Falls City Disposal Site, Falls City, Texas. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Oct 1996. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97001056. Source: OSTI; NTIS; INIS; GPO Dep.

This document contains the comments made by the US Nuclear Regulatory Commission on the Department of Energy's (DOE) Long-Term Surveillance Plan for the Falls City Disposal Site, Falls City, Texas. DOE's responses to the comments are also included.

104
(DOE/AL/62350–T15)
Fiscal year 1996 annual report to stakeholders, Uranium Mill Tailings Remedial Action Project. USDOE Assistant Secretary for Environmental Management, Washington, DC (United States). 1 Oct 1996. 35p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE98000660. Source: OSTI; NTIS; INIS; GPO Dep.

This is the Fiscal Year (FY) 1996 annual report on the status of the US Department of Energy's (DOE) Uranium Mill Tailings Remedial Action (UMTRA) Project. In 1978, Congress directed the DOE to assess and clean up contamination at 24 designated former uranium processing sites. The DOE is also responsible for cleaning up properties in the vicinity of the sites where wind and water erosion deposited tailings or people removed them from the site for use in construction of landscaping. Cleanup is being undertaken in cooperation with state governments and Indian tribes within whose boundaries the sites are located. It is being conducted in two phases: the surface project and the ground water project. This report addresses specifics about the surface phase of the UMTRA Project.

105
(DOE/CH/10849–T2)
Focus group report, Part I. Virginia Polytechnic Inst. and State Univ., Blacksburg, VA (United States). Waste Policy Inst. Jul 1997. 38p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FC02-96CH10849. Order Number DE97009338. Source: OSTI; NTIS; INIS; GPO Dep.

The Waste Policy Institute, through a cooperative agreement with the U.S. Department of Energy's (DOE) Office of Science and Technology (OST), conducted two focus groups with people who live or work near DOE sites. The purpose of the focus groups was to gain a better understanding of the general community's information needs about the development of innovative technologies that are used in the cleanup of the sites. The authors wanted to better understand of what role these people want to play in the development of new technologies, how OST communication products can help facilitate that role, and the usefulness of current OST communication products. WPI held the focus groups in communities near the Idaho National Engineering and Environmental Laboratory (INEEL) and the Savannah River Site (SRS) because they are among the DOE sites that cannot be cleaned up before 2006. To include many facets of the communities, WPI randomly selected participants from membership lists of organized groups in each community including: elected officials, school boards, unions, chambers of commerce, economic development organizations,

environmental organizations, health and human service organizations, and area clergy. While in the communities, WPI also interviewed stakeholders such as tribal representatives and a Citizens Advisory Board (CAB) member. Qualitative data gathered during the focus group sessions give some indication of general stakeholder opinions. However, the authors caution readers not to make broad assumptions about the general stakeholder audience based on the opinions of a limited number of general community stakeholders.

106
(DOE/EA–1217)
Environmental Assessment – Test Area North pool stabilization project update. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Aug 1997. 36p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050423. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this Environmental Assessment (EA) is to update the "Test Area North Pool Stabilization Project" EA (DOE/EA-1050) and finding of no significant impact (FONSI) issued May 6, 1996. This update analyzes the environmental and health impacts of a drying process for the Three Mile Island (TMI) nuclear reactor core debris canisters now stored underwater in a facility on the Idaho National Engineering and Environmental Laboratory (INEEL). A drying process was analyzed in the predecision versions of the EA released in 1995 but that particular process was determined to be ineffective and dropped from the EA/FONSI issued May 6, 1996. A new drying process was subsequently developed and is analyzed in Section 2.1.2 of this document. As did the 1996 EA, this update analyzes the environmental and health impacts of removing various radioactive materials from underwater storage, dewatering these materials, constructing a new interim dry storage facility, and transporting and placing the materials into the new facility. Also, as did the 1996 EA, this EA analyzes the removal, treatment and disposal of water from the pool, and placement of the facility into a safe, standby condition. The entire action would take place within the boundaries of the INEEL. The materials are currently stored underwater in the Test Area North (TAN) building 607 pool, the new interim dry storage facility would be constructed at the Idaho Chemical Processing Plant (ICPP) which is about 25 miles south of TAN.

107
(DOE/EA–1217-Draft)
Draft environmental assessment – Test Area North pool stabilization project update. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Jun 1997. 43p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050440. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this Environmental Assessment (EA) is to update the "Test Area North Pool Stabilization Project" EA (DOE/EA-1050) and finding of no significant impact (FONSI) issued May 6, 1996. This update analyzes the environmental and health impacts of a drying process for the Three Mile Island (TMI) nuclear reactor core debris canisters now stored underwater in a facility on the Idaho National Engineering and Environmental Laboratory (INEEL). A drying process was analyzed in the predecision versions of the EA released in 1995 but that particular process was determined to be ineffective and dropped form the Ea/FONSI issued May 6, 1996. The origin and nature of the TMI core debris and the proposed drying process are described and analyzed in detail in this EA. As did the 1996 EA, this update analyzes the environmental and health impacts of removing various radioactive materials from underwater storage, dewatering these materials, constructing a new interim dry storage facility, and transporting and placing the materials into the new facility. Also, as did the 1996 EA, this EA analyzes the removal, treatment and disposal of water from the pool, and placement of the facility into a safe, standby condition. The entire action would take place within the boundaries of the INEEL. The materials are currently stored underwater in the Test Area North (TAN) building 607 pool, the new interim dry storage facility would be constructed at the Idaho Chemical Processing Plant (ICPP) which is about 25 miles south of TAN.

108
(DOE/EIS–0026-S-2-Summ.)
Waste Isolation Pilot Plant disposal phase final supplemental environmental impact statement. Summary. USDOE Carlsbad Area Office, NM (United States). Sep 1997. 87p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE98000782. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the Waste Isolation Pilot Plant Disposal Final Supplemental Environmental Impact Statement (SEIS-II) is to provide information on environmental impacts regarding the Department of Energy's (DOE) proposed disposal operations at WIPP. The Proposed Action describes the treatment and disposal of the Basic inventory of TRU waste over a 35-year period. The Action Alternatives proposed the treatment of the Basic Inventory and an Additional Inventory as well as the transportation of the treated waste to WIPP for disposal over a 150- to 190-year period. The three Action Alternatives include the treatment of TRU waste at consolidation sites to meet WIPP planning-basic Waste Acceptance Criteria, the thermal treatment of TRU waste to meet Land Disposal Restrictions, and the treatment of TRU waste by a shred and grout process. SEIS-II evaluates environmental impacts resulting from the various treatment options; the transportation of TRU waste to WIPP using truck, a combination of truck and regular rail service, and a combination of truck and dedicated rail service; and the disposal of this waste in the repository. Evaluated impacts include those to the general environment and to human health. Additional issues associated with the implementation of the alternatives are discussed to provide further understanding of the decisions to be reached and to provide the opportunity for public input on improving DOE's Environmental Management Program.

109
(DOE/EIS–0026-S-2-Vol.1)
Waste Isolation Pilot Plant disposal phase final supplemental environmental impact statement. Volume 1, Chapters 1–6. USDOE Carlsbad Area Office, NM (United States). Sep 1997. 457p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE98000783. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the Waste Isolation Pilot Plant Disposal Final Supplemental Environmental Impact Statement (SEIS-II) is to provide information on environmental impacts regarding

the Department of Energy's (DOE) proposed disposal operations at WIPP. The Proposed Action describes the treatment and disposal of the Basic inventory of TRU waste over a 35-year period. The Action Alternatives proposed the treatment of the Basic Inventory and an Additional Inventory as well as the transportation of the treated waste to WIPP for disposal over a 150- to 190-year period. The three Action Alternatives include the treatment of TRU waste at consolidation sites to meet WIPP planning-basic Waste Acceptance Criteria, the thermal treatment of TRU waste to meet Land Disposal Restrictions, and the treatment of TRU waste by a shred and grout process. SEIS-II evaluates environmental impacts resulting from the various treatment options; the transportation of TRU waste to WIPP using truck, a combination of truck and regular rail service, and a combination of truck and dedicated rail service; and the disposal of this waste in the repository. Evaluated impacts include those to the general environment and to human health. Additional issues associated with the implementation of the alternatives are discussed to provide further understanding of the decisions to be reached and to provide the opportunity for public input on improving DOE's Environmental Management Program. Chapters 1–6 include an introduction, background information, description of the proposed action and alternatives, description of the affected environments, environmental impacts, and consultations and permits.

110
(DOE/EIS–0026-S-2-Vol.2)
Waste Isolation Pilot Plant disposal phase final supplemental environmental impact statement. Volume 2: Appendices. USDOE Carlsbad Area Office, NM (United States). Sep 1997. 619p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE98000784. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the Waste Isolation Pilot Plant Disposal Final Supplemental Environmental Impact Statement (SEIS-II) is to provide information on environmental impacts regarding the Department of Energy's (DOE) proposed disposal operations at WIPP. The Proposed Action describes the treatment and disposal of the Basic inventory of TRU waste over a 35-year period. The Action Alternatives proposed the treatment of the Basic Inventory and an Additional Inventory as well as the transportation of the treated waste to WIPP for disposal over a 150- to 190-year period. The three Action Alternatives include the treatment of TRU waste at consolidation sites to meet WIPP planning-basic Waste Acceptance Criteria, the thermal treatment of TRU waste to meet Land Disposal Restrictions, and the treatment of TRU waste by a shred and grout process. SEIS-II evaluates environmental impacts resulting from the various treatment options; the transportation of TRU waste to WIPP using truck, a combination of truck and regular rail service, and a combination of truck and dedicated rail service; and the disposal of this waste in the repository. Evaluated impacts include those to the general environment and to human health. Additional issues associated with the implementation of the alternatives are discussed to provide further understanding of the decisions to be reached and to provide the opportunity for public input on improving DOE's Environmental Management Program. This volume contains the following appendices: Waste inventory; Summary of the waste management programmatic environmental impact statement and its use in determining human health impacts at treatment sites; Air quality; Life-cycle costs and economic impacts; Transportation; Human health; Facility accidents; Long-term consequence analysis for proposed action and action alternatives; Long-term consequence analysis for no action alternative 2; and Updated estimates of the DOE's transuranic waste volumes.

111
(DOE/EIS–0026-S-2-Vol.3)
Waste Isolation Pilot Plant disposal phase final supplemental environmental impact statement. Volume 3: Comment response document. USDOE Carlsbad Area Office, NM (United States). Sep 1997. 579p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE98000785. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the Waste Isolation Pilot Plant Disposal Final Supplemental Environmental Impact Statement (SEIS-II) is to provide information on environmental impacts regarding the Department of Energy's (DOE) proposed disposal operations at WIPP. The Proposed Action describes the treatment and disposal of the Basic inventory of TRU waste over a 35-year period. The Action Alternatives proposed the treatment of the Basic Inventory and an Additional Inventory as well as the transportation of the treated waste to WIPP for disposal over a 150- to 190-year period. The three Action Alternatives include the treatment of TRU waste at consolidation sites to meet WIPP planning-basic Waste Acceptance Criteria, the thermal treatment of TRU waste to meet Land Disposal Restrictions, and the treatment of TRU waste by a shred and grout process. SEIS-II evaluates environmental impacts resulting from the various treatment options; the transportation of TRU waste to WIPP using truck, a combination of truck and regular rail service, and a combination of truck and dedicated rail service; and the disposal of this waste in the repository. Evaluated impacts include those to the general environment and to human health. Additional issues associated with the implementation of the alternatives are discussed to provide further understanding of the decisions to be reached and to provide the opportunity for public input on improving DOE's Environmental Management Program. This volume provides responses to public comments on the Draft SEIS-II. Comments are related to: Alternatives; TRU waste; DOE credibility; Editorial; Endorsement/opposition; Environmental justice; Facility accidents; Generator site operations; Health and safety; Legal and policy issues; NEPA process; WIPP facilities; WIPP waste isolation performance; Purpose and need; WIPP operations; Site characterization; Site selection; Socioeconomics; and Transportation.

112
(DOE/EIS–0200-F-Summ.)
Final waste management programmatic environmental impact statement for managing treatment, storage, and disposal of radioactive and hazardous waste. Summary. USDOE Assistant Secretary for Environmental Management, Washington, DC (United States). May 1997. 132p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97007517. Source: OSTI; NTIS; INIS; GPO Dep.

This Waste Management Programmatic Environmental Impact Statement (WM PEIS) is a nationwide study examining the environmental impacts of managing five types of radioactive and hazardous wastes generated by past and future nuclear defense and research activities at a variety of

sites located around the United States. The five waste types are low-level mixed waste (LLMW), low-level waste (LLW), transuranic waste (TRUW), high-level waste (HLW), and hazardous waste (HW).

113
(DOE/EIS–0200-F-Vol.1)
Final waste management programmatic environmental impact statement for managing treatment, storage, and disposal of radioactive and hazardous waste. Volume I of V. USDOE Assistant Secretary for Environmental Management, Washington, DC (United States). May 1997. 1022p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97007518. Source: OSTI; NTIS; INIS; GPO Dep.

The Final Waste Management Programmatic Environmental Impact Statement (WM PEIS) examines the potential environmental and cost impacts of strategic management alternatives for managing five types of radioactive and hazardous wastes that have resulted and will continue to result from nuclear defense and research activities at a variety of sites around the United States. The five waste types are low-level mixed waste, low-level waste, transuranic waste, high-level waste, and hazardous waste. The WM PEIS provides information on the impacts of various siting alternatives which the Department of Energy (DOE) will use to decide at which sites to locate additional treatment, storage, and disposal capacity for each waste type. This information includes the cumulative impacts of combining future siting configurations for the five waste types and the collective impacts of other past, present, and reasonably foreseeable future activities. The selected waste management facilities being considered for these different waste types are treatment and disposal facilities for low-level mixed waste; treatment and disposal facilities for low-level waste; treatment and storage facilities for transuranic waste in the event that treatment is required before disposal; storage facilities for treated (vitrified) high-level waste canisters; and treatment of nonwastewater hazardous waste by DOE and commercial vendors. In addition to the no action alternative, which includes only existing or approved waste management facilities, the alternatives for each of the waste type configurations include decentralized, regionalized, and centralized alternatives for using existing and operating new waste management facilities. However, the siting, construction and operations of any new facility at a selected site will not be decided until completion of a sitewide or project-specific environmental impact review.

114
(DOE/EM–0324)
EM international activities. February 1997 highlights. USDOE Assistant Secretary for Environmental Management, Washington, DC (United States). Feb 1997. 25p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97004016. Source: OSTI; NTIS; GPO Dep.

EM International Highlights is a brief summary of on-going international projects within the Department of Energy's Office of Environmental Management (EM). This document contains sections on: Global Issues, activities in Western Europe, activities in central and Eastern Europe, activities in Russia, activities in Asia and the Pacific Rim, activities in South America, activities in North America, and International Organizations.

115
(DOE/EM–0329)
Waste management progress report. USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Jun 1997. 15p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97008763. Source: OSTI; NTIS; INIS; GPO Dep.

During the Cold War era, when DOE and its predecessor agencies produced nuclear weapons and components, and conducted nuclear research, a variety of wastes were generated (both radioactive and hazardous). DOE now has the task of managing these wastes so that they are not a threat to human health and the environment. This document is the Waste Management Progress Report for the U.S. Department of Energy dated June 1997. This progress report contains a radioactive and hazardous waste inventory and waste management program mission, a section describing progress toward mission completion, mid-year 1997 accomplishments, and the future outlook for waste management.

116
(DOE/EM–0331)
Fifty years of federal radioactive waste management: Policies and practices. Bradley, R.G. ATL International, Inc. (United States). Apr 1997. 78p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Contract 12K-GAM72C. Order Number DE97008246. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides a chronological history of policies and practices relating to the management of radioactive waste for which the US Atomic Energy Commission and its successor agencies, the Energy Research and Development Administration and the Department of Energy, have been responsible since the enactment of the Atomic Energy Act in 1946. The defense programs and capabilities that the Commission inherited in 1947 are briefly described. The Commission undertook a dramatic expansion nationwide of its physical facilities and program capabilities over the five years beginning in 1947. While the nuclear defense activities continued to be a major portion of the Atomic Energy Commission's program, there was added in 1955 the Atoms for Peace program that spawned a multiplicity of peaceful use applications for nuclear energy, e.g., the civilian nuclear power program and its associated nuclear fuel cycle; a variety of industrial applications; and medical research, diagnostic, and therapeutic applications. All of these nuclear programs and activities generated large volumes of radioactive waste that had to be managed in a manner that was safe for the workers, the public, and the environment. The management of these materials, which varied significantly in their physical, chemical, and radiological characteristics, involved to varying degrees the following phases of the waste management system life cycle: waste characterization, storage, treatment, and disposal, with appropriate transportation linkages. One of the benefits of reviewing the history of the waste management program policies and practices if the opportunity it provides for identifying the lessons learned over the years. Examples are summarized at the end of the report and are listed in no particular order of importance.

117
(DOE/EW/11494–T1)
Strengthening programs in science, engineering and mathematics. Third annual progress report. Sandhu, S.S. Claflin Coll., Orangeburg, SC (United States). 30 Sep 1997. 30p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG01-94EW11494. Order Number DE98002791. Source: OSTI; NTIS; GPO Dep.

The Division of Natural Sciences and Mathematics at Claflin College consists of the Departments of Biology, Chemistry, Computer Science, Physics, Engineering and Mathematics. It offers a variety of major and minor academic programs designed to meet the mission and objectives of the college. The division's pursuit to achieve excellence in science education is adversely impacted by the poor academic preparation of entering students and the lack of equipment, facilities and research participation, required to impart adequate academic training and laboratory skills to the students. Funds were received from the US Department of Energy to improve the divisional facilities and laboratory equipment and establish mechanism at pre-college and college levels to increase (1) the pool of high school students who will enroll in Science and Mathematics courses (2) the pool of well qualified college freshmen who will seek careers in Science, Engineering and Mathematics (3) the graduation rate in Science,engineering and Mathematics at the undergraduate level and (4) the pool of well-qualified students who can successfully compete to enter the graduate schools of their choice in the fields of science, engineering, and mathematics. The strategies that were used to achieve the mentioned objectives include: (1) Improved Mentoring and Advisement, (2) Summer Science Camp for 7th and 8th graders, (3) Summer Research Internships for Claflin SEM Seniors, (4) Summer Internships for Rising High School Seniors, (5) Development of Mathematical Skills at Pre-college/Post-secondary Levels, (6) Expansion of Undergraduate Seminars, (7) Exposure of Undergraduates to Guest Speakers/Roll Models, (8) Visitations by Undergraduate Students to Graduate Schools, and (9) Expanded Academic Program in Environmental Chemistry.

118
(DOE/EW/50625–T33)
Environmental hazards assessment program. Quarterly report, July 1996–September 1996. Medical Univ. of South Carolina, Charleston, SC (United States). 31 Oct 1996. 56p. Sponsored by USDOE, Washington, DC (United States). DOE Contract FG01-92EW50625. Order Number DE97000820. Source: OSTI; NTIS; INIS; GPO Dep.

On June 23, 1992, the United States Department of Energy (DOE) signed Assistance Instrument Number DE-FG01-92EW50625 with the Medical University of South Carolina (MUSC) to support the Environmental Hazards Assessment Program (EHAP). Dr. James B. Edwards, President of the Medical University of South Carolina, suggested, "Good health is not the result of good doctoring but the result of a healthy society in a healthy, economic, political and biological environment." To further good health, it is appropriate that an educational institution such as MUSC utilize grant funds to help people from all walks of life understand better what truly does affect human health, what does not, and why.

119
(DOE/EW/50625–T34)
Environmental hazards assessment program. Quarterly progress report, October–December 1996. Medical Univ. of South Carolina, Charleston, SC (United States). 31 Jan 1997. 54p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG01-92EW50625. Order Number DE97003055. Source: OSTI; NTIS; GPO Dep.

On June 23, 1992, the United States Department of Energy (DOE) signed Assistance Instrument Number DE-FG01-92EW50625 with the Medical University of South Carolina (MUSC) to support the Environmental Hazards Assessment Program (EHAP). This report presents research information on the following: identification of trichloroethylene-hemoglobin adducts for use in the development of an immunological assay to assess trichloroethylene exposure in humans; species comparison of trichloroethylene induced peroxisome proliferation and induction of DNA synthesis; molecular dosimetry in relative oxygen species mediated toxicity of environmental chemicals; immunogenetic epidemiology of scleroderma; anaerobic dechlorination of polychlorinated biphenyls and the biodegradation of ether containing gasoline additives and ether solvents; biodegradation of hydrophobic contaminants; risk assessment of low-dose radiation and trichloroethylene; risk perceptions; and development of a geographic information system for risk assessment.

120
(DOE/EW/50625–T35)
Environmental Hazards Assessment Program quarterly report, January–March 1997. Medical Univ. of South Carolina, Charleston, SC (United States). 30 Apr 1997. 51p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG01-92EW50625. Order Number DE97005980. Source: OSTI; NTIS; GPO Dep.

The objectives of the Environmental Hazards Assessment Program (EHAP) stated in the proposal to DOE are to: (1) develop a holistic, national basis for risk assessment, risk management, and risk communication that recognizes the direct impact of environmental hazards on the health and well-being of all; (2) develop a pool of talented scientists and experts in cleanup activities, especially in human health aspects; and (3) identify needs and develop programs addressing the critical shortage of well-educated, high-skilled technical and scientific personnel to address the health-oriented aspects of environmental restoration and waste management. This report describes activities and reports for the third quarter (January–March) of the fifth year of the grant. It reports progress against these grant objectives and the Program Implementation Plan published at the end of the first year of the grant. Summaries are included of research projects which focus on the risk assessment of various hazardous materials. One project reports on the health effects of low dose-rate radiation.

121
(DOE/EW/53023–97/C0827)
Tulane/Xavier Center for Bioenvironmental Research; project: hazardous materials in aquatic environments; subproject: biomarkers and risk assessment in Bayou Trepagnier, LA. Ide, C. Tulane Univ., New Orleans, LA (United States). [1996]. 13p. Sponsored by USDOE Office of

Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG21-93EW53023. (CONF-9610231–1: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052186. Source: OSTI; NTIS; INIS; GPO Dep.

Tulane and Xavier Universities have singled out the environment as a major strategic focus for research and training for now and beyond the year 2000. the Tulane/Xavier Center for Bioenvironmental Research (CBR) was established in 1989 as the umbrella organization to coordinate environmental research at both universities. CBR projects funded by the DOE under the Hazardous Materials in Aquatic Environments grant are defining the following: (1) the complex interactions that occur during the transport of contaminants through wetlands environments, (2) the actual and potential impact of contaminants on ecological systems and health, (3) the mechanisms and new technologies through which these impacts might be remediated, and (4) new programs aimed at educating and training environmental workers of the future. The subproject described in this report, 'Biomarkers and Risk Assessment in Bayou Trepagnier, LN', is particularly relevant to the US Department of Energy's Environmental Restoration and Waste Management program aimed at solving problems related to hazard monitoring and clean-up prioritization at sites with aquatic pollution problems in the DOE complex.

122
(DOE/EW/53023–T16)
Hazardous materials in aquatic environments of the Mississippi River Basin Project management. Technical quarterly progress report, April 1, 1996–June 30, 1996. McLachlan, J.; Ide, C.F.; O'Connor, S. Tulane Univ., New Orleans, LA (United States). 1996. 75p. Sponsored by USDOE, Washington, DC (United States). DOE Contract FG21-93EW53023. Order Number DE96013670. Source: OSTI; NTIS; GPO Dep.

This quarterly report summarizes accomplishments for the Project examining hazardous materials in aquatic environments of the Mississippi River Basin. Among the many research areas summarized are the following: assessment of mechanisms of metal-induced reproductive toxicity in aquatic species as a biomarker of exposure; hazardous wastes in aquatic environment;ecological sentinels of aquatic contamination in the lower Mississippi River System; remediation of selected contaminants; rapid on-site immunassay for heavy metal contamination; molecular mechanisms of developmental toxicity induced by retinoids and retinoid-like molecules; resuseable synthetic membranes for the removal of aromatic and halogenated organic pollutants from waste water; Effects of steroid receptor activation in neurendocrine cell of the mammalian hypothalamus; modeling and assessment of environmental quality of louisiana bayous and swamps; enhancement of environmental education. The report also contains a summary of publications resulting from this project and an appendix with analytical core protocals and target compounds and metals.

123
(DOE/EW/53023–T17)
Hazardous materials in aquatic environment of the Mississippi River basin. Quarterly progress report, July 1–September 30, 1996. Tulane Univ., New Orleans, LA (United States). Center for Bioenvironmental Research. [1996]. 45p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG21-93EW53023. Order Number DE97001789. Source: OSTI; NTIS; GPO Dep.

This report is divided into four aspects relating to water pollution problems in the Mississippi River Basin. They are: collaborative cluster research projects, in which investigators employ a synergistic approach to the solution of problems; initiation research projects, in which a single investigator is involved ; technical support activities, which involve anything that is required to support the research; and the research training and education core, which is designed to develop courses with emphasis on environmental studies. This report presents the objectives and accomplishments of the various research projects for July 1, 1996–September 30, 1996.

124
(DOE/EW/55094–97/C0798)
Hemispheric center for environmental technology: research and development capabilities. Boudreaux, J.F. Florida International Univ., Miami, FL (United States). [1996]. 40p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG21-95EW55094. (CONF-9610231–28-Vugraphs: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052240. Source: OSTI; NTIS; GPO Dep.

Contains vugraphs only.

Contains vugraphs: decontamination and decommissioning, Latin America's D&D needs, metal decontamination, concrete decontamination, structural demolition and dust suppression, melting/solidification/remelting/separation of glass and metals, demonstrations, decision making, information systems, waste processing, tank waste treatment, characterization/monitoring/sensor technology, metal recycling, etc.

125
(DOE/EW/55101–97/C0799)
Technologies development for environmental restoration and waste management: International university and research institution and industry partnerships. Herndon, R.C.; Moerlins, J.E.; Kuperberg, J.M. Florida State Univ., Tallahassee, FL (United States). Inst. for Central and Eastern European Cooperative Environmental Research. [1996]. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FC21-95EW55101. (CONF-9610231–22: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052266. Source: OSTI; NTIS; INIS; GPO Dep.

The Institute for Central and Eastern European Cooperative Environmental Research (ICEECER) at Florida State University was formed in 1990 soon after the end of the Cold War. ICEECER consists of a number of joint centers which link FSU, and US as well as international funding agencies, to academic and research institutions in Hungary, Poland, the Czech Republic, Russia, and the other countries of Central and Eastern Europe and the Newly Independent States. Areas of interest include risk assessment, toxicology, contaminated site remediation/characterization, waste management, emergency response, environmental technology development/demonstration/transfer, and some

specialized areas of research (e.g., advanced chemical separations). Through ICEECER, numerous international conferences, symposia, training courses, and workshops have also been conducted on a variety of environmental topics. This paper summarizes the mission, structure, and administration of ICEECER and provides information on the projects conducted through this program at FSU.

126
(DOE/ID–10054(96))
Radioactive waste management information for 1996 and record-to-date. French, D.L.; Lisee, D.J.; Taylor, K.A. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Jul 1997. 136p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050370. Source: OSTI; NTIS; INIS; GPO Dep.

This document presents detailed data, bar graphs, and pie charts on volume, radioactivity, isotopic identity, origin, and status of radioactive waste for calendar year 1996. It also summarizes the radioactive waste data records compiled from 1952 to present for the Idaho National Engineering and Environmental Laboratory (INEEL). The data presented are from the INEEL Radioactive Waste Management Information System.

127
(DOE/ID–10561)
Plutonium Focus Area research and development plan. Revision 1. USDOE Idaho Operations Office, Idaho Falls, ID (United States). Nov 1996. 116p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97050844. Source: OSTI; NTIS; INIS; GPO Dep.

The Department of Energy (DOE) committed to a research and development program to support the technology needs for converting and stabilizing its nuclear materials for safe storage. The R and D Plan addresses five of the six material categories from the 94-1 Implementation Plan: plutonium (Pu) solutions, plutonium metals and oxides, plutonium residues, highly enriched uranium, and special isotopes. R and D efforts related to spent nuclear fuel (SNF) stabilization were specifically excluded from this plan. This updated plan has narrowed the focus to more effectively target specific problem areas by incorporating results form trade studies. Specifically, the trade studies involved salt; ash; sand, slag, and crucible (SS and C); combustibles; and scrub alloy. The plan anticipates possible disposition paths for nuclear materials and identifies resulting research requirements. These requirements may change as disposition paths become more certain. Thus, this plan represents a snapshot of the current progress and will continue to be updated on a regular basis. The paper discusses progress in safeguards and security, plutonium stabilization, special isotopes stabilization, highly-enriched uranium stabilization–MSRE remediation project, storage technologies, engineered systems, core technology, and proposed DOE/Russian technology exchange projects.

128
(DOE/ID–10595)
System specification for the integrated monitoring and surveillance system. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Sep 1997. 59p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050427. Source: OSTI; NTIS; INIS; GPO Dep.

This System Specification establishes the requirements for the Plutonium Focus Area (PFA) Integrated Monitoring and Surveillance System (IMSS). In this document, "Integrated Monitoring and Surveillance System" is used to describe the concept of integrated sensors, computers, personnel, and systems that perform the functions of sensing conditions, acquiring data, monitoring environmental safety and health, controlling and accounting for materials, monitoring material stability, monitoring container integrity, transferring data, and analyzing, reporting, and storing data. This concept encompasses systems (e.g. sensors, personnel, databases, etc.) that are already in place at the sites but may require modifications or additions to meet all identified surveillance requirements. The purpose of this System Specification is to provide Department of Energy (DOE) sites that store plutonium materials with a consolidation of all known requirements for the storage and surveillance of 3013 packages of stabilized plutonium metals and oxides. This compilation may be used (1) as a baseline for surveillance system design specifications where 3013 packages of stabilized plutonium metals and oxides will be stored and monitored; (2) as a checklist for evaluating existing surveillance systems to ensure that all requirements are met for the storage and surveillance of 3013 packages of stabilized plutonium metals and oxides; and (3) as a baseline for preparing procurement specifications tailored for site specific storage and surveillance of 3013 packages of stabilized plutonium metals and oxides.

129
(DOE/ID/13220–T8)
Magnetically controlled deposition of metals using gas plasma. Quarterly progress report, July–September 1996. Woodall, D.M.; Lemmon, E.C. Idaho Univ., Moscow, ID (United States). Dept. of Mechanical Engineering. 1996. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG07-93ID13220. Order Number DE97000853. Source: OSTI; NTIS; GPO Dep.

Objective is to develop a method of spraying materials on a substrate in a controlled manner to eliminate the waste inherent in present plating processes. The process under investigation is magnetically controlled plasma spraying. The field equations have been cast in a format that allows finite element solution. Potential flow and finite element solutions for temperature isolines and velocity vectors are compared for 2-D flow with heat addition.

130
(DOE/ID/13268–T3)
Environmental Science and Research Foundation annual technical report: Calendar year 1996. Environmental Science and Research Foundation report series, Number 17. Morris, R.C.; Blew, R.D. (eds.). Environmental Science and Research Foundation, Idaho Falls, ID (United States). Jul 1997. 199p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13268. Order Number DE98000707. Source: OSTI; NTIS; INIS; GPO Dep.

This Annual Technical Report describes work conducted for the Department of Energy, Idaho Operations Office (DOE-ID), by the Environmental Science and Research Foundation (Foundation). The Foundation's mission to DOE-ID provides support in several key areas. The authors conduct an environmental monitoring and surveillance program over an area covering much of the upper Snake River Plain, and provide environmental education and support services related to Idaho National Engineering and Environmental Laboratory (INEEL) natural resource issues. Also, the Foundation, with its University Affiliates, conducts ecological and radioecological research in the Idaho National Environmental Research Park. This research benefits major DOE-ID programs including Waste Management, Environmental Restoration, Spent Nuclear Fuels, and Land Management Issues. The major accomplishments of the Foundation and its University Affiliates during the calendar year 1996 are discussed.

131
(DOE/ID–22137)
Hydrologic conditions and distribution of selected radiochemical and chemical constituents in water, Snake River Plain aquifer, Idaho National Engineering Laboratory, Idaho, 1992 through 1995. Bartholomay, R.C.; Tucker, B.J.; Ackerman, D.J.; Liszewski, M.J. Geological Survey, Idaho Falls, ID (United States). Apr 1997. 62p. Sponsored by Department of the Interior, Washington, DC (United States);USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. (USGS-WRI–97-4086). Order Number DE98050295. Source: OSTI; NTIS; INIS; GPO Dep.

Radiochemical and chemical wastewater discharged since 1952 to infiltration ponds and disposal wells at the Idaho National Engineering Laboratory (INEL) has affected water quality in the Snake River Plain aquifer. The US Geological Survey, in cooperation with the US Department of Energy, maintains a monitoring network at the INEL to determine hydrologic trends and to delineate the movement of radiochemical and chemical wastes in the aquifer. This report presents an analysis of water-level and water-quality data collected from the Snake River Plain aquifer during 1992–95.

132
(DOE/ID–22140)
Strontium distribution coefficients of surficial sediment samples from the Idaho National Engineering Laboratory, Idaho. Liszewski, M.J. (Geological Survey, Idaho Falls, ID (United States)); Miller, K.E.; Rosentreter, J.J. Geological Survey, Idaho Falls, ID (United States). May 1997. 37p. Sponsored by Department of the Interior, Washington, DC (United States);USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. (USGS-WRI–97-4044). Order Number DE98050294. Source: OSTI; NTIS; INIS; GPO Dep.

Strontium distribution coefficients (K_d's) were measured for 20 surficial sediment samples collected from selected sites at the Idaho national Engineering Laboratory (INEL). The measurements were made to help assess the variability of strontium K_d's found at the INEL as part of an ongoing investigation of strontium chemical transport properties of surficial and interbedded sediments at the INEL. The investigation is being conducted by the US Geological Survey and Idaho State University in cooperation with the US Department of Energy. Batch experimental techniques wee used to determine K_d's of surficial sediments using a synthesized aqueous solution representative of wastewater in waste disposal ponds at the INEL. Strontium K_d's of the 20 surficial sediments ranged from 36 $\pm$ 1 to 275 $\pm$ 6 milliliters per gram. These results indicate significant variability in the strontium sorptive capacities of surficial sediments at the INEL. Some of this variability can be attributed to physical and chemical properties of the sediment itself; however, the remainder of the variability may be due to compositional changes in the equilibrated solutions after being mixed with the sediment.

133
(DOE/LLW–239)
A comparison and cross-reference of commercial low-level radioactive waste acceptance criteria. Kerr, T.A. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Apr 1997. 33p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98051442. Source: OSTI; NTIS; INIS; GPO Dep.

This document, prepared by the National Low-Level Waste Management Program at the Idaho National Engineering and Environmental Laboratory, is a comparison and cross-reference of commercial low-level radioactive waste acceptance criteria. Many of these are draft or preliminary criteria as well as implemented criteria at operating low-level radioactive waste management facilities. Waste acceptance criteria from the following entities are included: US Nuclear Regulatory Commission, South Carolina, Washington, Utah, Nevada, California, Illinois, Texas, North Carolina, Nebraska, Pennsylvania, New York, and the Midwest Compact Region. Criteria in the matrix include the following: physical form, chemical form, liquid limits, void space in packages, concentration averaging, types of packaging, chelating agents, solidification media, stability requirements, sorptive media, gas, oil, biological waste, pyrophorics, source material, special nuclear material, package dimensions, incinerator ash, dewatered resin, transuranics, and mixed waste. Each criterion in the matrix is cross-referenced to its source document so that exact requirements can be determined.

134
(DOE/LLW–243)
1996 state-by-state assessment of low-level radioactive wastes received at commercial disposal sites. Fuchs, R.L. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Sep 1997. 162p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050438. Source: OSTI; NTIS; INIS; GPO Dep.

Each year the National Low-Level Waste Management Program publishes a state-by-state assessment report. This report provides both national and state-specific disposal data on low-level radioactive waste commercially disposed in the US. Data in this report are categorized according to disposal site, generator category, waste class, volumes, and radionuclide activity. Included in this report are tables showing the distribution of waste by state for 1996 and a comparison of waste volumes and radioactivity by state for 1992 through 1996; also included is a list of all commercial

nuclear power reactors in the US as of December 31, 1996. This report distinguishes between low-level radioactive waste shipped directly for disposal by generators and waste that was handled by an intermediary, a reporting change introduced in the 1988 state-by-state report.

135
(DOE/MC/29101–5742)
High-resolution subsurface imaging and neural network recognition: Non-intrusive buried substance location. Final report. Arizona Univ., Tucson, AZ (United States). Dept. of Mining and Geological Engineering. 26 Jan 1997. 179p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-92MC29101. Order Number DE97005448. Source: OSTI; NTIS; INIS; GPO Dep.

A high-frequency, high-resolution electromagnetic (EM) imaging system has been developed for environmental geophysics surveys. Some key features of this system include: (1) rapid surveying to allow dense spatial sampling over a large area, (2) high-accuracy measurements which are used to produce a high-resolution image of the subsurface, (3) measurements which have excellent signal-to-noise ratio over a wide bandwidth (31 kHz to 32 MHz), (4) elimination of electric-field interference at high frequencies, (5) large-scale physical modeling to produce accurate theoretical responses over targets of interest in environmental geophysics surveys, (6) rapid neural network interpretation at the field site, and (7) visualization of complex structures during the survey. Four major experiments were conducted with the system: (1) Data were collected for several targets in our physical modeling facility. (2) The authors tested the system over targets buried in soil. (3) The authors conducted an extensive survey at the Idaho National Engineering Laboratory (INEL) Cold Test Pit (CTP). The location of the buried waste, category of waste, and thickness of the clay cap were successfully mapped. (4) The authors ran surveys over the acid pit at INEL. This was an operational survey over a hot site. The interpreted low-resistivity region correlated closely with the known extent of the acid pit.

136
(DOE/MC/29107–97/C0787)
Development studies of a novel wet oxidation process. Rogers, T.W.; Dooge, P.M. Delphi Research, Inc., Albuquerque, NM (United States). [1996]. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-92MC29107. (CONF-9610231–29: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052229. Source: OSTI; NTIS; INIS; GPO Dep.

The objective of this study is to develop a novel catalytic chemical oxidation process that can be used to effectively treat multi-component wastes with a minimum of pretreatment characterization, thus providing a versatile, non-combustion method which will destroy hazardous organic compounds while simultaneously containing and concentrating toxic and radioactive metals for recovery or disposal in a readily stabilized matrix. Although the DETOX^{SM} process had been tested to a limited extent for potential application to mixed wastes, there had not been sufficient experience with the process to determine its range of application to multicomponent waste forms. The potential applications of the process needed to be better identified. Then, the process needed to be demonstrated on wastes and remediate types on a practical scale in order that data could be obtained on application range, equipment size, capital and operating costs, effectiveness, safety, reliability, permittability, and potential commercial applications of the process. The approach for the project was, therefore, to identify the potential range of applications of the process (Phase I), to choose demonstration sites and design a demonstration prototype (Phase II), to fabricate and shakedown the demonstration unit (Phase III), then finally to demonstrate the process on surrogate hazardous and mixed wastes, and on actual mixed wastes (Phase IV).

137
(DOE/MC/29115–96/C0634)
Image processing algorithm design and implementation for real-time autonomous inspection of mixed waste. Schalkoff, R.J. (Clemson Univ., SC (United States). Dept. of Electrical and Computer Engineering); Shaaban, K.M.; Carver, A.E. South Carolina Universities Research and Education Foundation, Clemson, SC (United States). Strom Thurman Inst. [1996]. 15p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-92MC29115. (CONF-960368–1: Symposium on visual communications and image processing, Orlando, FL (United States), 17-20 Mar 1996). Order Number DE97050711. Source: OSTI; NTIS; INIS; GPO Dep.

The ARIES #1 (Autonomous Robotic Inspection Experimental System) vision system is used to acquire drum surface images under controlled conditions and subsequently perform autonomous visual inspection leading to a classification as 'acceptable' or 'suspect'. Specific topics described include vision system design methodology, algorithmic structure,hardware processing structure, and image acquisition hardware. Most of these capabilities were demonstrated at the ARIES Phase II Demo held on Nov. 30, 1995. Finally, Phase III efforts are briefly addressed.

138
(DOE/MC/30170–97/C0806)
Advanced technologies for decontamination and conversion of scrap metal. MacNair, V.; Muth, T.; Shasteen, K.; Liby, A.; Hradil, G.; Mishra, B. Manufacturing Sciences Corp., Oak Ridge, TN (United States). [1996]. 22p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-93MC30170. (CONF-9610231–6: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052246. Source: OSTI; NTIS; INIS; GPO Dep.

In October 1993, Manufacturing Sciences Corporation was awarded DOE contract DE-AC21-93MC30170 to develop and test recycling of radioactive scrap metal (RSM) to high value and intermediate and final product forms. This work was conducted to help solve the problems associated with decontamination and reuse of the diffusion plant barrier nickel and other radioactively contaminated scrap metals present in the diffusion plants. Options available for disposition of the nickel include decontamination and subsequent release or recycled product manufacture for restricted end use. Both of these options are evaluated during the course of this research effort. work during phase I of this project successfully demonstrated the ability to make stainless steel

from barrier nickel feed. This paved the way for restricted end use products made from stainless steel. Also, after repeated trials and studies, the inducto-slag nickel decontamination process was eliminated as a suitable alternative. Electro-refining appeared to be a promising technology for decontamination of the diffusion plant barrier material. Goals for phase II included conducting experiments to facilitate the development of an electro-refining process to separate technetium from nickel. In parallel with those activities, phase II efforts were to include the development of the necessary processes to make useful products from radioactive scrap metal. Nickel from the diffusion plants as well as stainless steel and carbon steel could be used as feed material for these products.

139
(DOE/MC/30174–97/C0821)
Rapid surface sampling and archival record (RSSAR) system. Barren, E; Dorn, S.B.; Ortiz, A.L., Jr; Penney, C.M.; Sheldon, R.B.; Shapiro, A.P.; Bracco, A.A. General Electric Co., Schenectady, NY (United States). Corporate Research and Development Dept. [1996]. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-93MC30174. (CONF-9610231–18: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052261. Source: OSTI; NTIS; INIS; GPO Dep.

Purpose is to develop a rapid surface contamination measurement system that will provide a "quick-look" indication of contaminated areas, an archival record, and an automated analysis of that record. By providing rapid analysis and a large number of accurate measurements of surface and subsurface contamination, the cost of remediation of large industrial sites will be dramatically lowered by reducing both characterization time and the material fraction that must be remediated. The RSSAR system is capable of sampling a variety of surfaces for semivolatile organic contaminants. The sampling is rapid (one sample per 100 sec). The system comprises thermal sampler heads, a "quick-look" module, and archival multisample trapping module.

140
(DOE/MC/30175–97/C0822)
Portable sensor for hazardous waste. Piper, L.G.; Hunter, A.J.R.; Fraser, M.E.; Davis, S.J. Physical Sciences, Inc., Andover, MA (United States). [1996]. 22p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-93MC30175. (CONF-9610231–19: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052262. Source: OSTI; NTIS; INIS; GPO Dep.

We are part-way through the second phase of a 4-year program designed to develop a portable monitor for sensitive hazardous waste detection. The ultimate goal of the program is to develop our concept to the prototype instrument level. Our monitor will be a compact, portable instrument that will allow real-time, in situ, monitoring of hazardous wastes. This instrument will be able to provide the means for rapid field screening of hazardous waste sites to map the areas of greatest contamination. Remediation efforts can then focus on these areas. Our analysis approach is to excite atomic and molecular fluorescence by the technique of active nitrogen energy transfer (ANET). The active nitrogen is made in a dielectric-barrier (D-B) discharge in nitrogen at atmospheric pressure. Only a few emission lines or bands are excited for each hazardous species, so spectral resolution requirements are greatly simplified over those of other spectroscopic techniques. The D-B discharge is compact, 1 to 2 cm in diameter and 1 to 10 cm long. Furthermore, the discharge power requirements are quite modest, so that the unit can be powered by batteries. Thus an instrument based on ANET can readily be made portable. Our results indicate that ANET is a very sensitive technique for monitoring heavy metals and chlorinated hydrocarbons. We have demonstrated an overall detection sensitivity for most species that is at or below ppb levels. ANET alone, however, appears to be most successful in treating hazardous species that have been atomized. We are therefore developing a hybrid technique which combines a miniature, solid-state laser for sample collection and vaporization with ANET for subsequent detection. This approach requires no special sample preparation, can operate continuously, and lends itself well to compact packaging.

141
(DOE/MC/30176–97/C0805)
Field testing of the Advanced Worker Protection System. Todd, R.J.E.; Hamill, D. Oceaneering Space Systems, Houston, TX (United States). [1996]. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-93MC30176. (CONF-9610231–5: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052245. Source: OSTI; NTIS; GPO Dep.

AWPS is a life support system that allows a suited worker in operate in a chemically hazardous or radiologically hot environment for up to 2 hours with minimal heat stress and minimal encumbrance from his life support equipment. It consists of 3 parts: a backpack using liquid air to supply breathing gas and cooling power; a liquid cooling garment (LCG) that circulates water chilled from vaporizing and warming the cryogen; and a Level B protective garment which accommodates the low profile of the backpack, permits greater mobility and doesn't require tape closure. The AWPS backpack and LCG are compatible with commercially available Level A protective garments. A one-hour demonstration of a AWPS prototype was done.

142
(DOE/MC/30359–97/C0820)
Laser surface cleaning. Crivella, E.C.; Freiwald, J.; Freiwald, D.A. F2 Associates, Albuquerque, NM (United States). [1996]. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-94MC30359. (CONF-9610231–17: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052260. Source: OSTI; NTIS; INIS; GPO Dep.

Decontamination of contaminated metal and material recycle, two of 31 priority needs identified by the D&D focus group, are the most promising applications for laser ablation within the DOE complex. F2 Associates has developed a robotic laser ablation system that is capable of high contamination rates, waste volume reduction, surface pore cleaning, and real-time characterization of materials. It is being

demonstrated that this system will be the most cost-effective technology for metal decontamination and material recycle.

143
(DOE/MC/30362–97/C0808)
BOA II: pipe-asbestos insulation removal system. Schempf, H.; Mutschler; Boehmke, S.; Chemel, B.; Piepgras, C. Carnegie-Mellon Univ., Pittsburgh, PA (United States). Robotics Inst. [1996]. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-93MC30362. (CONF-9610231–8: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052248. Source: OSTI; NTIS; INIS; GPO Dep.

BOA system is a mobile pipe-external robotic crawler used to remotely strip and bag asbestos-containing lagging and insulation materials from various diameter pipes in (primarily) industrial installations. Steam and process lines within the DOE weapons complex warrant the use of a remote device due to high labor costs and high level of radioactive contamination, making manual removal costly and inefficient. Currently targeted facilities for demonstration and remediation are Fernald in Ohio and Oak Ridge in Tennessee.

144
(DOE/MC/31178–97/C0792)
Steerable/distance enhanced penetrometer delivery system. Amini, A.; Boyd, G.M. UTD, Inc., Newington, VA (United States). [1996]. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-94MC31178. (CONF-9610231–32: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052234. Source: OSTI; NTIS; INIS; GPO Dep.

Characterization, monitoring, and remediation of many of the nation's highly contaminated sites are high priority at DOE. Penetrometers are often used for rapid characterization of underground contamination (plumes). Because of their heavy weight, use of penetrometer trucks over shallow buried storage tanks is restricted and risky. To close this gap, UTD developed a new position location device for penetrometers, called POLO (POsition LOcator), which provides real- time position location without blocking downhole access for environmental sensors. UTD also developed a system to make penetrometers steerable and capable of deeper penetration. Products of this work is a Steerable Vibratory System, which a relatively lightweight rig capable of greater penetration than traditional penetrometers of the same weight.

145
(DOE/MC/31190–97/C0818)
Fiber optic coherent laser radar 3D vision system. Clark, R.B. (Coleman Research Corp., Springfield, VA (United States)); Gallman, P.G.; Slotwinski, A.R.; Wagner, K.; Weaver, S.; Xu, Jieping. Coleman Research Corp., Springfield, VA (United States). [1996]. 13p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-94MC31190. (CONF-9610231–16: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052258. Source: OSTI; NTIS; INIS; GPO Dep.

This CLVS will provide a substantial advance in high speed computer vision performance to support robotic Environmental Management (EM) operations. This 3D system employs a compact fiber optic based scanner and operator at a 128 x 128 pixel frame at one frame per second with a range resolution of 1 mm over its 1.5 meter working range. Using acousto-optic deflectors, the scanner is completely randomly addressable. This can provide live 3D monitoring for situations where it is necessary to update once per second. This can be used for decontamination and decommissioning operations in which robotic systems are altering the scene such as in waste removal, surface scarafacing, or equipment disassembly and removal. The fiber- optic coherent laser radar based system is immune to variations in lighting, color, or surface shading, which have plagued the reliability of existing 3D vision systems, while providing substantially superior range resolution.

146
(DOE/MC/31388–97/C0832)
Dynamic partnership: A new approach to EM technology commercialization and deployment. Daly, D.J. (and others); Erickson, T.A.; Groenewold, G.H. North Dakota Univ., Grand Forks, ND (United States). 1996. 7p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FC21-94MC31388. (CONF-960804–60: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE97052714. Source: OSTI; NTIS; INIS; GPO Dep.

The task of restoring nuclear defense complex sites under the U.S. Department of Energy (DOE) Environmental Management (EM) Program presents an unprecedented challenge to the environmental restoration community. Effective and efficient cleanup requires the timely development or modification of novel cleanup technologies applicable to radioactive wastes. Fostering the commercialization of these innovative technologies is the mission of EM-50, the EM Program Office of Science and Technology. However, efforts are often arrested at the "valley of death," the general term for barriers to demonstration, commercialization, and deployment. The Energy & Environmental Research Center (EERC), a not-for-profit, contract-supported organization focused on research, development, demonstration, and commercialization (RDD&C) of energy and environmental technologies, is in the second year of a cooperative agreement with the U.S. Department of Energy (DOE) Morgantown Energy Technology Center (METC) designed to deliver EM technologies into the commercial marketplace through a unique combination of technical support, real-world demonstration, and brokering. This paper profiles this novel approach, termed "Dynamic Partnership," and reviews the application of this concept to the ongoing commercialization and deployment of four innovative cleanup technologies. 2 tabs.

147
(DOE/MC/31388–5318)
Review of the integrated thermal and nonthermal treatment system studies. North Dakota Univ., Grand Forks, ND (United States). Energy and Environmental Research Center. 1 Oct 1996. 147p. Sponsored by USDOE Office of Environmental Restoration and Waste Management,

Washington, DC (United States). DOE Contract FC21-94MC31388. Order Number DE97002123. Source: OSTI; NTIS; INIS; GPO Dep.

This report contains a review and evaluation of three systems analysis studies performed by LITCO on integrated thermal treatment systems and integrated nonthermal treatment systems for the remediation of mixed low-level waste stored throughout the US Department of Energy weapons complex. The review was performed by an independent team of nine researchers from the Energy and Environmental Research Center, Science Applications International Corporation, the Waste Policy Institute, and Virginia Tech. The purpose of this review was to (1) determine whether the assumptions of the studies were adequate to produce an unbiased review of both thermal and nonthermal systems, (2) to identify the critical areas of the studies that would benefit from further investigation, and (3) to develop a standard template that could be used in future studies to assure a sound application of systems engineering.

148
(DOE/MC/31388–5766)
Task 11 - systems analysis of environmental management technologies. Musich, M.A. North Dakota Univ., Grand Forks, ND (United States). Energy and Environmental Research Center. Jun 1997. 174p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FC21-94MC31388. Order Number DE97005467. Source: OSTI; NTIS; INIS; GPO Dep.

A review was conducted of three systems analysis (SA) studies performed by Lockheed Idaho Technologies Company (LITCO) on integrated thermal treatment systems (ITTs) and integrated nonthermal treatment systems (INTSs) for the remediation of mixed low-level waste (MLLW) stored throughout the U.S. Department of Energy (DOE) weapons complex. The review was performed by an independent team led by the Energy & Environment Research Center (EERC), including Science Applications International Corporation (SAIC), the Waste Policy Institute (WPI), and Virginia Tech.

149
(DOE/MC/32087–96/C0700)
An advanced open-path atmospheric monitor design. Taylor, L. (Westinghouse Electric Corp., Pittsburgh, PA (United States)); Suhre, D.; Mech, S. Westinghouse Electric Corp., Pittsburgh, PA (United States). [1996]. 12p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AR21-95MC32087. (CONF-9604143–1: 41. annual analysis division spring symposium, Framingham, MA (United States), 21-24 Apr 1996). Order Number DE96010426. Source: OSTI; NTIS; INIS; GPO Dep.

The conceptual design of an open-path atmospheric monitor combines an acousto-optic tunable filter for emission spectroscopy (3-14 μm) with a mid-IR (4.6-5.4 μm) for absorption spectroscopy. It utilizes mostly commercially available components, covers a large area ($\sim$4 km radius), measures the distance to any reflecting object, can take measurements along any line-of-sight, and is eye safe. Of twenty test pollutants it is to detect, the concentrations of all twenty will be measurable via emission spectroscopy and ten by the more sensitive absorption spectroscopy.

150
(DOE/MC/32087–97/C0797)
An advanced open path atmospheric pollution monitor for large areas. Taylor, L. (and others); Suhre, D.; Mani, S. Northrop Grumman Corp., Pittsburgh, PA (United States). [1996]. 15p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-95MC32087. (CONF-9610231–37: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052239. Source: OSTI; NTIS; INIS; GPO Dep.

Over 100 million gallons of radioactive and toxic waste materials generated in weapon materials production are stored in 322 tanks buried within large areas at DOE sites. Toxic vapors occur in the tank headspace due to the solvents used and chemical reactions within the tanks. To prevent flammable or explosive concentration of volatile vapors, the headspace are vented, either manually or automatically, to the atmosphere when the headspace pressure exceeds preset values. Furthermore, 67 of the 177 tanks at the DOE Hanford Site are suspected or are known to be leaking into the ground. These underground storage tanks are grouped into tank farms which contain closely spaced tanks in areas as large as 1 km^2. The objective of this program is to protect DOE personnel and the public by monitoring the air above these tank farms for toxic air pollutants without the monitor entering the tanks farms, which can be radioactive. A secondary objective is to protect personnel by monitoring the air above buried 50 gallon drums containing moderately low radioactive materials but which could also emit toxic air pollutants.

151
(DOE/MC/32089–97/C0812)
Fiber optic/cone penetrometer system For subsurface heavy metals detection. Saggese, S.; Bratton, W.; Fisk, B. Science and Engineering Associates, Inc., San Diego, CA (United States). [1996]. 15p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-95MC32089. (CONF-9610231–11: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052252. Source: OSTI; NTIS; INIS; GPO Dep.

Contamination of the soil by heavy metals (Pb, Cr, Cu, Zn, Cd) is of great concern for government and industry; characterization, monitoring, and remediation is expensive and time consuming. Objective of this project is to develop an integrated fiber optic sensor/cone penetrometer system to analyze the heavy metals content of the subsurface. Laser-induced breakdown spectroscopy is used in the system. Work is being done on developing a truck mounted system.

152
(DOE/MC/32092–97/C0795)
Houdini: a remote mobile platform for tank waste retrieval tasks. Denmeade, T.J.; SSlifko, A.D.; Thompson, B.R.; White, D.W. Redzone Robotics, Inc., Pittsburgh, PA (United States). [1996]. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-95MC32092. (CONF-9610231–35: Conference on industry

partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052237. Source: OSTI; NTIS; INIS; GPO Dep.

RedZone has developed Houdini™, a folding frame vehicle for work in waste storage tanks and other confined-access areas. Houdini is a tethered, hydraulically-powered platform that folds to fit through small openings. Once deployed, the vehicle unfolds to provide a substantial work platform for the deployment of a wide variety of tools. The Houdini system will perform wheel removal, waste retrieval, waste mobilization, waste size reduction, and other tank waste retrieval and decommissioning tasks. Within the DOE Complex, 332 underground storage tanks have been used to process and store radioactive and chemical mixed waste generated from weapon materials production. The ultimate goal of the program is to develop and commercialize the Houdini system for broad application throughout the DOE Complex.

153
(DOE/MC/33082–97/C0825)
Field-scale model for air sparging performance assessment and design. Hein, G; Hutzler; Gierke, J.; Falta, R. Michigan Technological Univ., Houghton, MI (United States). [1996]. 27p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-96MC33082. (CONF-9610231–23: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052265. Source: OSTI; NTIS; INIS; GPO Dep.

Air sparging has been used as an in situ technique to remove VOCs from contaminated groundwater: air is injected into the groundwater from an injection well, and the VOC partitions into the air phase and rises to the unsaturated zone, where another technique, such as soil vapor extraction, is used to remove the gases from the vadose zone. A computer model that accurately describes the process is needed. This project comprises model development and laboratory experiments, conducted independently. The model will be tested using the laboratory data. Only preliminary results are available. Preliminary laboratory column tests have been conducted along with some modeling to simulate the removal of a single VOC from a soil column. Comparison show that a finite element code is able to predict removal of methane and TCE. To determine if the air flow pattern in air sparging is predictable, experiments were done in a large-scale reactor and compared to numerical simulations.

154
(DOE/METC/C–96/7220)
Technology demonstrations in the Decontamination and Decommissioning Focus Area. Bossart, S.J. USDOE Morgantown Energy Technology Center, WV (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). (CONF-960487–1: ANS topical meeting on best of decontamination and decommissioning, Chicago, IL (United States), 14-17 Apr 1996). Order Number DE96005197. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes three large-scale demonstration projects sponsored jointly by the Decontamination and Decommissioning Focus Area (DDFA), and the three US Department of Energy (DOE) Operations Offices that successfully offered to deactivate or decommission (D&D) one of its facilities using a combination of innovative and commercial D&D technologies. The paper also includes discussions on recent technology demonstrations for an Advanced Worker Protection System, an Electrohydraulic Scabbling System, and a Pipe Explorer™. The references at the conclusion of this paper should be consulted for more detailed information about the large-scale demonstration projects and recent technology demonstrations sponsored by the DDFA.

155
(DOE/METC/C–96/7241)
Opportunities for industry participation in DOE's environmental management technology development program. Bedick, R.C. (USDOE Morgantown Energy Technology Center, WV (United States)); Walker, J.S. USDOE Morgantown Energy Technology Center, WV (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). (CONF-9609234–1-Ext.Abst.: American Chemical Society special symposium on Industrial & engineering chemistry, Birmingham, AL (United States), 9-12 Sep 1996). Order Number DE96014526. Source: OSTI; NTIS; INIS; GPO Dep.

METC has managed about 85 research, development, and demonstration projects on behalf of DOE-EM's Office of Science and Technology that include those in each of the four major environmental remediation and waste management problem areas: subsurface contaminants (radionuclides, heavy metals, dense nonaqueous phase liquids); decontamination and decommissioning of facilities; high-level waste tank remediation; and mixed waste characterization/treament/disposal. All projects within the Industry Programs are phased or have optional tasks at specific go/no-go decision points, allowing DOE to make investment decisions at various points in the technology development cycle to ensure that we are meeting the technology development goals and the needs of the customer or end-user. This decision making process is formalized in a Technology Investment Decision Model. A brief summary is given of R&D requirements (technology needs) in each of the above-mentioned 4 problem areas.

156
(DOE/NE/44139–72)
Qualification testing and full-scale demonstration of titanium-treated zeolite for sludge wash processing. Dalton, W.J. West Valley Nuclear Services Co., Inc., West Valley, NY (United States). 30 Jun 1997. 153p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC24-81NE44139. Order Number DE98001968. Source: OSTI; NTIS; INIS; GPO Dep.

Titanium-treated zeolite is a new ion-exchange material that is a variation of UOP (formerly Union Carbide) IONSIV IE-96 zeolite (IE-96) that has been treated with an aqueous titanium solution in a proprietary process. IE-96 zeolite, without the titanium treatment, has been used since 1988 in the West Valley Demonstration Project's (WVDP) Supernatant Treatment System (STS) ion-exchange columns to remove Cs-137 from the liquid supernatant solution. The titanium-treated zeolite (TIE-96) was developed by Battelle-Pacific Northwest Laboratory (PNL). Following successful lab-scale testing of the PNL-prepared TIE-96, UOP was selected as a commercial supplier of the TIE-96 zeolite. Extensive laboratory tests conducted by both the WVDP and PNL indicate that the TIE-96 will successfully remove comparable quantities of Cs-137 from Tank 8D-2 high-level radioactive liquid

as was done previously with IE-96. In addition to removing Cs-137, TIE-96 also removes trace quantities of Pu, as well as Sr-90, from the liquid being processed over a wide range of operating conditions: temperature, pH, and dilution. The exact mechanism responsible for the Pu removal is not fully understood. However, the Pu that is removed by the TIE-96 remains on the ion-exchange column under anticipated sludge wash processing conditions. From May 1988 to November 1990, the WVDP processed 560,000 gallons of liquid high-level radioactive supernatant waste stored in Tank 8D-2. Supernatant is an aqueous salt solution comprised primarily of soluble sodium salts. The second stage of the high-level waste treatment process began November 1991 with the initiation of sludge washing. Sludge washing involves the mixing of Tank 8D-2 contents, both sludge and liquid, to dissolve the sulfate salts present in the sludge. Two sludge washes were required to remove sulfates from the sludge.

157
(DOE/NE/44139–T4)
West Valley Demonstration Project site environmental report for calendar year 1996. West Valley Nuclear Services Co., Inc., West Valley, NY (United States). Jun 1997. [300p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC24-81NE44139. Order Number DE97009323. Source: OSTI; NTIS; INIS; GPO Dep.

The West Valley Demonstration Project (WVDP), the site of a US Department of Energy environmental cleanup activity operated by West Valley Nuclear Services Co., Inc., (WVNS), is in the process of solidifying liquid high-level radioactive waste remaining at the site after commercial nuclear fuel reprocessing was discontinued. The Project is located in Western New York State, about 30 miles south of Buffalo, within the New York State-owned Western New York Nuclear Service Center (WNYNSC). This report represents a single, comprehensive source of off-site and on-site environmental monitoring data collected during 1996 by environmental monitoring personnel. The environmental monitoring program and results are discussed in the body of this report. The monitoring data are presented in the appendices. Appendix A is a summary of the site environmental monitoring schedule. Appendix B lists the environmental permits and regulations pertaining to the WVDP. Appendices C through F contain summaries of data obtained during 1996 and are intended for those interested in more detail than is provided in the main body of the report.

158
(DOE/NV/10833–34)
An arid zone lysimeter facility for performance assessment and closure investigations at the Nevada Test Site. Levitt, D.G. (Bechtel Nevada Corp., Las Vegas, NV (United States)); Lohrstorfer, C.F.; Sully, M.J.; Ginanni, J.M. Bechtel Nevada Corp., Las Vegas, NV (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC08-91NV10833. (CONF-960212–94: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96012182. Source: OSTI; NTIS; INIS; GPO Dep.

Two precision weighing lysimeters were installed near the Area 5 Radioactive Waste Management Site (RWMS) on the Nevada Test Site to provide support for investigations of water, solute, and heat fluxes in the near-surface of the soil. The lysimeters consist of soil tanks with a volume of 16 cubic meters mounted on a sensitive scale. One lysimeter was revegetated with native shrubs whereas the other was kept bare to stimulate a non-vegetated waste cover. Data consisting of physical and hydrological properties of the lysimeter soils, thermal and moisture conditions in the lysimeters, and atmospheric boundary conditions are being collected for calibrating and verifying computer models for simulating the flow of water and heat in the near surface alluvium at the Area 5 RWMS. This effort will provide site-specific models for demonstration of "no migration" of constituents to the water table. Moisture and thermal conditions in the lysimeters are monitored daily using time domain reflectometry probes and thermocouple psychrometers. Daily evaporation and evapotranspiration are calculated from the lysimeter scales. Meteorological variables are monitored by sensors mounted on a 3 meter tower adjacent to the lysimeters. An array of soil-solution samplers to be installed through the side of the soil tank will allow studies of waste mobility under natural conditions. Conceptual designs for closure at the RWMS are focused on using an upper layer of repacked native alluvium, which can be tested with the lysimeters. In addition, performance of other components such as a capillary barrier can be tested by installing a scaled version in one of the lysimeter tanks.

159
(DOE/NV/11040–T1)
Summary of hydrogeologic controls on ground-water flow at the Nevada Test Site, Nye County, Nevada. Laczniak, R.J.; Cole, J.C.; Sawyer, D.A.; Trudeau, D.A. Geological Survey, Carson City, NV (United States). 1996. 128p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AI08-91NV11040. Order Number DE96012361. Source: OSTI; NTIS; INIS; GPO Dep.

Includes maps.

The underground testing of nuclear devices has generated substantial volumes of radioactive and other chemical contaminants below ground at the Nevada Test Site (NTS). Many of the more radioactive contaminants are highly toxic and are known to persist in the environment for thousands of years. In response to concerns about potential health hazards, the US Department of Energy, under its Environmental Restoration Program, has made NTS the subject of a long-term investigation. Efforts will assess whether byproducts of underground testing pose a potential hazard to the health and safety of the public and, if necessary, will evaluate and implement steps to remediate any of the identified dangers. Ground-water flow is the primary mechanism by which contaminants can be transported significant distances away from the initial point of injection. Flow paths between contaminant sources and potential receptors are separated by remote areas that span tens of miles. The diversity and structural complexity of the rocks along these flow paths complicates the hydrology of the region. Although the hydrology has been studied in some detail, much still remains uncertain about flow rates and directions through the fractured-rock aquifers that transmit water great distances across this arid region. Unique to the hydrology of NTS are the effects of underground testing, which severely alter local rock characteristics and affect hydrologic conditions throughout the region. This report summarizes what is known and inferred about ground-water flow throughout the NTS region.

The report identifies and updates what is known about some of the major controls on ground-water flow, highlights some of the uncertainties in the current understanding, and prioritizes some of the technical needs as related to the Environmental Restoration Program. 113 refs.

160
(DOE/NV/11508–18)
Analysis of shallow soil moisture flux adjacent to the Area 5 radioactive waste management site. Albright, W.; Tyler, S.; Hokett, S. Nevada Univ., Las Vegas, NV (United States). Water Resources Center. Aug 1997. 53p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC08-95NV11508. (DRI–45150). Order Number DE98001224. Source: OSTI; NTIS; INIS; GPO Dep.

Hazardous waste requires significant isolation from the biosphere. Shallow land burial of radioactive waste is currently employed at Area 5 of the Nevada Test Site to prevent release of impounded radioactive materials. Soil covers have been proposed to limit the infiltration of precipitation into the waste. Appropriate design for these covers depends on knowledge of infiltration in the soils intended for use as engineering materials. The current effort summarizes two years of field soil moisture data collection, analysis of those data and an examination of the predictive abilities of an unsaturated soil moisture flow model, HYDRUS-2D.

161
(DOE/NV/11508–23)
Near-field modeling in Frenchman Flat, Nevada Test Site. Pohlmann, K.; Shirley, C.; Andricevic, R. Nevada Univ., Las Vegas, NV (United States). Water Resources Center. Dec 1996. 35p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC08-95NV11508. Order Number DE97006646. Source: OSTI; NTIS; INIS; GPO Dep.

The US Department of Energy (DOE) is investigating the effects of nuclear testing in underground test areas (the UGTA program) at the Nevada Test Site. The principal focus of the UGTA program is to better understand and define subsurface radionuclide migration. The study described in this report focuses on the development of tools for generating maps of hydrogeologic characteristics of subsurface Tertiary volcanic units at the Frenchman Flat corrective Action Unit (CAU). The process includes three steps. The first step involves generation of three-dimensional maps of the geologic structure of subsurface volcanic units using geophysical logs to distinguish between two classes: densely welded tuff and nonwelded tuff. The second step generates three-dimensional maps of hydraulic conductivity utilizing the spatial distribution of the two geologic classes obtained in the first step. Each class is described by a correlation structure based on existing data on hydraulic conductivity, and conditioned on the generated spatial location of each class. The final step demonstrates the use of the maps of hydraulic conductivity for modeling groundwater flow and radionuclide transport in volcanic tuffs from an underground nuclear test at the Frenchman Flat CAU. The results indicate that the majority of groundwater flow through the volcanic section occurs through zones of densely welded tuff where connected fractures provide the transport pathway. Migration rates range between near zero to approximately four m/yr, with a mean rate of 0.68 m/yr. This report presents the results of work under the FY96 Near-Field Modeling task of the UGTA program.

162
(DOE/NV/11508–27)
24 M meteorological tower data report period: January–December, 1994. Freeman, D. (and others); Bowen, J.; Egami, R. Nevada Univ., Reno, NV (United States). Desert Research Inst. Aug 1997. 717p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC08-95NV11508. Order Number DE98002543. Source: OSTI; NTIS; GPO Dep.

This report was prepared by the Desert Research Institute (DRI) for the U.S. Department of Energy (DOE). It summarizes meteorological data collected at the 24 meter tower at the Nevada Test Site Hazardous Material Spill Center (HAZMAT) located at Frenchman Flat near Mercury, Nevada, approximately 75 miles northwest of Las Vegas, Nevada. The tower was originally installed in July, 1993 to characterize baseline conditions for an EPA sponsored experimental research program at the HAZMAT.

163
(DOE/NV/11718–091)
Closure report: Nevada Test Site Underground Storage Tank (UST) number 25-3123-1: Nevada Division of Emergency Management case number H940825D corrective action unit 450. Bechtel Nevada Corp., Las Vegas, NV (United States). Jan 1997. 263p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC08-96NV11718. Order Number DE97052284. Source: OSTI; NTIS; GPO Dep.

This document has been prepared as a final closure report documenting the assessment and corrective actions taken for the petroleum hydrocarbon release associated with underground storage tank (UST) UST25-3123-1. UST25-3123-1 was located at Area 25 within the Nevada Test Site. The UST was identified as abandoned to be closed under the U.S. Department of Energy/Nevada Operations Office Environmental Restoration Division Program during Fiscal Year 1994. The scope of work for closure of the UST included evaluating site conditions and closing the tank in accordance with all applicable regulations. Site evaluation analytic results of a soil sample collected below the tank showed a diesel concentration of 120 mg/kg at a depth of 3 meters. During remedial excavation, approximately 3.8 cubic meters of hydrocarbon impacted soil was removed. Laboratory analysis of the soil sample collected from the excavation bottom confirms that total petroleum hydrocarbon concentrations greater than 100 mg/kg are no longer present. Therefore, it is requested that the site be closed without further action. 4 refs., 2 figs., 3 tabs.

164
(DOE/OR–01-1168&D3)
Risk characterization data manual for Category D inactive liquid low-level waste tank systems at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Apr 1997. 82p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97005321. Source: OSTI; NTIS; INIS; GPO Dep.

This manual reports the results of a risk characterization of Category D inactive liquid low-level radioactive waste (LLLW) at the Oak Ridge National Laboratory (ORNL). The risk characterization is required by the Federal Facility Agreement between the Department of Energy-Oak Ridge Operations Office, the Environmental Protection Agency-Region IV, and the Tennessee Department of Environment and Conservation. The intent of the risk characterization is to determine relative priorities for assessment and remediation. When the scores for all tanks had been weighted and summed, the tanks were ranked in descending order on the basis of their total scores. The highest possible score for a tank is 30. The descending order represents the recommended priorities for evaluation: the higher the score, the higher the priority for evaluation.

165
(DOE/OR–01-1441/V4)
Oak Ridge Reservation Federal Facility Agreement. Quarterly report for the Environmental Restoration Program. Volume 4: July–September 1996. Oak Ridge National Lab., TN (United States). Oct 1996. 94p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97001830. Source: OSTI; NTIS; GPO Dep.

This report presents significant accomplishments for the Oak Ridge Reservation's environmental restoration projects for the fourth quarter of FY 1996.

166
(DOE/OR–01-1473&D2)
Implementation plan for liquid low-level radioactive waste systems under the FFA for Fiscal years 1996 and 1997 at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Oct 1996. 85p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. (ORNL/M–5469). Order Number DE97050730. Source: OSTI; NTIS; INIS; GPO Dep.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires a Federal Facility Agreement (FFA) for federal facilities placed on the National Priorities List. The Oak Ridge Reservation was placed on that list on December 21, 1989, and the agreement was signed in November 1991 by the Department of Energy Oak Ridge Operations Office (DOE-ORO), the U.S. Environmental Protection Agency (EPA)-Region IV, and the Tennessee Department of Environment and Conservation (TDEC). The effective date of the FFA was January 1, 1992. Section IX and Appendix F of the agreement impose design and operating requirements on the Oak Ridge National Laboratory (ORNL) liquid low-level radioactive waste (LLLW) tank systems and identify several plans, schedules, and assessments that must be submitted to EPA/TDEC for review of approval. The issue of ES/ER-17&D1 Federal Facility Agreement Plans and Schedules for Liquid Low-Level Radioactive Waste Tank Systems at Oak Ridge National Laboratory, Oak Ridge, Tennessee in March 1992 transmitted to EPA/TDEC those plans and schedules that were required within 60 to 90 days of the FFA effective date. This document updates the plans, schedules, and strategy for achieving compliance with the FFA as presented in ES/ER-17&D I and summarizes the progress that has been made to date. This document supersedes all updates of ES/ER-17&D 1. Chapter 1 describes the history and operation of the ORNL LLLW System and the objectives of the FFA. Chapters 2 through 5 contain the updated plans and schedules for meeting FFA requirements. This document will continue to be periodically reassessed and refined to reflect newly developed information and progress.

167
(DOE/OR–01-1537&D1)
Design/Installation and Structural Integrity Assessment of the Bethel Valley Low-Level Waste Collection and Transfer System Upgrade for Building 3544 (Process Waste Treatment Plant) at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Gilbert/Commonwealth, Inc., Oak Ridge, TN (United States). Dec 1996. 60p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. (ORNL/M–5816). Order Number DE97051282. Source: OSTI; NTIS; INIS; GPO Dep.

This document describes and assesses planned modifications to be made to the Building 3544 Process Waste Treatment Plant of the Oak Ridge National Laboratory, Oak Ridge, Tennessee. The modifications are made in response to the requirements of the Federal Facility Agreement (FFA) relating to environmental protection requirements for tank systems. The modifications include the provision of a new double contained LLW line replacing an existing buried line that does not provide double containment. This new above ground, double contained pipeline is provided to permit discharge of treated process waste fluid to an outside truck loading station. The new double contained discharge line is provided with leak detection and provisions to remove accumulated liquid. An existing LLW transfer pump, concentrated waste tank, piping and accessories are being utilized, with the addition of a secondary containment system comprised of a dike, a chemically resistant internal coating on the diked area surfaces and operator surveillance on a daily basis for the diked area leak detection. This assessment concludes that the planned modifications comply with applicable requirements of Federal Facility Agreement, Docket No. 89-04-FF, covering the Oak Ridge Reservation.

168
(DOE/OR–01-1546-V2&D2)
Remedial investigation report on the Melton Valley watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Volume 2: Appendixes A and B. Oak Ridge National Lab., TN (United States); CDM Federal Programs Corp., Oak Ridge, TN (United States); Science Applications International Corp., Oak Ridge, TN (United States). May 1997. 487p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97006085. Source: OSTI; NTIS; INIS; GPO Dep.

The Melton Valley watershed presents a multifaceted management and decision-making challenge because of the very heterogeneous conditions that exist with respect to contaminant type, disposal unit age, mode of disposal, release mechanism, and potential risk-producing pathways. The investigation presented here has assembled relevant site data in the geographic context with the intent of enabling program managers and decision-makers to understand site conditions and evaluate the necessity, relative

priority, and scope of potential remedial actions. The industrial and recreational exposure scenarios are used to provide a risk assessment reference context to evaluate levels of contamination in surface water, groundwater, soil, and sediment within each subbasin of the Melton Valley watershed. All available analytical results for the media of interest that could be qualified for use in the risk assessment were screened to determine carcinogenic risk values and noncarcinogenic hazard indexes and to identify the chemicals of concern (COCs) for each evaluated media in each subbasin.

169
(DOE/OR–01-1546/V3&D2)
Remedial investigation report on the Melton Valley watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Volume 3: Appendix C. Oak Ridge National Lab., TN (United States); CDM Federal Programs Corp., Oak Ridge, TN (United States); Science Applications International Corp., Oak Ridge, TN (United States). May 1997. 577p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97006086. Source: OSTI; NTIS; INIS; GPO Dep.

The Melton Valley watershed presents a multifaceted management and decision-making challenge because of the very heterogeneous conditions that exist with respect to contaminant type, disposal unit age, mode of disposal, release mechanism, and potential risk-producing pathways. The investigation presented here has assembled relevant site data in the geographic context with the intent of enabling program managers and decision-makers to understand site conditions and evaluate the necessity, relative priority, and scope of potential remedial actions. The industrial and recreational exposure scenarios are used to provide a risk assessment reference context to evaluate levels of contamination in surface water, groundwater, soil, and sediment within each subbasin of the Melton Valley watershed. All available analytical results for the media of interest that could be qualified for use in the risk assessment were screened to determine carcinogenic risk values and noncarcinogenic hazard indexes and to identify the chemicals of concern (COCs) for each evaluated media in each subbasin.

170
(DOE/OR–01-1599&D1)
Removal action report on the Building 3001 canal at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). May 1997. 25p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97006022. Source: OSTI; NTIS; INIS; GPO Dep.

Oak Ridge National Laboratory (ORNL) is a federal facility managed by Lockheed Martin C, Energy Research, Inc., for the U.S. Department of Energy (DOE). ORNL on the Oak Ridge Reservation in East Tennessee at the Anderson and Roane County lines, approximately 38 km (24 miles) west of Knoxville, Tennessee, and 18 km (11 miles) southwest of downtown Oak Ridge. The Oak Ridge Graphite Reactor and its storage and transfer canal are located in Bldg. 3001 in the approximate center of Waste Area Grouping I in the ORNL main complex. 4:1 The Bldg. 3001 Storage Canal is an L-shaped, underground, reinforced-concrete structure running from the back and below the Graphite Reactor in Bldg. 3001 to a location beneath a hot cell in the adjacent Bldg. 3019. The Graphite Reactor was built in 1943 to produce small quantities of plutonium and was subsequently used to produce other isotopes for medical research before it was finally shut down in 1963. The associated canal was used to transport, under water, spent fuel slugs and other isotopes from the back of the reactor to the adjacent Bldg. 31319 hot cell for further processing. During its operation and years subsequent to operation, the canal's concrete walls and floor became contaminated with radioisotopes from the water.This report documents the activities involved with replacing the canal water with a solid, controlled, low-strength material (CLSM) in response to a Comprehensive Environmental Response, Compensation, and Liability Act non-time-critical removal action.

171
(DOE/OR–02-1503/V2&D1/A1)
Work plan addendum for David Witherspoon, Inc., 901 Site Building Characterization, Knoxville, Tennessee. Jacobs Engineering Group, Inc., Oak Ridge, TN (United States). Jan 1997. 33p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97002411. Source: OSTI; NTIS; INIS; GPO Dep.

This building characterization plan was developed as an addendum to the existing site characterization work plan documents, which are in Appendix B of the David Witherspoon, Inc., (DWI) preliminary remedial investigation (RI)/feasibility study (FS). All building characterization activities will be conducted in accordance with the rules of the Hazardous Substance Remedial Action Program under the direction of the Tennessee Department of Environment and Conservation, Division of Superfund (TN Rules 1200-1-3) and its implementing regulations. Additional rules of the state of Tennessee, Comprehensive Environmental Response, Compensation, and Liability Act of 1980, and the U.S. Environmental Protection Agency guidance were consulted during development of this plan. Activities at the DWI site were concerned with scrap metal processing and scrap metal resale.

172
(DOE/OR–11-1617-D1)
US Department of Energy Portsmouth annual environmental report for 1996. Oak Ridge National Lab., TN (United States). Sep 1997. 129p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. (POEF-LMES–139-D1). Order Number DE98000631. Source: OSTI; NTIS; INIS; GPO Dep.

The Portsmouth plant is one of two U.S. Department of Energy (DOE)-owned, contractor-managed uranium enrichment facilities in operation. As of July 1, 1993, responsibility for implementing environmental compliance at the facility was split between DOE, as site owner, and the United States Enrichment Corporation (USEC), a government-owned corporation formed by the National Energy Policy Act of 1992, to operate the nation's uranium enrichment business. The management contractor for DOE is Lockheed Martin Energy Systems (formerly Martin Marietta Energy Systems), which is responsible for waste management, environmental restoration, removal of highly enriched uranium (HEU), and operation of nonleased facilities at the

Portsmouth Gaseous Diffusion Plant (DOE/PORTS). Lockheed Martin Utility Services (formerly Martin Marietta Utility Services) provides management services for USEC. The Nuclear Regulatory Commission will assume direct oversight of USEC operations in 1997. Until then, DOE will provide oversight of nuclear safety and safeguards and security. DOE/PORTS is located on about six square miles in Pike County, Ohio. The County has approximately 24,250 residents. The total population within 50 miles of the plant is about 900,000. The main process at PORTS has been the separation of uranium isotopes through gaseous diffusion. Uranium is no longer enriched by DOE at PORTS. The uranium enrichment production operation facilities at the site are leased to USEC and are managed and operated by Lockheed Martin Utility Services.

173
(DOE/OR/21985–93-455)
Geohydrologic data for the St. Charles County well field and public-water supply 1985-91, and projected public-water supply, 1995 and 2000, for St. Charles County, Missouri. Mugel, D.N. Geological Survey, Rolla, MO (United States). [1996]. 33p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AI05-91OR21985. (CONF-9602126–Summ.: Geosciences workshop, O'Fallon, MO (United States), 21 Feb 1996; USGS-OFR–93-455). Order Number DE97000188. Source: OSTI; NTIS; U.S. Geological Survey, Earth Science Information Center, Open-File Reports Section, Box 25286, MS 517, Federal Center, Denver CO 80225; GPO Dep.

Geohydrologic data for this well field and public water supply data for St. Charles County were compiled to assist US DOE in developing the St. Charles County well field contingency plan to ensure a supply of water in the event that the well field becomes contaminated from wastes (radioactive, nitroaromatic, other) stored in the Weldon Spring quarry. The well field consists of 8 wells penetrating the entire thickness of the Missouri River alluvial aquifer and is 98-116 feet deep. Aquifer tests were conducted on 3 occasions at 3 different locations in the well field. Calculated transmissivities range from 900 to 60,200 feet squared per day; hydraulic conductivities ranged from 23 to 602 feet/day. Calculated/estimated storage coefficients ranged from 0.005 to 0.2. Tracer test showed effective porosity of 0. 21-0.32. Point dilution showed a ground-water velocity of 0.83 foot/day. From 1985-91, ave daily water supply from the well field and water treatment plant increased from 5.76 to 10.23 Mgd; this is projected to increase to 11.0 Mgd in 1995 and to 12.2 Mgd in 2000. The water department's projections of peak daily demands from customers indicate that these demands will exceed the capacity of the treatment plant in 1995 and will exceed the capacities of the well field and plant during 2000.

174
(DOE/ORO–2036)
Testing and evaluation of electrokinetic decontamination of concrete. DePaoli, D.W. (Oak Ridge National Lab., TN (United States). Chemical Technology Div.); Harris, M.T.; Ally, M.R. Oak Ridge National Lab., TN (United States). Oct 1996. 133p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97000033. Source: OSTI; NTIS; INIS; GPO Dep.

The goals and objectives of the technical task plan (TTP) are to (1) describe the nature and extent of concrete contamination within the Department of Energy (DOE) complex and emerging and commercial technologies applicable to these problems; (2) to match technologies to the concrete problems and recommend up to four demonstrations; (3) to initiate recommended demonstrations; and (4) to continue investigation and evaluation of the application of electrokinetic decontamination processes to concrete. This document presents findings of experimental and theoretical studies of the electrokinetic decontamination (EK) process and their implications for field demonstrations. This effort is an extension of the work performed under TTP 142005, "Electroosmotic Concrete Decontamination. The goals of this task were to determine the applicability of EK for treating contaminated concrete and, if warranted, to evaluate EK as a potential technology for demonstration. 62 refs.

175
(DOE/OSTI–3411/2)
The Office of Environmental Management technical reports: a bibliography. USDOE Office of Scientific and Technical Information (OSTI), Oak Ridge, TN (United States). Jul 1997. 961p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97006343. Source: OSTI; NTIS; INIS; GPO Dep.

The Office of Environmental Management's (EM) technical reports bibliography is an annual publication that contains information on scientific and technical reports sponsored by the Office of Environmental Management added to the Energy Science and Technology Database from July 1, 1995 through Sept. 30, 1996. This information is divided into the following categories: Focus Areas and Crosscutting Programs. Support Programs, Technology Integration and International Technology Exchange are now included in the General category. EM's Office of Science and Technology sponsors this bibliography.

176
(DOE/RL–92-35-Rev.1)
Hanford facility dangerous waste permit application, 325 hazardous waste treatment units. Revision 1. Pacific Northwest National Lab., Richland, WA (United States). Jul 1997. [250p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. (PNNL–11649). Order Number DE97054025. Source: OSTI; NTIS; INIS; GPO Dep.

This report contains the Hanford Facility Dangerous Waste Permit Application for the 325 Hazardous Waste Treatment Units (325 HWTUs) which consist of the Shielded Analytical Laboratory, the 325 Building, and the 325 Collection/Loadout Station Tank. The 325 HWTUs receive, store, and treat dangerous waste generated by Hanford Facility programs. Routine dangerous and/or mixed waste treatment that will be conducted in the 325 HWTUs will include pH adjustment, ion exchange, carbon absorption, oxidation, reduction, waste concentration by evaporation, precipitation, filtration, solvent extraction, solids washing, phase separation, catalytic destruction, and solidification/stabilization.

177
(DOE/RL–96-16-C-R1-V2)
Data for the screening assessment: Volume 2, Appendices. Columbia River comprehensive impact assessment. Miley, T.B.; O'Neil, T.K.; Gilbert, R.O.; Klevgard,

L.A.; Walters, T.B. Pacific Northwest National Lab., Richland, WA (United States). Apr 1997. 493p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. (PNNL–11540-Rev.1-Vol.2). Order Number DE97052906. Source: OSTI; NTIS; INIS; GPO Dep.

For complete package including technical report and 9 diskettes, Order nos. DE97006073, DE97006074, DE97006075, DE97006076, DE97006077, DE97006078, DE97006079, DE97006080, and DE97006081.

This report contains three appendices: Appendix A - Raw Concentration Data, Appendix B - Maps of Sampling Locations by Segment with Coordinates, and Appendix C - Plots of Raw Data and Maximum Representative Values for the Contaminants of Interest. The raw environmental data collected from all sources for use in the screening assessment were combined into a single Microsoft Access database for each medium. The raw data values for biota, cobalt-60 particles, drive point groundwater, N Springs punch point water, and pore water are provided in this report for completeness.

178
(DOE/RL–96-16-Vol.1-Draft)
Screening assessment and requirements for a comprehensive assessment: Volume 1, Draft. Columbia River comprehensive impact assessment. Pacific Northwest National Lab., Richland, WA (United States). Apr 1997. 647p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. (PNNL–11540-Vol.1-Draft). Order Number DE97052904. Source: OSTI; NTIS; INIS; GPO Dep.

For complete package including technical report and 8 diskettes, Order nos. DE97006258, DE97006259, DE97006260, DE97006261, DE97006262, DE97006263, DE97006264, and DE97006265.

To evaluate the impact to the Columbia River from the Hanford Site-derived contaminants, the U.S. Department of Energy, U.S. Environmental Protection Agency, and Washington State Department of Ecology initiated a study referred to as the Columbia River Comprehensive Impact Assessment (CRCIA). To address concerns about the scope and direction of CRCIA as well as enhance regulator, tribal, stockholder, and public involvement, the CRCIA Management Team was formed in August 1995. The Team agreed to conduct CRCIA using a phased approach. The initial phase, includes two components: 1) a screening assessment to evaluate the potential impact to the river, resulting from current levels of Hanford-derived contaminants in order to support decisions on Interim Remedial Measures, and 2) a definition of the essential work remaining to provide an acceptable comprehensive river impact assessment. The screening assessment is described in Part I of this report. The essential work remaining is Part II of this report. The objective of the screening assessment is to identify areas where the greatest potential exists for adverse effects on humans or the environment. Part I of this report discusses the scope, technical approach, and results of the screening assessment. Part II defines a new paradigm for predecisional participation by those affected by Hanford cleanup decisions.

179
(DOE/RL–96-106)
100-KR-4 pump and treat project: Report of archeological test excavations. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 35p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052823. Source: OSTI; NTIS; INIS; GPO Dep.

Remediation activities planned for the 100-KR-4 Operable Unit help protect the Columbia River by pumping chromium-contaminated groundwater to a treatment system and then returning the treated water to the aquifer upgradient of the 116-K-2 trench. These activities are taking place within an area of extreme cultural resource sensitivity. Several meetings were held between the U.S. Department of Energy, Richland Operations Office, the Environmental Restoration Contractor Project Team, and Tribal representatives of the affected Tribes and Nation to design the project to both protect the area's natural and cultural resources while reducing the flow of chromium to the Columbia River.

180
(DOE/RL–96-107)
Mitigation action plan for the 100-HR-3 and 100-KR-4 pump and treat project. Bechtel Hanford, Inc., Richland, WA (United States). Nov 1996. 21p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97051701. Source: OSTI; NTIS; INIS; GPO Dep.

This project involves drilling 22 wells, improving access roads to existing and new wells, laying connecting pipes, and constructing groundwater treatment facilities in the 100-KR-4 Area and 100-HR-3 Operable Units. Drilling is expected to be completed by September 1996, but the treatment operations will continue for approximately 10 years.

181
(DOE/RL–97-08)
Removal action report for the 233-S Plutonium Concentration Facility. USDOE Richland Operations Office, WA (United States). Aug 1997. 340p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE98050446. Source: OSTI; NTIS; GPO Dep.

The 233-S Facility is located just north of the Reduction Oxidation (REDOX) Plant in the 200 West Area, as shown in Figure 1-1. The original construction of the 233-S Facility was completed in 1955 to expand plutonium production by further concentrating the plutonium nitrate product solution from the REDOX Plant. The 233-S Facility operated until July 1967, at which time the building entered the U.S. Department of Energy (DOE) Surplus Facility Management Program as a retired facility. The 233-S Facility has been inactive for over 25 years and has no identified future use that would justify a partial cleanup/maintenance approach. The building is a significantly, radioactively contaminated facility that has undergone severe structural deterioration due to exposure to extreme weather conditions. Decommissioning activities will be performed in a manner that prevents the release of hazardous substances to the environment and minimizes personnel exposures to levels as low as reasonably achievable(ALARA). The removal of facility components, the dismantlement of the facility structures, and the processing of generated wastes create conditions that could release contamination to the atmosphere. The removal of

subsurface structures could potentially release contaminants into the underlying soil.

182
(DOE/RL/12929–1)
Science literacy programs for K-12 teachers, public officials, news media and the public. Final report, 1994–1997. Science and Society Inst., Ellensburg, WA (United States). Mar 1997. 42p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG06-94RL12929. Order Number DE97009219. Source: OSTI; NTIS; GPO Dep.

On 12 July 94, The Institute for Science and Society received the above titled grant for $300,000 with an additional $323,000 awarded 14 August 95. The Institute completed the programs provided by the Department of Energy grant on 28 February 97. These programs for teachers, public officials, news media and the public will continue through 31 December 97 with funding from other sources. The Institute is a non-profit 501-c-3 corporation. It was organized "... to help increase science literacy in all segments of the population and contribute to a more rational atmosphere than now exists for the public consideration of societal issues involving science and technology, both regional and national." Institute personnel include the Honorable Mike McCormack, Director; Joan Harris, Associate Director; Kim Freier, Ed.D, Program Manager; and Sharon Hunt, Executive Secretary.

183
(DOE/S–0118)
Pollution prevention program plan 1996. USDOE Office of the Secretary, Washington, DC (United States). 1996. 72p. Sponsored by USDOE, Washington, DC (United States). Order Number DE96011033. Source: OSTI; NTIS; INIS; GPO Dep.

This plan serves as the principal crosscutting guidance to Department of Energy (DOE) Headquarters, Operations Office, laboratory, and contractor management to fully implement pollution prevention programs within the DOE complex between now and 2000. To firmly demonstrate DOE's commitment to pollution prevention, the Secretary of Energy has established goals, to be achieved by December 31, 1999, that will aggressively reduce DOE's routine generation of radioactive, mixed, and hazardous wastes, and total releases and offsite transfers of toxic chemicals. The Secretary also has established sanitary waste reduction, recycling, and affirmative procurement goals. Site progress in meeting these goals will be reported annually to the Secretary in the Annual Report on Waste Generation and Waste Minimization Progress, using 1993 as the baseline year. Implementation of this plan will represent a major step toward reducing the environmental risks and costs associated with DOE operations.

184
(DOE/SF/20686–T1)
Laboratory for Energy-Related Health Research (LEHR) University of California at Davis, California. Final report. Weiss Associates, Emeryville, CA (United States). Sep 1997. 224p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC03-96SF20686. Order Number DE98000930. Source: OSTI; NTIS; INIS; GPO Dep.

This Annual Site Environmental Report for the Laboratory for Energy-Related Health Research (LEHR) Site (the Site) includes 1996 environmental monitoring data for Site air, soil, ground water, surface water, storm water and ambient radiation. DOE operation of LEHR as a functioning research location ceased in 1989, after the completion of three decades of research on the health effects of low-level radiation exposure (primarily strontium-90 and radium-226), using beagles to simulate effects on human health. During 1996, the U.S. Department of Energy (DOE) conducted activities at the Site in support of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Environmental remediation and the decontamination and decommissioning (D&D) of Site buildings. Extensive environmental data were collected in 1996 to evaluate appropriate remedial actions for the Site.

185
(DOE/SF/20948–T1)
Plutonium stabilization and packaging system. BNFL, Inc., Richland, WA (United States). [1996]. 175p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC03-96SF20948. Order Number DE96009306. Source: OSTI; NTIS; INIS; GPO Dep.

This document describes the functional design of the Plutonium Stabilization and Packaging System (Pu SPS). The objective of this system is to stabilize and package plutonium metals and oxides of greater than 50% wt, as well as other selected isotopes, in accordance with the requirements of the DOE standard for safe storage of these materials for 50 years. This system will support completion of stabilization and packaging campaigns of the inventory at a number of affected sites before the year 2002. The package will be standard for all sites and will provide a minimum of two uncontaminated, organics free confinement barriers for the packaged material.

186
(DOE/SF/20948–T4)
System specification/system design document comment review: Plutonium Stabilization and Packaging System. Notes of conference. BNFL, Inc., Denver, CO (United States). [1996]. 158p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC03-96SF20948. Order Number DE96012349. Source: OSTI; NTIS; INIS; GPO Dep.

A meeting was held between DOE personnel and the BNFL team to review the proposed resolutions to DOE comments on the initial issue of the system specification and system design document for the Plutonium Stabilization and Packaging System. The objectives of this project are to design, fabricate, install, and start up a glovebox system for the safe repackaging of plutonium oxide and metal, with a requirement of a 50-year storage period. The areas discussed at the meeting were: nitrogen in can; moisture instrumentation; glovebox atmosphere; can marking-bar coding; weld quality; NFPA-101 references; inner can swabbing; ultimate storage environment; throughput; convenience can screw-top design; furnace/trays; authorization basis; compactor safety; schedule for DOE review actions; fire protection; criticality safety; applicable standards; approach to MC and A; homogeneous oxide; resistance welder power; and tray overfill. Revised resolutions were drafted and are presented.

187
(DOE/SF/20948–T6)
System specification for the plutonium stabilization and packaging system. BNFL Engineering Ltd., Denver, CO (United States). 1996. 188p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC03-96SF20948. Order Number DE96012347. Source: OSTI; NTIS; INIS; GPO Dep.

This document describes functional design requirements for the Plutonium Stabilization and Packaging System (Pu SPS), as required by DOE contract DE-AC03-96SF20948 through contract modification 9 for equipment in Building 707 at Rocky Flats Environmental Technology Site (RFETS).

188
(DOE/WIPP–95-2065-Rev.1)
Waste Isolation Pilot Plant safety analysis report. US-DOE Albuquerque Operations Office, NM (United States). Waste Isolation Pilot Plant Project Office. Mar 1997. 1004p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-86AL31950. Order Number DE97005099. Source: OSTI; NTIS; INIS; GPO Dep.

The United States Department of Energy (DOE) was authorized by Public Law 96-164 to provide a research and development facility for demonstrating the safe permanent disposal of transuranic (TRU) wastes from national defense activities and programs of the United States exempted from regulations by the US Nuclear Regulatory Commission (NRC). The Waste Isolation Pilot Plant (WIPP), located in southeastern New Mexico near Carlsbad, was constructed to determine the efficacy of an underground repository for disposal of TRU wastes. In accordance with the 1981 and 1990 Records of Decision (ROD), the development of the WIPP was to proceed with a phased approach. Development of the WIPP began with a siting phase, during which several sites were evaluated and the present site selected based on extensive geotechnical research, supplemented by testing. The site and preliminary design validation phase (SPDV) followed the siting phase, during which two shafts were constructed, an underground testing area was excavated, and various geologic, hydrologic, and other geotechnical features were investigated. The construction phase followed the SPDV phase during which surface structures for receiving waste were built and underground excavations were completed for waste emplacement.

189
(DOE/WIPP–95-2132)
WIPP WAC REV. 5 applicability. Bisping, R.L. (U.S. Dept. of Energy, Carlsbad, NM (United States)); Kelley, C.R. Westinghouse Electric Corp., Carlsbad, NM (United States). Waste Isolation Div. [1996]. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-86AL31950. (CONF-960212–97: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96014293. Source: OSTI; NTIS; INIS; GPO Dep.

The Department of Energy (DOE) is preparing for disposal operations at the Waste Isolation Pilot Plant (WIPP) in 1998. WIPP is a deep geological repository designed for the safe and efficient disposal of transuranic (TRU) wastes. The Waste Acceptance Criteria (WAC) for WIPP were initially developed by a DOE steering committee in 1980. Revision 5 reflects the latest negotiations and permit requirements from the Environmental Protection Agency (EPA), the State of New Mexico Environment Department (NMED), and the Nuclear Regulatory Commission (NRC). The regulatory requirements are combined with the requirements derived from the WIPP safety analysis performed for disposal operations and the original criteria established for safe waste handling operations. The WIPP WAC provides a comprehensive overview of the requirements and basis for developing waste acceptance criteria to meet today's rules and regulations for transportation and disposal of TRU wastes. The authors believe that it is a comprehensive criteria and a guidance manual for generator/storage sites who must characterize and certify TRU waste for disposal at WIPP. It also provides valuable insight to future projects that may develop their own waste acceptance criteria. The WIPP WAC presents the requirements from the following sources: 1) Resource Conservation and Recovery Act (RCRA) Permit Application; 2) Land Disposal No-migration Variance Petition; 3) 40 CFR 191 Draft Compliance Certification Application; 4) Certificate of Compliance (C of C) from the NRC for a Type B shipping container; 5) Federal Land Withdrawal Act for WIPP; WIPP Safety Analysis Report; 7) WIPP System Design Descriptions (SDDs). The WIPP WAC combines operations and nuclear safety requirements with transportation and hazardous waste regulatory requirements to provide a comprehensive set of criteria and requirements that ensure the safe disposal of TRU waste.

190
(DOE/WIPP–95-2140)
Environmental impact statement for initiation of transuranic waste disposal at the waste isolation pilot plant. Johnson, H.E. (U.S. Dept. of Energy, Carlsbad, NM (United States) Carlsbad Area Office); Whatley, M.E. Westinghouse Electric Corp., Carlsbad, NM (United States). Waste Isolation Div. [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-86AL31950. (CONF-960911–2: Canadian Nuclear Society (CNS) international conference on deep geological disposal of radioactive waste, Winnipeg (Canada), 15-18 Sep 1996). Order Number DE96014289. Source: OSTI; NTIS; INIS; GPO Dep.

WIPP's long-standing mission is to demonstrate the safe disposal of TRU waste from US defense activities. In 1980, to comply with NEPA, US DOE completed its first environmental impact statement (EIS) which compared impacts of alternatives for TRU waste disposal. Based on this 1980 analysis, DOE decided to construct WIPP in 1981. In a 1990 decision based on examination of alternatives in a 1990 Supplemental EIS, DOE decided to continue WIPP development by proceeding with a testing program to examine WIPP's suitability as a TRU waste repository. Now, as DOE's Carlsbad Area Office (CAO) attempts to complete its regulatory obligations to begin WIPP disposal operations, CAO is developing WIPP's second supplemental EIS (SEIS-II). To complete the SEIS-II, CAO will have to meet a number of challenges. This paper explores both the past and present EISs prepared to evaluate the suitability of WIPP. The challenges in completing an objective comparison of alternatives, while also finalizing other critical-path compliance documents, controlling costs, and keeping stakeholders involved during the decision-making process are addressed.

191
(DOE/WIPP–96-2087)
Time domain reflectometry as a rock mass monitoring technique. Francke, J.L.; Terrill, L.J.; Allen, W.W. Westinghouse Electric Corp., Carlsbad, NM (United States). Waste Isolation Div. [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-86AL31950. (CONF-960303–2: Annual meeting and exhibition of the Society for Mining, Metallurgy and Exploration, Phoenix, AZ (United States), 11-14 Mar 1996). Order Number DE96010276. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes the practices and methods used in a study of Time Domain Reflectometry (TDR) as an inexpensive deformation monitoring tool in underground excavations at the Waste Isolation Pilot Plant (WIPP). The WIPP is being developed near Carlsbad, New Mexico, for the disposal of transuranic nuclear wastes in bedded salt 655 m (2150 ft) below the surface. Data collected from WIPP geomechanical monitoring are used to characterize conditions, confirm design assumptions, and understand and predict the performance of the deep salt excavation. The geomechanical monitoring techniques ranging from inspection of observation boreholes to advanced radar surveys. In 1989 TDR was introduced as a monitoring tool with the installation of 12.7 mm (0.5 in) diameter TDR cables in the underground excavations. In 1993, a new TDR system was installed in a separate location. Based on experience with the previous installation, enhancements were implemented into the new TDR system that: (1) extended the period of performance by increasing cable diameter to 22. 2 mm (0.875 in), (2) increased accuracy in locating areas of deformation by aligning cables with nearby observation boreholes, and (3) improved data acquisition and analyses using a standard laptop computer, eliminating the chart recorder previously used. In summary, the results of a correlation between the TDR signatures to nearby observation boreholes and geomechanical instrumentation will be presented.

192
(DOE/WIPP–96-2164)
Monitoring roof beam lateral displacement at the waste isolation pilot plant. Terrill, L.J.; Lewis, R.E. Westinghouse Electric Corp., Carlsbad, NM (United States). Waste Isolation Div. [1996]. 13p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-86AL31950. Order Number DE96014291. Source: OSTI; NTIS; INIS; GPO Dep.

Lateral displacement in the immediate roof beam at the Waste Isolation Pilot Plant (WIPP) is a significant factor in assessment of excavation performance for the design of ground control systems. Information on roof beam lateral displacement, expansion, fracture formation, as well as excavation convergence, is gathered using a variety of manually and remotely read instruments. Visual observations are also used when possible. This paper describes the methods used to measure lateral displacement, or offset, at the WIPP. Offset magnitudes are determined by the degree of occlusion in drillholes that intersect the offset plane. The Borehole Lateral Displacement Sensor (BLDS) was developed for installation at WIPP to monitor offset at a high degree of accuracy at a short reading frequency. Offset measurements have historically been obtained by visual estimation of borehole occlusion. Use of the BLDS will enable relationships between time dependent roof beam lateral displacement and expansion to be established in much shorter periods than is possible using visual observations. The instrument will also allow remote monitoring of roof beam displacement in areas where visual estimations are not possible. Continued monitoring of roof beam displacement, convergence, and expansion, is integral to timely and pertinent assessments of WIPP excavation performance.

193
(DOE/WIPP–96-2175)
Hazard and consequence analysis for waste emplacement at the Waste Isolation Pilot Plant. Gerstner, D.M.; Clayton, S.G.; Farrell, R.F.; McCormick, J.A.; Ortiz, C.; Standiford, D.L. Westinghouse Electric Corp., Carlsbad, NM (United States). Waste Isolation Div. [1996]. 2p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-86AL31950. Order Number DE96010280. Source: OSTI; NTIS; INIS; GPO Dep.

The Carlsbad Area Office established and analyzed the safety bases for the design and operations as documented in the WIPP Safety Analysis Report (SAR). Additional independent efforts are currently underway to assess the hazards associated with the long-term (10,000 year) isolation period as required by 40 CFR 191. The structure of the WIPP SAR is unique due to the hazards involved, and the agreement between the State of New Mexico and the DOE regarding SAR content and format. However, the hazards and accident analysis philosophy as contained in DOE-STD-3009-94 was followed as closely as possible, while adhering to state agreements. Hazards associated with WIPP waste receipt, emplacement, and disposal operations were systematically identified using a modified Hazard and Operability Study (HAZOP) technique. The WIPP HAZOP assessed the potential internal, external, and natural phenomena events that can cause the identified hazards to develop into accidents. The hazard assessment identified deviations from the intended design and operation of the waste handling system, analyzed potential accident consequences to the public and workers, estimated likelihood of occurrence, and evaluated associated preventative and mitigative features. It was concluded from the assessment that the proposed WIPP waste emplacement operations and design are sufficient to ensure safety of the public, workers, and environment, over the 35 year disposal phase.

194
(DOE/WIPP–96-2192)
Direct laboratory tensile testing of select yielding rock bolt systems. VandeKraats, J.D.; Watson, S.O. Westinghouse Electric Corp., Carlsbad, NM (United States). Waste Isolation Div. [1996]. 12p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-86AL31950. Order Number DE96014290. Source: OSTI; NTIS; GPO Dep.

Yielding rock bolt support systems have been developed to accommodate ground movement in shifting ground such as in coal operations; in creeping ground such as salt, trona, and potash; and in swelling ground associated with some clays. These systems, designed to remain intact despite ground movement, should enhance mine safety and help contain costs in areas where rebolting of rigid non-yielding systems is typically required. Four such systems were tested in straight tensile pulls in the laboratory. They include the Slip Nut System from Dywidag Systems International USA, Inc., Ischebeck's bolt mounted Titan Load Indicator, Rocky Mountain Bolt Company's Yielding Cable Bolt, and a

rock bolt installed variation of the yielding steel post developed by RE/SPEC Inc. The first two systems are currently marketed products and the latter two are prototype systems. Each system responds to load and displacement by yielding in an unique manner. All are designed to yield at predetermined loads. A description of each system and its yield function is provided. Each system was tested over its prescribed yield range in a test machine. At least five tests were performed on each system. Each system yielded and continued to provide support according to its design. Each shows promise for ground control use in shifting or creeping rock. This work helps to illustrate the comparative differences in performance between these specialized systems and the applications where they may be most useful.

195
(ES/ER/MS–5)
Evaluation of radiochemical data usability. Paar, J.G. (Univ. of Tennessee, Knoxville, TN (United States)); Porterfield, D.R. Oak Ridge National Lab., TN (United States). Apr 1997. 80p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97003857. Source: OSTI; NTIS; INIS; GPO Dep.

This procedure provides a framework for implementation of radiochemical data verification and validation for environmental remediation activities. It has been developed through participation of many individuals currently involved in analytical radiochemistry, radiochemical validation, and validation program development throughout the DOE complex. It should be regarded as a guidance to use in developing an implementable radiochemical validation strategy. This procedure provides specifications for developing and implementing a radiochemical validation methodology flexible enough to allow evaluation of data useability for project-specific Data Quality Objectives (DQO). Data produced by analytical methods for which this procedure provides limited guidance are classified as "non-routine" radionuclides and methods, and analyses by these methods may necessitate adoption of modified criteria from this procedure.

196
(ES/ER/TM–227-Pt.1A)
Nuclear facility decommissioning and site remedial actions: A selected bibliography, Volume 18. Part 1A: Citations with abstracts, sections 1 through 9. Oak Ridge National Lab., TN (United States); Remedial Action Program Information Center, Oak Ridge, TN (United States); Information International Associates, Inc., Oak Ridge, TN (United States). Sep 1997. 447p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE98002757. Source: OSTI; NTIS; GPO Dep.

This bibliography contains 3,638 citations with abstracts of documents relevant to environmental restoration, nuclear facility decontamination and decommissioning (D and D), uranium mill tailings management, and site remedial actions. The bibliography contains scientific, technical, financial, and regulatory information that pertains to DOE environmental restoration programs. The citations are separated by topic into 16 sections, including (1) DOE Environmental Restoration program; (2) DOE D and D Program; (3) Nuclear Facilities Decommissioning; (4) DOE Formerly Utilized Sites Remedial Action Program; (5) NORM-Contaminated Site Restoration; (6) DOE Uranium Mill Tailings Remedial Action Project; (7) Uranium Mill Tailings Management; (8) DOE Site-Wide Remedial Actions; (9) DOE Onsite Remedial Action Projects; (10) Contaminated Site Remedial Actions; (11) DOE Underground Storage Tank Remediation; (12) DOE Technology Development, Demonstration, and Evaluation; (13) Soil Remediation; (14) Groundwater Remediation; (15) Environmental Measurements, Analysis, and Decision-Making; and (16) Environmental Management Issues.

197
(ES/ER/TM–227-Pt.1B)
Nuclear facility decommissioning and site remedial actions: A selected bibliography, Volume 18. Part 1B: Citations with abstracts, sections 10 through 16. Oak Ridge National Lab., TN (United States); Remedial Action Program Information Center, Oak Ridge, TN (United States); Information International Associates, Inc., Oak Ridge, TN (United States). Sep 1997. 508p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE98002758. Source: OSTI; NTIS; GPO Dep.

This bibliography contains 3,638 citations with abstracts of documents relevant to environmental restoration, nuclear facility decontamination and decommissioning (D and D), uranium mill tailings management, and site remedial actions. The bibliography contains scientific, technical, financial, and regulatory information that pertains to DOE environmental restoration programs. The citations are separated by topic into 16 sections, including (1) DOE Environmental Restoration Program; (2) DOE D and D Program; (3) Nuclear Facilities Decommissioning; (4) DOE Formerly Utilized sites Remedial Action Program; (5) NORM-Contaminated Site Restoration; (6) DOE Uranium Mill Tailings Remedial Action Project; (7) Uranium Mill Tailings Management; (8) DOE Site-Wide Remedial Actions; (9) DOE Onsite Remedial Action Projects; (10) Contaminated Site Remedial Actions; (11) DOE Underground Storage Tank Remediation; (12) DOE Technology Development, Demonstration, and Evaluation; (13) Soil Remediation; (14) Groundwater Remediation; (15) Environmental Measurements, Analysis, and Decision-Making; and (16) Environmental Management Issues.

198
(ES/ER/TM–227/Pt.2)
Nuclear facility decommissioning and site remedial actions: A selected bibliography, Vol. 18. Part 2. Indexes. Oak Ridge National Lab., TN (United States). Sep 1997. 418p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE98003275. Source: OSTI; NTIS; INIS; GPO Dep.

This bibliography contains 3638 citations with abstracts of documents relevant to environmental restoration, nuclear facility decontamination and decommissioning (D&D), uranium mill tailings management, and site remedial actions. This report is the eighteenth in a series of bibliographies prepared annually for the U.S. Department of Energy (DOE) Office of Environmental Restoration. Citations to foreign and domestic literature of all types - technical reports, progress reports, journal articles, symposia proceedings, theses, books, patents, legislation, and research project descriptions - have been included in Part 1 of the report. The bibliography

contains scientific, technical, financial, and regulatory information that pertains to DOE environmental restoration programs. The citations are separated by topic into 16 sections, including (1) DOE Environmental Restoration Program; (2) DOE D&D Program; (3) Nuclear Facilities Decommissioning; (4) DOE Formerly Utilized Sites Remedial Action Programs; (5) NORM-Contaminated Site Restoration; (6) DOE Uranium Mill Tailings Remedial Action Project; (7) Uranium Mill Tailings Management; (8) DOE Site-Wide Remedial Actions; (9) DOE Onsite Remedial Action Projects; (10) Contaminated Site Remedial Actions; (11) DOE Underground Storage Tank Remediation; (12) DOE Technology Development, Demonstration, and Evaluations; (13) Soil Remediation; (14) Groundwater Remediation; (15) Environmental Measurements, Analysis, and Decision-Making; and (16) Environmental Management Issues. Within the 16 sections, the citations are sorted by geographic location. If a geographic location is not specified, the citations are sorted according to the document title. In Part 2 of the report, indexes are provided for author, author affiliation, selected title phrase, selected title word, publication description, geographic location, and keyword.

199
(FEMP–2516)
Remediation activities at the Fernald Environmental Management Project (FEMP). Walsh, T.J. (FERMCO, Cincinnati, OH (United States)); Danner, R. Fernald Environmental Restoration Management Corp., Cincinnati, OH (United States). Fernald Environmental Management Project. 1996. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC24-92OR21972. (CONF-9606125–10: Air and Waste Management (AWM) annual meeting, Nashville, TN (United States), 23-28 Jun 1996). Order Number DE96012142. Source: OSTI; NTIS; INIS; GPO Dep.

The Fernald Environmental Management Project (FEMP) is a United States Department of Energy (DOE) facility located in southwestern Ohio. The facility began manufacturing uranium products in the early 1950's and continued processing uranium ore concentrates until 1989. The facility used a variety of chemical and metallurgical processes to produce uranium metals for use at other DOE sites across the country. Since the facility manufactured uranium metals for over thirty years, various amounts of radiological contamination exists at the site. Because of the chemical and metallurgical processes employed at the site, some hazardous wastes as defined by the Resource Conservation and Recovery Act (RCRA) were also generated at the site. In 1989. the FEMP was placed on the National Priorities List (NPL) requiring cleanup of the facility's radioactive and chemical contamination under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This paper discusses the proposed remediation activities at the five Operable Units (OUs) designated at the FEMP. In addition, the paper also examines the ongoing CERCLA response actions and RCRA closure activities at the facility.

200
(INEEL/EXT–97-00496)
Preparation of plutonium waste forms with ICPP calcined high-level waste. Staples, B.A. (Lockheed Idaho Technologies Co., Idaho Falls, ID (United States)); Knecht, D.A.; O'Holleran, T.P. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). May 1997. 80p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050303. Source: OSTI; NTIS; INIS; GPO Dep.

Glass and glass-ceramic forms developed for the immobilization of calcined high-level wastes generated by Idaho Chemical Processing Plant (ICPP) fuel reprocessing activities have been investigated for ability to immobilize plutonium and to simultaneously incorporate calcined waste as an anti-proliferation barrier. Within the forms investigated, crystallization of host phases result in an increased loading of plutonium as well as its incorporation into potentially more durable phases than the glass. The host phases were initially formed and characterized with cerium (Ce^{+4}) as a surrogate for plutonium (Pu^{+4}) and samarium as a neutron absorber for criticality control. Verification of the surrogate testing results were then performed replacing cerium with plutonium. All testing was performed with surrogate calcined high-level waste. The results of these tests indicated that a potentially useful host phase, based on zirconia, can be formed either by devitrification or solid state reaction in the glass studied. This phase incorporates plutonium as well as samarium and the calcined waste becomes part of the matrix. Its ease of formation makes it potentially useful in excess plutonium dispositioning. Other durable host phases for plutonium and samarium, including zirconolite and zircon have been formed from zirconia or alumina calcine through cold press-sintering techniques and hot isostatic pressing. Host phase formation experiments conducted through vitrification or by cold press-sintering techniques are described and the results discussed. Recommendations are given for future work that extends the results of this study.

201
(INEEL/EXT–97-00587)
ICPP environmental monitoring report for CY-1996. Neff, J.K. Idaho National Engineering Lab., Idaho Falls, ID (United States). Jun 1997. 45p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050472. Source: OSTI; NTIS; INIS; GPO Dep.

Summarized in this report are the data collected through Environmental Monitoring programs conducted at the Idaho Chemical Processing Plant (ICPP) by the Environmental Affairs Department. This report is published in response to DOE Order 5400.1. The ICPP is responsible for complying with all applicable Federal, State, Local and DOE Rules, Regulations and Orders. Radiological effluent and emissions are regulated by the DOE in accordance with the Derived Concentration Guides (DCGs) as presented in DOE Order 5400.5. The State of Idaho regulates nonradiological waste resulting from the ICPP operations including airborne, liquid, and solid waste. Quality Assurance activities have resulted in the ICPP's implementation of the Environmental Protection Agency (EPA) rules and guidelines pertaining to the collection, analyses, and reporting of environmentally related samples. Where no EPA methods for analyses existed for radionuclides, Lockheed Martin Idaho Technologies Company (LMITCO) methods were used.

202
(INEEL/EXT–97-00666)
Hot Spot Removal System: System description. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Sep 1997. [300p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050428. Source: OSTI; NTIS; INIS; GPO Dep.

Hazardous wastes contaminated with radionuclides, chemicals, and explosives exist across the Department of Energy complex and need to be remediated due to environmental concerns. Currently, an opportunity is being developed to dramatically reduce remediation costs and to assist in the acceleration of schedules associated with these wastes by deploying a Hot Spot Removal System. Removing the hot spot from the waste site will remove risk driver(s) and enable another, more cost effective process/option/remedial alternative (i.e., capping) to be applied to the remainder of the site. The Hot Spot Removal System consists of a suite of technologies that will be utilized to locate and remove source terms. Components of the system can also be used in a variety of other cleanup activities. This Hot Spot Removal System Description document presents technologies that were considered for possible inclusion in the Hot Spot Removal System, technologies made available to the Hot Spot Removal System, industrial interest in the Hot Spot Removal System's subsystems, the schedule required for the Hot Spot Removal System, the evaluation of the relevant technologies, and the recommendations for equipment and technologies as stated in the Plan section.

203
(INEEL/EXT–97-00699)
Evaluation of strain levels in the IFSF rack. Richins, W.D.; Miller, G.K. Idaho National Engineering Lab., Idaho Falls, ID (United States). Jun 1997. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050359. Source: OSTI; NTIS; GPO Dep.

An evaluation has been performed on strain levels determined for the IFSF fuel storage rack for seismic loading. The storage rack had been previously analyzed by a consulting company, Advanced Engineering Consultants (AEC), who reported significant strain levels in several members of the rack. The purpose for the study conducted herein was to refine the method for calculating strain levels, and then to assess the acceptability of the refined strain values. This was accomplished by making a modification to AEC's model to more realistically represent plastic behavior in all locations where material yields. An analysis was performed where this modified model was subjected to the same seismic loadings as applied in AEC's analysis. It was expected that the more realistic representation of plastic behavior in the modified model would result in reduced maximum calculated strains for the rack. Results of the analysis showed that the more realistic representation of plastic behavior in rack members did reduce the calculated maximum strains from those reported by AEC. These modified strains were evaluated for acceptability according to ductility criteria of the governing standard (i.e. ANSI/AISC N690-1994, as specified by the project Criteria Application Document). This evaluation showed that the strains meet these acceptance criteria. The analysis described herein was performed only to investigate this issue. AEC's analysis stands as the analysis of record for the rack.

204
(INEEL/EXT–97-00767)
INEEL portable vapor generator operations and maintenance manual. Gresham, G.L.; Hartenstein, S.D.; Leppert, Y.M.; Mottishaw, P. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Jul 1997. 17p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050480. Source: OSTI; NTIS; GPO Dep.

The Idaho National Engineering and Environmental Laboratory (INEEL) has developed a calibrated vapor generator, which delivers reproducible vapor aliquots of a standard in the picogram to low nanogram range. The basic system design includes: (a) a reservoir that contains the target analyte, (b) a head, which contains the equipment (valves, filters, transducers) necessary to use the reservoir, and (c) a controller assembly that contains the CPU, pump, and air filtering system. The reservoir consists of a known quantity of target or analyte material (i.e., explosive, narcotic, etc.) dissolved in a solvent and deposited on an inert substrate (e.g., glass wool, stainless steel beads, etc.), which is located in a stainless steel block. The reservoir temperature is controlled via thermal electric cooler to generate a level of saturation of the target analyte in the reservoir. Each reservoir contains only a single target analyte; therefore, each analyte has its own complete head. The controller houses a small computer that performs all of the control functions. Also included in the controller are the power supplies, an air pump, a pressure regulator, air filters, flow controllers, and displays.

205
(INEEL/EXT–97-00812)
SWEPP PAN assay system uncertainty analysis: Passive mode measurements of graphite waste. Blackwood, L.G.; Harker, Y.D.; Meachum, T.R.; Yoon, Woo Y. Idaho National Engineering Lab., Idaho Falls, ID (United States). Jul 1997. 80p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050364. Source: OSTI; NTIS; INIS; GPO Dep.

The Idaho National Engineering and Environmental Laboratory is being used as a temporary storage facility for transuranic waste generated by the U.S. Nuclear Weapons program at the Rocky Flats Plant (RFP) in Golden, Colorado. Currently, there is a large effort in progress to prepare to ship this waste to the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico. In order to meet the TRU Waste Characterization Quality Assurance Program Plan nondestructive assay compliance requirements and quality assurance objectives, it is necessary to determine the total uncertainty of the radioassay results produced by the Stored Waste Examination Pilot Plant (SWEPP) Passive Active Neutron (PAN) radioassay system. To this end a modified statistical sampling and verification approach has been developed to determine the total uncertainty of a PAN measurement. In this approach the total performance of the PAN nondestructive assay system is simulated using computer models of the assay system and the resultant output is compared with the known input to assess the total uncertainty. This paper is one of a series of reports quantifying the

results of the uncertainty analysis of the PAN system measurements for specific waste types and measurement modes. In particular this report covers passive mode measurements of weapons grade plutonium-contaminated graphite molds contained in 208 liter drums (waste code 300). The validity of the simulation approach is verified by comparing simulated output against results from measurements using known plutonium sources and a surrogate graphite waste form drum. For actual graphite waste form conditions, a set of 50 cases covering a statistical sampling of the conditions exhibited in graphite wastes was compiled using a Latin hypercube statistical sampling approach.

206
(INEEL/EXT–97-00825)
Demonstration of various ion exchange sorbents for the removal of cesium and strontium from tan groundwater. Garn, T.G.; Brewer, K.N.; Tillotson, R.D.; Todd, T.A. Idaho National Engineering Lab., Idaho Falls, ID (United States). Aug 1997. 30p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050313. Source: OSTI; NTIS; INIS; GPO Dep.

Groundwater remediation efforts are currently ongoing at the Test Area North (TAN) located at the Idaho Engineering and Environmental Laboratory (INEEL). These efforts are primarily directed towards the Technical Support Facility-05 (TSF-05) for the removal of volatile organic compounds (VOC's). The Groundwater Treatment Facility (GWTF), positioned near the TSF-05 injection well at TAN, was installed in 1994 to pump and treat the injection well groundwater. The GWTF was designed to be operated continuously at 50 gpm. Presently the GWTF operates in batch mode attributed to ^{137}'Cs found at higher concentrations than expected. This presence of ^{137}Cs, along with the higher than expected concentration of suspended solids revealed a need for further testing and evaluation of the GWTF process. Two independent experiments were conducted at the GWTF with actual groundwater pumped from TSF-25 and TSF-05 injection wells. One experiment used the 3M Company's web technology to remove Cs from the actual groundwater, while the second experiment contained a duplicate set of ion exchange columns in series. Each set having two columns, one to remove Cs, the other to remove Sr from the actual groundwater. A total of 5 Cs or Sr specific sorbents were tested in the column setups. A total of eight batches of water were processed through the GWTF with the experimental setups in place, six from TSF-25 and two from TSF-05. Downtime occasionally occurred when high differential pressures prompted the high pressure shutoff switches to shut down the 3M experiment feed pump. A prefilter change out was initiated when this occurred. Also, experimental setups were shut down for GWTF backwash and discharge operations.

207
(INEEL/EXT–97-00832)
Demonstration of a SREX flowsheet for the partitioning of strontium and lead from actual ICPP sodium-bearing waste. Law, J.D.; Wood, D.J.; Olson, L.G.; Todd, T.A. Idaho National Engineering Lab., Idaho Falls, ID (United States). Aug 1997. 36p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050368. Source: OSTI; NTIS; INIS; GPO Dep.

Laboratory experimentation has indicated that the SREX process is effective for partitioning ^{90}Sr and Pb from acidic radioactive waste solutions located at the Idaho Chemical Processing Plant. Previous countercurrent flowsheet testing of the SREX process with simulated waste resulted in 99.98% removal of Sr and 99.9% removal of Pb. Based on the results of these studies, a demonstration of the SREX flowsheet was performed. The demonstration consisted of (1) countercurrent flowsheet testing of the SREX process using simulated sodium-bearing waste spiked with ^{85}Sr and (2) countercurrent flowsheet testing of the SREX process using actual waste from tank WM-183. All testing was performed using 24 stages of 2-cm diameter centrifugal contactors which are installed in the Remote Analytical Laboratory hot cell. The flowsheet tested consisted of an extraction section (0. 15 M 4',4'(5)-di-(tert-butyldicyclohexo)-18-crown-6 and 1.5 M TBP in Isopar-L®), a 2.0 $MHNO_3$ scrub section to remove extracted K from the SREX solvent, a 0.05 M HNO_3 strip section for the removal of Sr from the SREX solvent, a 0.1 M ammonium citrate strip section for the removal of Pb from the SREX solvent, and a 3.0 M HNO_3 equilibration section. The behavior of ^{90}Sr, Pb, Na, K, Hg, H^+, the actinides, and numerous other non-radioactive elements was evaluated. The described flowsheet successfully extracted and selectively stripped Sr and Ph from the SBW simulant and the actual tank waste. For the testing with actual tank waste (WM - 183), removal efficiencies of 99.995 % and >94% were obtained for ^{90}Sr and Pb, respectively.

208
(INEEL/EXT–97-00836)
Elimination of phosphate and zirconium in the high-activity fraction resulting from TRUEX partitioning of ICPP zirconium calcines. Brewer, K.N. (and others); Tillotson, R.D.; Tullock, P.A. Idaho National Engineering Lab., Idaho Falls, ID (United States). Jul 1997. 50p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050424. Source: OSTI; NTIS; INIS; GPO Dep.

Laboratory testing was undertaken with the aim of developing a TRUEX flowsheet that would efficiently remove actinides from solutions of dissolved zirconium calcine and minimize the glass volume produced from the ensuing high-activity fraction. A TRUEX flowsheet is recommended for testing in the 2-cm centrifugal contactor pilot-plant based on the results from this testing. These laboratory tests show that zirconium recovery in the high activity fraction is minimized by scrubbing with an optimized NHF concentration of 0.2 M. This NH4F concentration in the scrub allowed the HEDPA strip concentration to be reduced from 0.04 M to 0.004 M because HEDPA is not consumed by zirconium. Complete TRU stripping was also achieved in these laboratory tests with 0.004 M HEDPA. Data from the small-scale laboratory batch contact tests were used in the Generic TRUEX Model (GTM) to evaluate the proposed flowsheet under counter-current conditions. GTM results indicate the raffinate will meet the Class A non-TRU limit of < 10 nCi/g in six extraction stages (O/A = 1), and quantitative actinide recovery will be achieved with the 0.004 M HEDPA in six strip stages (O/A = 1). Only 6.6 % of the initial zirconium concentration is anticipated to be recovered with the actinides, indicating the four scrub stages (O/A = 3) efficiently removes zirconium from the TRUEX solvent. In addition to recommending an improved TRUEX flowsheet for testing in

the 2-cm centrifugal contactor pilot-plant, this work has shown that small reductions in zirconium extraction drastically improves flowsheet performance. These small changes in zirconium extraction can be accomplished by modifying the calcine dissolution parameters. Therefore, further calcine dissolution testing followed by TRUEX testing with the resulting feed solutions is also recommended.

209
(INEEL/EXT–97-01009)
Mixed waste characterization reference document. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Sep 1997. [150p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050429. Source: OSTI; NTIS; INIS; GPO Dep.

Waste characterization and monitoring are major activities in the management of waste from generation through storage and treatment to disposal. Adequate waste characterization is necessary to ensure safe storage, selection of appropriate and effective treatment, and adherence to disposal standards. For some wastes characterization objectives can be difficult and costly to achieve. The purpose of this document is to evaluate costs of characterizing one such waste type, mixed (hazardous and radioactive) waste. For the purpose of this document, waste characterization includes treatment system monitoring, where monitoring is a supplement or substitute for waste characterization. This document establishes a cost baseline for mixed waste characterization and treatment system monitoring requirements from which to evaluate alternatives. The cost baseline established as part of this work includes costs for a thermal treatment technology (i.e., a rotary kiln incinerator), a nonthermal treatment process (i.e., waste sorting, macronencapsulation, and catalytic wet oxidation), and no treatment (i.e., disposal of waste at the Waste Isolation Pilot Plant (WIPP)). The analysis of improvement over the baseline includes assessment of promising areas for technology development in front-end waste characterization, process equipment, off gas controls, and monitoring. Based on this assessment, an ideal characterization and monitoring configuration is described that minimizes costs and optimizes resources required for waste characterization.

210
(INEEL/EXT–97-01049)
System description for DART (Decision Analysis for Remediation Technologies). Nonte, J.; Bolander, T.; Nickelson, D.; Nielson, R.; Richardson, J.; Sebo, D. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Sep 1997. [200p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050365. Source: OSTI; NTIS; INIS; GPO Dep.

DART is a computer aided system populated with influence models to determine quantitative benefits derived by matching requirements and technologies. The DART database is populated with data from over 900 DOE sites from 10 Field Offices. These sites are either source terms, such as buried waste pits, or soil or groundwater contaminated plumes. The data, traceable to published documents, consists of site-specific data (contaminants, area, volume, depth, size, remedial action dates, site preferred remedial option), problems (e.g., offsite contaminant plume), and Site Technology Coordinating Group (STCG) need statements (also contained in the Ten-Year Plan). DART uses this data to calculate and derive site priorities, risk rankings, and site specific technology requirements. DART is also populated with over 900 industry and DOE SCFA technologies. Technology capabilities can be used to match technologies to waste sites based on the technology's capability to meet site requirements and constraints. Queries may be used to access, sort, roll-up, and rank site data. Data roll-ups may be graphically displayed.

211
(INEEL/EXT–97-01052)
Decision Analysis for Remediation Technologies (DART) user's manual. Sebo, D. Idaho National Engineering Lab., Idaho Falls, ID (United States). Sep 1997. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050362. Source: OSTI; NTIS; GPO Dep.

One copy and 1332.15 to ESTSC.

This user's manual is an introduction to the use of the Decision Analysis for Remediation Technology (DART) Report Generator. DART provides a user interface to a database containing site data (e.g., contaminants, waste depth, area) for sites within the Subsurface Contaminant Focus Area (SCFA). The database also contains SCFA requirements, needs, and technology information. The manual is arranged in two major sections. The first section describes loading DART onto a user system. The second section describes DART operation. DART operation is organized into sections by the user interface forms. For each form, user input, both optional and required, DART capabilities, and the result of user selections will be covered in sufficient detail to enable the user to understand DART, capabilities and determine how to use DART to meet specific needs.

212
(INEEL/EXT–97-01082)
Environmental management compliance reengineering project, FY 1997 report. VanVliet, J.A.; Davis, J.N. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Sep 1997. [150p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050363. Source: OSTI; NTIS; INIS; GPO Dep.

Through an integrated reengineering effort, the Idaho National Engineering and Environmental Laboratory (INEEL) is successfully implementing process improvements that will permit safe and compliant operations to continue during the next 5 years, even though $80 million was removed from the Environmental Management (EM) program budget. A 2-year analysis, design, and implementation project will reengineer compliance-related activities and reduce operating costs by approximately $17 million per year from Fiscal Year (FY) 1998 through 2002, while continuing to meet the INEEL's environment, safety, and health requirements and milestone commitments. Compliance reengineer's focus is improving processes, not avoiding full compliance with environmental, safety, and health laws. In FY 1997, compliance reengineering used a three-phase approach to analyze, design, and implement the changes that would decrease operating costs. Implementation for seven specific improvement projects was completed in FY 1997, while five projects

will complete implementation in FY 1998. During FY 1998, the three-phase process will be repeated to continue reengineering the INEEL.

213
(INEEL/EXT–97-01192)
Experimental results of calcine dissolution studies performed during FY-94,95. Brewer, K.N.; Olson, A.L.; Roesener, W.S.; Tonso, J.L. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Sep 1997. 40p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050592. Source: OSTI; NTIS; INIS; GPO Dep.

Calcine dissolution studies were performed in FY-94,95 in order to extend the knowledge of dissolution and to obtain information necessary for scale-up design and operation. Experiments reported in this document were performed with non-radioactive and actual calcines to generate qualitative data regarding: (a) calcine dissolution rates, (b) undissolved solids settling characteristics, (c) undissolved solids heel formation, and (d) chemical treatments for undissolved solids heel dissolution. The goal of this work was to achieve complete calcine dissolution, or to determine conditions that would result in the maximum calcine dissolution. Small scale laboratory experiments (test-tube dissolutions) and a bench scale dissolver set-up were used in the effort. Results from this work show the bulk of the undissolved solids to settle at a rate of >9 inches per second when the baseline dissolution parameters are used. Baseline dissolution parameters were 100 grams of calcine being dissolved in 1 L of 5 M HNO_3 at > 90 C while the solution is being vigorously and constantly mixed. This work also verified that dissolution is most complete when performed with aggressive mixing. Sequential dissolutions performed with non-radioactive and actual calcine indicate that little undissolved solids heel build-up is expected, and this small heel can be further dissolved by increasing the dissolution time or by adding fresh nitric acid.

214
(INEL–95/00410)
Remote inspection of the IFSF spent fuel storage rack. Uldrich, E.D. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960426–10: 58. annual meeting of the American power conference, Chicago, IL (United States), 9-11 Apr 1996). Order Number DE96010447. Source: OSTI; NTIS; INIS; GPO Dep.

The Irradiated Fuel Storage Facility (IFSF) is a dry storage facility for spent nuclear fuels located at the Idaho Chemical Processing Plant; it was constructed in the 1970's specifically for the Fort Saint Vrain spent reactor fuels. Currently, it is being used for various spent fuels. It was not known if IFSF would met current DOE seismic criteria, so re-analysis was started, with the rack being analyzed first. The rack was inspected to determine the as-built condition. LazrLyne and VideoRuler were used in lieu of using a tape measure with the camera. It was concluded that when a visual inspection shows widely varying weld sizes, the engineer has to use all resources available to determine the most probable specified weld sizes.

215
(INEL–95/00437)
Drying studies of simulated DOE aluminum plate fuels. Lords, R.E. (Idaho National Engineering Lab., Idaho Falls, ID (United States)); Windes, W.E.; Crepeau, J.C.; Sidwell, R.W. Idaho National Engineering Lab., Idaho Falls, ID (United States). 1996. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-9606116–44: Annual meeting of the American Nuclear Society (ANS), Reno, NV (United States), 16-20 Jun 1996). Order Number DE96010440. Source: OSTI; NTIS; INIS; GPO Dep.

Experiments have been conducted to validate the Idaho National Engineering Laboratory (INEL) drying procedures for preparation of corroded aluminum plate fuel for dry storage in an existing vented (and filtered) fuel storage facility. A mixture of hydrated aluminum oxide bound with a clay was used to model the aluminum corrosion product and sediment expected in these Department of Energy (DOE) owned fuel types. Previous studies demonstrated that the current drying procedures are adequate for removal of free water inside the storage canister and for transfer of this fuel to a vented dry storage facility. However, using these same drying procedures, the simulated corrosion product was found to be difficult to dry completely from between the aluminum clad plates of the fuel. Another related set of experiments was designed to ensure that the fuel would not be damaged during the drying process. Aluminum plate fuels are susceptible to pitting damage on the cladding that can result in a portion of UAl_x fuel meat being disgorged. This would leave a water-filled void beneath the pit in the cladding. The question was whether bursting would occur when water in the void flashes to steam, causing separation of the cladding from the fuel, and/or possible rupture. Aluminum coupons were fabricated to model damaged fuel plates. These coupons do not rupture or sustain any visible damage during credible drying scenarios.

216
(INEL–95/00507)
National high-level waste systems analysis. Kristofferson, K.; O'Holleran, T.P. Idaho National Engineering Lab., Idaho Falls, ID (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960804–23: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96009060. Source: OSTI; NTIS; INIS; GPO Dep.

Previously, no mechanism existed that provided a systematic, interrelated view or national perspective of all high-level waste treatment and storage systems that the US Department of Energy manages. The impacts of budgetary constraints and repository availability on storage and treatment must be assessed against existing and pending negotiated milestones for their impact on the overall HLW system. This assessment can give DOE a complex-wide view of the availability of waste treatment and help project the time required to prepare HLW for disposal. Facilities, throughputs, schedules, and milestones were modeled to ascertain the treatment and storage systems resource requirements at the Hanford Site, Savannah River Site, Idaho National Engineering Laboratory, and West Valley Demonstration Project. The impacts of various treatment system availabilities on schedule and throughput were compared to

repository readiness to determine the prudent application of resources. To assess the various impacts, the model was exercised against a number of plausible scenarios as discussed in this paper.

217
(INEL–95/00549)
Facility status and progress of the INEL's WERF MLLW and LLW incinerator. Conley, D.; Corrigan, S. Idaho National Engineering Lab., Idaho Falls, ID (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-76ID01570. (CONF-960804–27: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96010442. Source: OSTI; NTIS; INIS; GPO Dep.

The Idaho National Engineering Laboratory's (INEL) Waste Experimental Reduction Facility (WERF) incinerator began processing beta/gamma- emitting low-level waste (LLW) in September 1984. A Resource Conservation and Recovery Act (RCRA) trial burn for the WERF incinerator was conducted in 1986, and in 1989 WERF began processing (hazardous and low-level radioactive) waste known as mixed low-level waste (MLLW). On February 14, 1991 WERF operations were suspended to improve operating procedures and configuration management. On July 12, 1995, WERF initiated incineration of LLW; and on September 20, 1995 WERF resumed its primary mission of incinerating MLLW. MLLW incineration is proceeding under RCRA interim status. State of Idaho issuance of the Part B permit is one of the State's highest permitting priorities. The State of Idaho's Division of Environmental Quality is reviewing the permit application along with a revised trial burn plan that was also submitted with the application. The trial burn has been proposed to be performed in 1996 to demonstrate compliance with the current incinerator guidance. This paper describes the experiences and problems associated with WERF's operations, incineration of MLLW, and the RCRA Part B Permit Application. Some of the challenges that have been overcome include waste characterization, waste repackaging, repackaged waste storage, and implementation of RCRA interim status requirements. A number of challenges remain. They include revision of the RCRA Part B Permit Application and the Trial Burn Plan in response to comments from the state permit application reviewers as well as facility and equipment upgrades required to meet RCRA Permitted Status.

218
(INEL–95/00559)
Decontamination technologies evaluations. Tripp, J. Idaho National Engineering Lab., Idaho Falls, ID (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960804–28: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96010446. Source: OSTI; NTIS; INIS; GPO Dep.

Testing has been completed at the Idaho Chemical Processing Plant (ICPP) on in situ recyclable abrasives grit blasting, concrete cleaning (using scabbling, chemicals and electro-kinetics) and laser light ablation of metals. Several small scale tests have also been conducted with strippable coatings, CO_2 pellet blasting and various other techniques. The results of this testing is summarized in this paper.

219
(INEL–95/00584)
Photo-oxidation of organic compounds in liquid low-level mixed wastes at the INEL. Gering, K.L.; Schwendiman, G.L. Idaho National Engineering Lab., Idaho Falls, ID (United States). [1996]. 10p. Sponsored by US-DOE, Washington, DC (United States). (CONF-960804–53: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96014102. Source: OSTI; NTIS; INIS; GPO Dep.

A bench-scale oxidation apparatus is implemented to study the effectiveness of using an artificial ultraviolet source, a 175-watt medium pressure mercury vapor lamp, to enhance the destruction of organic contaminants in water with chemical oxidants. The waste streams used in this study are samples or surrogates of mixed wastes at the Idaho National Engineering Laboratory. The contaminants that are investigated include methylene chloride, 1,1,1-trichlorethane, 1, 1-dichlororethane, acetone, 2-propanol, and ethylenediamine tetraacetic acid. We focus on H_2O_2-based oxidizers for our treatment scheme, which include the UV/H_2O_2 system, the dark Fenton system (H_2O_2/Fe^{2+}), and the photo- assisted Fenton system ($UV/H_2O_2/Fe^{3+}$) is used in particular. Variables include concentration of the chemical oxidizer, concentration of the organic contaminant, and the elapsed reaction time. Results indicate that the photo-assisted Fenton system provides the best overall performance of the oxidizing systems listed above, where decreases in concentrations of methylene chloride, 1,1,1-trichloroethane, 1,1-dichlororethane, 2-propanol, and ethylenediamine tetraacetic acid were seen. However, UV-oxidation treatment provided no measurable benefit for a mixed waste containing acetone in the presence of 2-propanol.

220
(INEL–95/0595-Rev.1)
Waste Management Program management plan. Revision 1. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Feb 1997. 85p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052952. Source: OSTI; NTIS; INIS; GPO Dep.

As the prime contractor to the Department of Energy Idaho Operations Office (DOE-ID), Lockheed Martin Idaho Technologies Company (LMITCO) provides comprehensive waste management services to all contractors at the Idaho National Engineering and Environmental Laboratory (INEEL) through the Waste Management (WM) Program. This Program Management Plan (PMP) provides an overview of the Waste Management Program objectives, organization and management practices, and scope of work. This document will be reviewed at least annually and updated as needed to address revisions to the Waste Management's objectives, organization and management practices, and scope of work. Waste Management Program is managed by LMITCO Waste Operations Directorate. The Waste Management Program manages transuranic, low-level, mixed low-level, hazardous, special-case, and industrial wastes generated at or transported to the INEEL.

221
(INEL–95/00603)
TRUEX process applied to radioactive Idaho Chemical Processing Plant high-level waste calcine. Brewer, K.N.; Herbst, R.S.; Law, J.D.; Todd, T.A.; Olson, A.L. Idaho National Engineering Lab., Idaho Falls, ID (United States). 1996. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-76ID01570. (CONF-960804–26: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96010437. Source: OSTI; NTIS; INIS; GPO Dep.

Equal volume batch contact experiments were performed with dissolved, radioactive high-level waste (HLW) calcine and the TRansUranic EXtraction (TRUEX) process solvent. Extraction, scrub, and strip distribution coefficients (D) were obtained for the transuranic (TRU) elements in order to evaluate the efficiency of the TRUEX process in treating this waste. The extraction, scrub, and strip behavior of other elements, such as chromium, zirconium, and technetium, was also observed. A TRU alpha decontamination factor of >10,000 was achieved; after three extraction batch contacts TRU alpha activity was reduced from 1,420 nCi/g to 0.02 nCi/g. Dilute nitric acid was used to scrub extracted acid, zirconium, and iron from the solvent prior to stripping. Dilute 1-hydroxyethane, 1-1, diphosphonic acid (HEDPA) was used as a gross TRU stripping reagent to recover the extracted TRUs. Data from these batch contact experiments were used to develop a counter-current flowsheet for TRU removal using the Generic TRUEX Model (GTM). Process improvements and optimizations of the flowsheet have been evaluated using a non-radioactive dissolved calcine simulant spiked with tracers to obtain additional distribution coefficient data. These data were used in the GTM to refine the flowsheet. The flowsheet was then evaluated using a counter-current 5.5 cm centrifugal contactor pilot plant with a non-radioactive dissolved calcine simulant. The experiments involving radioactive waste provided crucial data for developing a baseline TRUEX process flowsheet which can effectively separate TRU components from ICPP high-level waste.

222
(INEL–96/00005)
Measurement of ^{222}Rn flux, ^{222}Rn emanation and ^{226}Ra concentration from injection well pipe scale. Rood, A.S. (Idaho National Engineering Lab., Idaho Falls, ID (United States)); Kendrick, D.T. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States);American Petroleum Inst., Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960110–2: 29. midyear topical meeting of the Health Physics Society: naturally occuring and accelerator produced radioactive material - regulation and risk assessment, Scottsdale, AZ (United States), 7-10 Jan 1996). Order Number DE96007275. Source: OSTI; NTIS; INIS; GPO Dep.

The presence of Naturally Occurring Radioactive Material (NORM) has been recognized since the early 1930s in petroleum reservoirs and in oil and gas production and processing facilities. NORM was typically observed in barite scale that accumulated on the interior of oil production tubing and in storage tank and heater-treater separation sludge. Recent concern has been expressed over the health impacts from the uncontrolled release of NORM to the public. There are several potential exposure pathways to humans from oil-field NORM. Among these is inhalation of radon gas and its daughter products. For this exposure pathway to be of any significance, radon must first be released from the NORM matrix and diffuse in free air. The radon emanation fraction refers to the fraction of radon atoms produced by the decay of radium, that migrate from the bulk material as free gaseous atoms. The purpose of this investigation was to characterize the radon release rates from NORM-scale contaminated production tubing being stored above ground, characterize the radon emanation fraction of the bulk scale material when removed from the tubing, and characterize the radium concentrations of the scale. Accurate characterization of ^{222}Rn emanation fractions from pipe scale may dictate the type of disposal options available for this waste. Characterization of radon release from stored pipes will assist in determining if controls are needed for workers or members of the public downwind from the source. Due to the sensitive nature of this data, the location of this facility is not disclosed.

223
(INEL–96/00079)
The 10,000-year debate. Wilson, J.R. Idaho National Engineering Lab., Idaho Falls, ID (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). (CONF-9606116–80: Annual meeting of the American Nuclear Society (ANS), Reno, NV (United States), 16-20 Jun 1996). Order Number DE96014112. Source: OSTI; NTIS; INIS; GPO Dep.

Probabilistic Risk Assessment (PRA) has developed into a respected tool within the reactor community. Now, this PRA technique is being applied to a new arena, the distant future of the nuclear waste repository. Problems are already testing the credibility of PRA.

224
(INEL–96/00134)
Drying studies for corroded DOE aluminum plate fuels. Lords, R.E. (Idaho National Engineering Lab., Idaho Falls, ID (United States)); Windes, W.E.; Crepeau, J.C.; Sidwell, R.W. Idaho National Engineering Lab., Idaho Falls, ID (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-76ID01570. (CONF-960804–29: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96010448. Source: OSTI; NTIS; INIS; GPO Dep.

The Idaho National Engineering Laboratory (INEL) currently stores a wide variety of spent nuclear fuel. The fuel was originally intended to be stored underwater for a short period of thermal cooling, then removed and reprocessed. However, it has been stored underwater for much longer thank originally anticipated. During this time dust and airborne desert soil have entered the oldest INEL pool, accumulating on the fuel. Also, the aluminum fuel cladding has corroded compromising the exposed surfaces of the fuel. Plans are now underway to move some the the more vulnerable aluminum plate type fuels into dry storage in an existing vented and filtered fuel storage facility. In preparation for dry storage of the fuel a drying and canning station is being built at the INEL. The two primary objectives of this facility are to determine the influence of corrosion products

on the drying process and to establish temperature distribution inside the canister during heating.

225
(INEL–96/00139)
Simplified risk model for waste management and environmental restoration activities. Eide, S.; Smith, T.; Peatross, R.; Stepan, I. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-9607148–1: 6. EFCOG/SAWG annual safety analysis workshop, Knoxville, TN (United States), 5-7 Jul 1996). Order Number DE96014126. Source: OSTI; NTIS; INIS; GPO Dep.

A Simplified Risk Model (SRM) is being developed to support environmental restoration and waste management (EM) planning activities. The SRM is designed to be able to quantitatively estimate risk for various EM alternatives within hours or days, given limited information about the processes covered within the alternative. The risk model covers radiological, chemical, and industrial risk from both accidents and normal, incident free operations. A simple risk equation is used to model accident risk. Normal, incident free operation risk is modeled using a multiplier on accident risk. Ongoing applications of the SRM are expected to lead to significant improvements to the model in the near future.

226
(INEL–96/00151)
Technology transfer: A cooperative agreement and success story. Reno, H.W. (Idaho National Engineering Lab., Idaho Falls, ID (United States)); McNeel, K.; Armstrong, A.T.; Vance, J.K. Idaho National Engineering Lab., Idaho Falls, ID (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960804–52: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96014121. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes the cooperative agreement between the U.S. Department of Energy and Envirocare of Utah, Inc., wherein the former transferred macroencapsulative technology to the latter for purposes of demonstrating commercialization of treatment and disposal of 225, 000 Kg of radioactive lead stored at departmental installations.

227
(INEL–96/00185)
Uncertainties in repository modeling. Wilson, J.R. Lockheed Martin Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 5p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960912–43: International topical meeting on probabilistic safety assessment - moving toward risk based regulation, Park City, UT (United States), 29 Sep - 3 Oct 1996). Order Number DE97050833. Source: OSTI; NTIS; INIS; GPO Dep.

The distant future is ver difficult to predict. Unfortunately, our regulators are being enchouraged to extend ther regulatory period form the standard 10,000 years to 1 million years. Such overconfidence is not justified due to uncertainties in dating, calibration, and modeling.

228
(INEL–96/00188)
Packaged low-level waste verification system. Tuite, K.T. (Waste Management Group, Peekskill, NY (United States)); Winberg, M.; Flores, A.Y.; Killian, E.W.; McIsaac, C.V. Idaho National Engineering Lab., Idaho Falls, ID (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960804–54: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96014106. Source: OSTI; NTIS; INIS; GPO Dep.

Currently, states and low-level radioactive waste (LLW) disposal site operators have no method of independently verifying the radionuclide content of packaged LLW that arrive at disposal sites for disposal. At this time, disposal sites rely on LLW generator shipping manifests and accompanying records to insure that LLW received meets the waste acceptance criteria. An independent verification system would provide a method of checking generator LLW characterization methods and help ensure that LLW disposed of at disposal facilities meets requirements. The Mobile Low-Level Waste Verification System (MLLWVS) provides the equipment, software, and methods to enable the independent verification of LLW shipping records to insure that disposal site waste acceptance criteria are being met. The MLLWVS system was developed under a cost share subcontract between WMG, Inc., and Lockheed Martin Idaho Technologies through the Department of Energy's National Low-Level Waste Management Program at the Idaho National Engineering Laboratory (INEL).

229
(INEL–96/0235)
The potential pyrophoricity of BMI-SPEC and aluminum plate spent fuels retrieved from underwater storage. Ebner, M.A. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 32p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE96014182. Source: OSTI; NTIS; INIS; GPO Dep.

Physical/chemical factors in U metal and hydride combustion, particularly pyrophoricity in ambient environment, were evaluated for BMI-SPEC and UAl_x plate fuels. Some metal fuels may be highly reactive (spontaneously igniting in air) due to high specific surface area, high decay heat, or a high U hydride content from corrosion during underwater storage. However, for the BMI-SPEC and the aluminum plate fuels, this reactivity is too low to present a realistic threat of uncontrolled spontaneous combustion at ambient conditions. While residual U hydride is expected in these corroded fuels, the hydride levels are expected to be too low and the configuration too unfavorable to ignite the fuel meat when the fuels are retrieved from the basin and dried. Furthermore the composition and microstructure of the UAl_x fuels further mitigate that risk.

230
(INEL–96/00245)
A strategy for maintaining CERCLA cleanup momentum in an uncertain federal funding climate. Cotten, G.B.; Dustin, J.D. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 7p. Sponsored by USDOE Office of Environmental Restoration and Waste Management,

Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-970335–56: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97052139. Source: OSTI; NTIS; INIS; GPO Dep.

Every Department of Energy (DOE) site has some form of Environmental Restoration (ER) in progress-be it remedial investigations or remedial action. A great challenge to successful- and timely-execution of projects within a federal ER program is preparing for and coping with the financing of those projects. There are two aspects of the budget process that make execution challenging, (1) living with the annual allocation–which is sometimes delayed until after the fiscal year has begun, and has a high likelihood of being less than optimally required, and (2) the inevitable release of additional year end money late in the fiscal year which requires the site to be able to solicit, award, mobilize, perform the cleanup, and demobilize in a few short months while coordinating these actions and obtaining the necessary approvals as required in the multi-party agreements that the various agencies are signatory to. To cope with these uncertainties effectively and efficiently, one must stay ahead of the curve by completing conceptual designs for a cross section of project types and complexity. These would be taken to an early stage, such as 30% design, which will give a technical scope and a budget and schedule estimate to a degree much better than a rough order of magnitude. These conceptual designs could then be put to the shelf and brought forward in short order when funds become available.

231
(INEL–96/00274)
Role of natural processes and risk in environmental remediation decisions. Breckenridge, R.P.; Maiers, D.T.; Wichlacz, P.L. Idaho National Engineering Lab., Idaho Falls, ID (United States). 1996. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-961119–2: Eco-informa '96: global networks for environmental information, Lake Buena Vista, FL (United States), 4-7 Nov 1996). Order Number DE96015355. Source: OSTI; NTIS; INIS; GPO Dep.

Much attention is currently given to risk-based approaches to managing natural resources and hazardous waste. In order to apply a risk-based approach, input from the various stakeholders needs to be obtained early and updated throughout the effort. Applying a risk-based approach allows decisionmakers to evaluate options based upon sound scientific data. This paper discusses two examples of how risk-based approaches have been used to evaluate remediation options for management of natural resources and hazardous material problems in the Intermountain West. These examples demonstrate that without stakeholder involvement and using a risk-based approach, time and effort would have been wasted and decisions made to correct perceived rather than actual problems. The paper also describes the role that natural attenuation plays in making both risk and remedial action decisions.

232
(INEL–96/00278)
Biodecontamination of concrete surfaces: Occupational and environmental benefits. Johnson, L. (Lockheed Martin Idaho Technologies, Idaho Falls, ID (United States). Idaho National Engineering Lab.); Rogers, R.; Hamilton, M.; Nelson, L.; Benson, J.; Green, M. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-970335–: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97053255. Source: OSTI; NTIS; INIS; GPO Dep.

Managers and engineers around the globe are presently challenged by high estimated costs for the decontamination and decommissioning of nuclear facilities which are no longer needed or are abandoned. It has been estimated that more than 73 Km^2 of contaminated concrete currently exists in the USDOE complex and is increased many fold when similar facilities are accounted for in other countries. Needs for the decontamination of concrete have been identified as: more cost effective decontamination methods, reduction of secondary wastes, minimized worker radiation exposures and, contaminant containment. Recently environmental microbes have been harnessed to remove the surface of concrete as a technique for decontamination and decommissioning (D and D). This biodecontamination technology has been tested by INEL and BNFL scientists and engineers in both US and United Kingdom nuclear facilities. Biodecontamination field tests at a shutdown nuclear reactor facility (EBR-I) have shown radioactively contaminated surface removed at rates of 4–8 mm/yr, thus validating the feasibility of this technology. Engineering economic analyses indicate two attractive benefits embedded in this approach to concrete D and D: (1) due to the passive nature of the technique, a cost savings of more than an order of magnitude is projected compared to the current labor intensive physical decontamination techniques; and (2) the exposure to humans and the natural environment is greatly reduced due to the unattended, highly contained biodecontamination process.

233
(INEL–96/0397)
User's guide for the Simplified Risk Model (SRM). Peatross, R.G.; Eide, S.A. Lockheed Martin Idaho Technologies Co., Idaho Falls, ID (United States). Oct 1996. 41p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97050825. Source: OSTI; NTIS; INIS; GPO Dep.

SRM can be used to quickly compare relative values relating to risk for many environmental management activities or alternatives at US DOE sites. Purpose of this guide is to provide the user with the essential values and decision points for each model variable. The numerical results are useful for ranking and screening purposes and should not be compared directly against absolute risk numerical results such as in CERCLA baseline risk assessments or Safety Analysis Reports. Implementing the SRM entails performing several preliminary steps, selecting values of the risk elements, calculating the risk equations, and checking the results. SRM considers two types of waste management states: inactive (rest) and active (transition). SRM considers risk from exposures to radionuclides and hazardous chemicals, as well as industrial hazards; however this user's guide does not cover risk from industrial hazards (Section 10 of Eide et al. (1996) must be consulted).

234
(INEL–96-0439)
Innovative subsurface stabilization project – Final Report. Loomis, G.G.; Zdinak, A.P.; Bishop, C.W. Lockheed

Idaho Technologies Co., Idaho Falls, ID (United States). Nov 1996. [200p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050288. Source: OSTI; NTIS; INIS; GPO Dep.

This is a report of results of applying four innovative grouting materials and one commercially available material for creating monoliths out of buried waste sites using jet grouting. The four innovative materials included a proprietary water-based epoxy, an Idaho National Engineering Laboratory-developed two-component grout that resembles hematite when cured with soil, molten low-temperature paraffin, and a proprietary iron oxide cement-based grout called TECT. The commercial grout was Type-H high-sulfate-resistant cement. These materials were tested in specially designed cold test pits that simulate buried transuranic waste at the Idaho National Engineering Laboratory. In addition to the grouting studies, specially designed field-scale permeameters were constructed to perform full-scale controlled mass balance hydraulic conductivity studies. An ungrouted field-scale permeameter contained simulated buried waste and soil and was left ungrouted, and a second identical field-scale permeameter was grouted with commercial-grade Type-H cement. The field demonstrations were performed in an area referred to as the Cold Test Pit at the Idaho National Engineering Laboratory. The Cold Test Pit is adjacent to the laboratory's Radioactive Waste Management Complex. At the complex, 2 million ft^3 of transuranic waste is commingled with 6–8 million ft^3 of soil in shallow land burial, and improving the confinement of this waste is one of the options for final waste disposition. This report gives results of grouting, coring, hydraulic conductivity, and destructive examination of the grouted buried waste matrix.

235
(INEL–96/0454)
Indirect Comprehensive Review Board (ICRB). Final Report. Idaho National Engineering Lab., Idaho Falls, ID (United States). Dec 1996. 154p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052146. Source: OSTI; NTIS; INIS; GPO Dep.

Includes vugraphs.

Lockheed Martin Idaho Technologies Company (LMITCO) used a systems engineering approach to take the first step toward defining a requirements baseline for all indirect work at the Idaho National Engineering Laboratory. The intent of this effort was to define the requirements for indirect work, identify the activities necessary to meet the requirements, and to produce defensible cost estimates for the work. The result of this effort is a scrubbed-down, defensible budget for all indirect work in FY 1997. Buying power for each dollar of direct work was increased by $.02. Recommendations are identified for improvements to this process in FY 1998. The purpose of this report is twofold. First is to report the final results of the 1996 ICRB process, and second is to document the process used such that incremental improvements may be made in future years. Objectives, processes, and approaches are described to provide a trail for future boards. Appendices contain copies of board composition, documentation of the process, as well as the actual training materials.

236
(INEL–96/0482)
Radionuclide mass inventory, activity, decay heat, and dose rate parametric data for TRIGA spent nuclear fuels. Sterbentz, J.W. Idaho National Engineering Lab., Idaho Falls, ID (United States). Mar 1997. 294p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052965. Source: OSTI; NTIS; INIS; GPO Dep.

Parametric burnup calculations are performed to estimate radionuclide isotopic mass and activity concentrations for four different Training, Research, and Isotope General Atomics (TRIGA) nuclear reactor fuel element types: (1) Aluminum-clad standard, (2) Stainless Steel-clad standard, (3) High-enrichment Fuel Life Improvement Program (FLIP), and (4) Low-enrichment Fuel Life Improvement Program (FLIP-LEU-1). Parametric activity data are tabulated for 145 important radionuclides that can be used to generate gamma-ray emission source terms or provide mass quantity estimates as a function of decay time. Fuel element decay heats and dose rates are also presented parametrically as a function of burnup and decay time. Dose rates are given at the fuel element midplane for contact, 3.0-feet, and 3.0-meter detector locations in air. The data herein are estimates based on specially derived Beginning-of-Life (BOL) neutron cross sections using geometrically-explicit TRIGA reactor core models. The calculated parametric data should represent good estimates relative to actual values, although no experimental data were available for direct comparison and validation. However, because the cross sections were not updated as a function of burnup, the actinide concentrations may deviate from the actual values at the higher burnups.

237
(INEL/EXT–97-00039)
A process for selecting ecological indicators for application in monitoring impacts to Air Quality Related Values (AQRVs) from atmospheric pollutants. Final report. White, G.J.; Breckenridge, R.P. Idaho National Engineering Lab., Idaho Falls, ID (United States). Jan 1997. 71p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052957. Source: OSTI; NTIS; GPO Dep.

Section 160 of the Clean Air Act (CAA) calls for measures be taken "to preserve, protect, and enhance air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value." Pursuant to this, stringent requirement have been established for "Class I" areas, which include most National Parks and Wilderness Areas. Federal Land Managers (FLMs) are charged with the task of carrying out these requirements through the identification of air quality related values (AQRVs) that are potentially at risk from atmospheric pollutants. This is a complex task, the success of which is dependent on the gathering of information on a wide variety of factors that contribute to the potential for impacting resources in Class I areas. Further complicating the issue is the diversity of ecological systems found in Class I areas. There is a critical need for the development of monitoring programs to assess the status of AQRVs in Class I areas with respect to impacts caused by atmospheric pollutants.

These monitoring programs must be based on the measurement of a carefully selected suite of key physical, chemical, and biological parameters that serve as indicators of the status of the ecosystems found in Class I areas. Such programs must be both scientifically-based and cost-effective, and must provide the data necessary for FLMs to make objective, defensible decisions. This document summarizes a method for developing AQRV monitoring programs in Class I areas.

238
(INEL/EXT–97-00117)
CO_2 pellet blasting studies. Archibald, K.E. Idaho National Engineering Lab., Idaho Falls, ID (United States). Jan 1997. 20p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052958. Source: OSTI; NTIS; INIS; GPO Dep.

Initial tests with CO_2 pellet blasting as a decontamination technique were completed in 1993 at the Idaho Chemical Processing Plant (ICPP) at the Idaho National Engineering Laboratory (INEL). During 1996, a number of additional CO_2 pellet blasting studies with Alpheus Cleaning Technologies, Oak Ridge National Laboratory, and Pennsylvania State University were conducted. After the testing with Alpheus was complete, an SDI-5 shaved CO_2 blasting unit was purchased by the ICPP to test and determine its capabilities before using in ICPP decontamination efforts. Results of the 1996 testing will be presented in this report.

239
(INEL/EXT–97-00123)
Evaluation of alternative nonflame technologies for destruction of hazardous organic waste. Schwinkendorf, W.E. (Lockheed Idaho Technologies Co., Idaho Falls, ID (United States)); Musgrave, B.C.; Drake, R.N. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Apr 1997. 174p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050476. Source: OSTI; NTIS; INIS; GPO Dep.

The US Department of Energy's Mixed Waste Focus Area (MWFA) commissioned an evaluation of mixed waste treatment technologies that are alternatives to incineration for destruction of hazardous organic wastes. The purpose of this effort is to evaluate technologies that are alternatives to open-flame, free-oxygen combustion (as exemplified by incinerators), and recommend to the Waste Type Managers and the MWFA which technologies should be considered for further development. Alternative technologies were defined as those that have the potential to: destroy organic material without use of open-flame reactions with free gas-phase oxygen as the reaction mechanism; reduce the offgas volume and associated contaminants (metals, radionuclides, and particulates) emitted under normal operating conditions; eliminate or reduce the production of dioxins and furans; and reduce the potential for excursions in the process that can lead to accidental release of harmful levels of chemical or radioactive materials. Twenty-three technologies were identified that have the potential for meeting these requirements. These technologies were rated against the categories of performance, readiness for deployment, and environment safety, and health. The top ten technologies that resulted from this evaluation are Steam Reforming, Electron Beam, UV Photo-Oxidation, Ultrasonics, Eco Logic reduction process, Supercritical Water oxidation, Cerium Mediated Electrochemical Oxidation, DETOX^{SM}, Direct Chemical Oxidation (peroxydisulfate), and Neutralization/Hydrolysis.

240
(INEL/EXT–97-00141)
Performance test results of noninvasive characterization of Resource Conservation and Recovery Act surrogate waste by prompt gamma neutron activation analysis. Gehrke, R.J.; Streier, G.G. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Mar 1997. 129p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050296. Source: OSTI; NTIS; INIS; GPO Dep.

During FY-96, a performance test was carried out with funding from the Mixed Waste Focus Area (MWFA) of the Department of Energy (DOE) to determine the noninvasive elemental assay capabilities of commercial companies for Resource Conservation and Recovery Act (RCRA) metals present in 8-gal drums containing surrogate waste. Commercial companies were required to be experienced in the use of prompt gamma neutron activation analysis (PGNAA) techniques and to have a prototype assay system with which to conduct the test assays. Potential participants were identified through responses to a call for proposals advertised in the Commerce Business Daily and through personal contacts. Six companies were originally identified. Two of these six were willing and able to participate in the performance test, as described in the test plan, with some subsidizing from the DOE MWFA. The tests were conducted with surrogate sludge waste because (1) a large volume of this type of waste awaits final disposition and (2) sludge tends to be somewhat homogeneous. The surrogate concentrations of the above RCRA metals ranged from $\sim$ 300 ppm to $\sim$ 20,000 ppm. The lower limit was chosen as an estimate of the expected sensitivity of detection required by noninvasive, pretreatment elemental assay systems to be of value for operational and compliance purposes and to still be achievable with state-of-the-art methods of analysis. The upper limit of $\sim$ 20,000 ppm was chosen because it is the opinion of the author that assay above this concentration level is within current state-of-the-art methods for most RCRA constituents. This report is organized into three parts: Part 1, Test Plan to Evaluate the Technical Status of Noninvasive Elemental Assay Techniques for Hazardous Waste; Part 2, Participants' Results; and Part 3, Evaluation of and Comments on Participants' Results.

241
(INEL/EXT–97-00221)
Test plan for buried waste containment system materials. Weidner, J.; Shaw, P. Idaho National Engineering Lab., Idaho Falls, ID (United States). Mar 1997. 26p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052959. Source: OSTI; NTIS; INIS; GPO Dep.

The objectives of the FY 1997 barrier material work at the Idaho National Engineering and Environmental Laboratory are to (1) select a waste barrier material and verify that it is compatible with the Buried Waste Containment System Process, and (2) determine if, and how, the Buried Waste

Containment System emplacement process affects the material properties and performance (on proof of principle scale). This test plan describes a set of measurements and procedures used to validate a waste barrier material for the Buried Waste Containment System. A latex modified proprietary cement manufactured by CTS Cement Manufacturing Company will be tested. Emplacement properties required for the Buried Waste Containment System process are: slump between 8 and 10 in., set time between 15 and 30 minutes, compressive strength at set of 20 psi minimum, and set temperature less than 100°C. Durability properties include resistance to degradation from carbonate, sulfate, and waste-site soil leachates. A set of baseline barrier material properties will be determined to provide a data base for comparison with the barrier materials when tested in the field. The measurements include permeability, petrographic analysis to determine separation and/or segregation of mix components, and a set of mechanical properties. The measurements will be repeated on specimens from the field test material. The data will be used to determine if the Buried Waste Containment System equipment changes the material. The emplacement properties will be determined using standard laboratory procedures and instruments. Durability of the barrier material will be evaluated by determining the effect of carbonate, sulfate, and waste-site soil leachates on the compressive strength of the barrier material. The baseline properties will be determined using standard ASTM procedures. 9 refs., 1 fig., 2 tabs.

242
(INEL/EXT–97-00277)
INEEL special case waste storage and disposal alternatives. Larson, L.A.; Bishop, C.W.; Bhatt, R.N. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Jul 1997. 69p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050473. Source: OSTI; NTIS; INIS; GPO Dep.

Special case waste is historically defined as radioactive waste that does not have a path forward or fit into current Department of Energy management plans for final treatment or disposal. The objectives of this report, relative to special case waste at the Idaho National Engineering and Environmental Laboratory, are to (a) identify its current storage locations, conditions, and configuration; (b) review and verify the currently reported inventory; (c) segregate the inventory into manageable categories; (d) identify the portion that has a path forward or is managed under other major programs/projects; (e) identify options for reconfiguring and separating the disposable portions; (f) determine if the special case waste needs to be consolidated into a single storage location; and (g) identify a preferred facility for storage. This report also provides an inventory of stored sealed sources that are potentially greater than Class C or special case waste based on Nuclear Regulatory Commission and Site-Specific Waste Acceptance Criteria.

243
(INEL/EXT–97-00358)
Pilot chargeback system program plan. Smith, P. Idaho National Engineering Lab., Idaho Falls, ID (United States). Mar 1997. 7p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052968. Source: OSTI; NTIS; INIS; GPO Dep.

This planning document outlines the steps necessary to develop, test, evaluate, and potentially implement a pilot chargeback system at the Idaho National Engineering and Environmental Laboratory for the treatment, storage, and disposal of current waste. This pilot program will demonstrate one system that can be used to charge onsite generators for the treatment and disposal of low-level radioactive waste. In FY 1997, mock billings will begin by July 15, 1997. Assuming approvals are received to do so, FY 1998 activities will include modifying the associated automated systems, testing and evaluating system performance, and estimating the amount generators will spend for waste storage, treatment, and disposal in FY 1999. If the program is fully implemented in FY 1999, generators will pay actual, automated bills for waste management services from funds transferred to their budgets from Environmental Management.

244
(INEL/EXT–97-00387-Vol.1)
Technical strategy for the management of INEEL spent nuclear fuel. Idaho National Engineering Lab., Idaho Falls, ID (United States). Mar 1997. 71p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97053254. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents evaluations, findings, and recommendations of the Idaho National Engineering and Environmental Laboratory (INEEL) Spent Nuclear Fuel Task Team. The technical strategy developed by the Task Team includes stabilization, near term storage, packaging, transport, and ultimate disposal. Key issues identified and discussed include waste characterization, criticality, packaging, waste form performance, and special fuels. Current plans focus on onsite needs, and include three central elements: (1) resolution of near-term vulnerabilities, (2) consolidation of storage locations, and (3) achieving dry storage in transportable packages. In addition to the Task Team report, appendices contain information on the INEEL spent fuel inventory; regulatory decisions and agreements; and analyses of criticality, packaging, storage, transportation, and system performance of a geological repository. 16 refs., 6 figs., 4 tabs.

245
(INEL/EXT–97-00516)
Process modeling for the Integrated Nonthermal Treatment System (INTS) study. Brown, B.W. Idaho National Engineering Lab., Idaho Falls, ID (United States). Apr 1997. 177p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050304. Source: OSTI; NTIS; GPO Dep.

This report describes the process modeling done in support of the Integrated Nonthermal Treatment System (INTS) study. This study was performed to supplement the Integrated Thermal Treatment System (ITTS) study and comprises five conceptual treatment systems that treat DOE contract-handled mixed low-level wastes (MLLW) at temperatures of less than 350°F. ASPEN PLUS, a chemical process simulator, was used to model the systems. Nonthermal treatment systems were developed as part of the INTS study and include sufficient processing steps to treat the entire inventory of MLLW. The final result of the modeling is a process flowsheet with a detailed mass and energy

balance. In contrast to the ITTS study, which modeled only the main treatment system, the INTS study modeled each of the various processing steps with ASPEN PLUS, release 9.1-1. Trace constituents, such as radionuclides and minor pollutant species, were not included in the calculations.

246
(INEL/EXT–97-00668)
Criticality safety validation: Simple geometry, single unit ^{233}U systems. Putman, V.L. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Jun 1997. [200p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050474. Source: OSTI; NTIS; INIS; GPO Dep.

Typically used LMITCO criticality safety computational methods are evaluated for suitability when applied to INEEL ^{233}U systems which reasonably can be modeled as simple-geometry, single-unit systems. Sixty-seven critical experiments of uranium highly enriched in ^{233}U, including 57 aqueous solution, thermal-energy systems and 10 metal, fast-energy systems, were modeled. These experiments include 41 cylindrical and 26 spherical cores, and 41 reflected and 26 unreflected systems. No experiments were found for intermediate-neutron-energy ranges, or with interstitial non-hydrogenous materials typical of waste systems, mixed ^{233}U and plutonium, or reflectors such as steel, lead, or concrete. No simple geometry experiments were found with cubic or annular cores, or approximating infinite sea systems. Calculations were performed with various tools and methodologies. Nine cross-section libraries, based on ENDF/B-IV, -V, or -VI.2, or on Hansen-Roach source data, were used with cross-section processing methods of MCNP or SCALE. The k_{eff} calculations were performed with neutral-particle transport and Monte Carlo methods of criticality codes DANT, MCNP 4A, and KENO Va.

247
(INEL/EXT–97-00741)
Independent review of inappropriate identification, storage and treatment methods of polychlorinated biphenyl waste streams. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Jul 1997. 75p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE98050482. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the review was to evaluate incidents involving the inappropriate identification, storage, and treatment methods associated with polychlorinated biphenyl (PCB) waste streams originating from the V-tank system at the Test Area North (TAN). The team was instructed to perform a comprehensive review of Lockheed Martin Idaho Technologies Company (LMITCO's) compliance programs related to these incidents to assess the adequacy and effectiveness of the management program in all respects including: adequacy of the waste management program in meeting all LMITCO requirements and regulations; adequacy of policies, plans, and procedures in addressing and implementing all federal and state requirements and regulations; and compliance status of LMITCO, LMITCO contract team members, and LMITCO contract/team member subcontractor personnel with established PCB management policies, plans, and procedures. The V-Tanks are part of an intermediate waste disposal system and are located at the Technical Support Facility (TSF) at TAN at the Idaho National Engineering and Environmental Laboratory (INEEL). The IRT evaluated how a waste was characterized, managed, and information was documented; however, they did not take control of wastes or ensure followup was performed on all waste streams that may have been generated from the V-Tanks. The team has also subsequently learned that the Environmental Restoration (ER) program is revising the plans for the decontamination and decommissioning of the intermediate waste disposal system based on new information listed and PCB wastes. The team has not reviewed those in-process changes. The source of PCB in the V-Tank is suspected to be a spill of hydraulic fluid in 1968.

248
(JE/ER–4)
Independent criticality safety evaluation of deposits in cooler equipment in Building K-31 at the Oak Ridge K-25 Site, Oak Ridge, Tennessee. Jacobs Engineering Group, Inc., Oak Ridge, TN (United States). Oct 1996. 91p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-93OR22028. Order Number DE97001827. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides an independent assessment of nuclear criticality issues associated with uranium deposits in the West and East Coolers for the 6A Booster Station in Building K-31 at the Oak Ridge K-25 Site. This assessment investigates the applicability of the initial assumptions used by Lockheed Martin Energy Systems (Energy Systems) and evaluates criticality calculations previously completed by Energy Systems. The calculations were independently verified. Each component was evaluated for its ability to satisfy requirements for subcriticality and meet the double contingency principle. Facility walk downs, detailed neutronics analysis, and fault tree analysis (FTA) were performed. The facility walk downs provided a better understanding of the building condition and status, equipment configuration, and uranium deposit locations. The detailed neutronics analysis focused on system geometry and moderation levels applicable to the individual components. The FTA considered the annual rate of occurrence for the events identified as potential causes of criticality issues. This report also examines the advantages of using this type of evaluation to assess the removal process for additional components and equipment.

249
(JIEE–97008406)
Risk reduction and the privatization option: First principles. Bjornstad, D.J. (Joint Inst. for Energy and Environment, Knoxville, TN (United States)); Jones, D.W.; Russell, M.; Cummings, R.C.; Valdez, G.; Duemmer, C.L. Joint Inst. for Energy and Environment, Knoxville, TN (United States). 25 Jun 1997. 87p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97008406. Source: OSTI; NTIS; INIS; GPO Dep.

The Department of Energy's Office of Environmental Restoration and Waste Management (EM) faces a challenging mission. To increase efficiency, EM is undertaking a number of highly innovative initiatives–two of which are of particular importance to the present study. One is the 2006 Plan, a planning and budgeting process that seeks to convert the clean-up program from a temporally and fiscally

open-ended endeavor to a strictly bounded one, with firm commitments over a decade-long horizon. The second is a major overhauling of the management and contracting practices that define the relationship between the Department and the private sector, aimed at cost reduction by increasing firms' responsibilities and profit opportunities and reducing DOE's direct participation in management practices and decisions. The goal of this paper is to provide an independent perspective on how EM should create new management practices to deal with private sector partners that are motivated by financial incentives. It seeks to ground this perspective in real world concerns–the background of the clean-up effort, the very difficult technical challenges it faces, the very real threats to environment, health and safety that have now been juxtaposed with financial drivers, and the constraints imposed by government's unique business practices and public responsibilities. The approach is to raise issues through application of first principles. The paper is targeted at the EM policy officer who must implement the joint visions of the 2006 plan and privatization within the context of the tradeoff between terminal risk reduction and interim risk management.

250
(KY/EM–176)
Paducah Site annual report for 1995. Belcher, G. (ed.). Paducah Gaseous Diffusion Plant, KY (United States). Jan 1997. 164p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97005216. Source: OSTI; NTIS; INIS; GPO Dep.

The Paducah Gaseous Diffusion Plant, located in McCracken County, Kentucky, has been producing enriched uranium since 1952. In July 1993, the US department of Energy (DOE) leased the production areas of the site to the US Enrichment Corporation (USEC). A new subsidiary of Lockheed Martin Corporation, Lockheed Martin Utility Services, manages the leased facilities for USEC. DOE maintains responsibility for the environmental restoration, waste management, and enrichment facilities activities at the plant through its management contractor, Lockheed Martin Energy Systems. The purpose of this document is to summarize calendar year 1995 environmental monitoring activities for DOE activities at the Paducah Site. DOE requires all of its facilities to conduct and document such activities annually. This report does not include USEC environmental activities.

251
(KY/EM–176-Summ.)
Paducah Site annual environmental report summary for 1995. Belcher, G. (ed.). Paducah Gaseous Diffusion Plant, KY (United States). Jan 1997. 22p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97005218. Source: OSTI; NTIS; INIS; GPO Dep.

This report contains summaries of the environmental programs at the Paducah Site, as well as the impacts of its operations on the environment and the public for 1995. The results of environmental monitoring are presented. The goal is to keep emissions as low as possible, enhance the strict safety controls that are in place and use state-of-the-art technology to complete environmental remediation projects in the most cost-effective and efficient manner possible.

252
(LA–13182-SR)
94-1 Research and Development Project Lead Laboratory Support. Status report, April 1, 1996–June 30, 1996. Dinehart, M. (comp.). Los Alamos National Lab., NM (United States). Oct 1996. 57p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97000574. Source: OSTI; NTIS; GPO Dep.

This document reports status and technical progress for Los Alamos 94-1 Research and Development projects concerned with the management of plutonium and plutonium contaminated materials during the third quarter of FY96.

253
(LA–13206-MS)
Human dose assessment for the radionuclides ^{90}Sr and ^{90}Y at TA-35 SWMU 35-003 (r) and Ten Site Canyon. Jarmer, D.; Lyman, J. Los Alamos National Lab., NM (United States). Jul 1997. 54p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97009283. Source: OSTI; NTIS; INIS; GPO Dep.

This report gives an estimate of the radiological dose to an individual living on or working at a site contaminated with strontium-90 (^{90}Sr) and yttrium-90 (^{90}Y). The site consists of a small receiving canyon that drains into Ten-Site Canyon at the eastern end of Los Alamos National Laboratory's technical area 35 (TA-35). Between 1951 and 1963 a wastewater treatment facility located at TA-35 discharged water containing ^{90}Sr and ^{90}Y to this receiving canyon. The authors used the RESRAD computer code to calculate the dose to an onsite individual, based on two exposure scenarios: (1) a person working at the site for eight hours a day, five days a week, for twenty-five years and (2) a farmer living at the site twenty four hours a day, seven days a week, for thirty years. The exposure pathways considered were direct exposure to external radiation; inhalation of contaminated dusts; and ingestion of plants, water, and soil. The authors found that the maximum estimated dose rates were 1 and 21 mrem y^{-1} for the worker and farmer scenarios respectively. The authors have concluded that the value for the worker scenario is well below the DOE dose limit of 100 mrem y^{-1} but the farmer is overexposed.

254
(LA–13215-MS)
Hydrolysis of ferric chloride in solution. Lussiez, G.; Beckstead, L. Los Alamos National Lab., NM (United States). Nov 1996. 36p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97002556. Source: OSTI; NTIS; INIS; GPO Dep.

The Detox™ process uses concentrated ferric chloride and small amounts of catalysts to oxidize organic compounds. It is under consideration for oxidizing transuranic organic wastes. Although the solution is reused extensively, at some point it will reach the acceptable limit of radioactivity or maximum solubility of the radioisotopes. This solution could be cemented, but the volume would be increased substantially because of the poor compatibility of chlorides and cement. A process has been developed that recovers the

chloride ions as HCl and either minimizes the volume of radioactive waste or permits recycling of the radioactive chlorides. The process involves a two-step hydrolysis at atmospheric pressure, or preferably under a slight vacuum, and relatively low temperature, about 200°C. During the first step of the process, hydrolysis occurs according to the reaction below: $FeCl_{3liquid} + H_2O \rightarrow FeOCl_{solid} + 2\ HCl_{gas}$ During the second step, the hot, solid, iron oxychloride is sprayed with water or placed in contact with steam, and hydrolysis proceeds to the iron oxide according to the following reaction: $2\ FeOCl_{solid} + H_2O \rightarrow Fe_2O_{3solid} + 2\ HCl_{gas}$. The iron oxide, which contains radioisotopes, can then be disposed of by cementation or encapsulation. Alternately, these chlorides can be washed off of the solids and can then either be recycled or disposed of in some other way.

255
(LA–13229-MS)
Technical basis for storage of elastomer-sealed produce cans in the DOE-STD-3013-94 package. Horrell, D.R. (Los Alamos National Lab., NM (United States)); Stakebake, J.L.; Szempruch, R.W. Los Alamos National Lab., NM (United States). Nov 1996. 17p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97002562. Source: OSTI; NTIS; INIS; GPO Dep.

Department of Energy standard DOE-STD-3013-94 establishes criteria for the long-term packaging of plutonium metal and oxide. The inclusion of organic materials in sealed packages of plutonium may produce gases that contribute to container pressurization. To expedite processing, it would be desirable to permit, within the DOE-outlined criteria, limited amounts of organic materials to be used as a sealing gasket in some packaging containers. This paper presents a technical basis for allowing elastomer-sealed cans to be packaged inside the sealed inner container of a double weld-sealed DOE-STD-3013-94 container system.

256
(LA–13231-SR)
94-1 Research and development project lead laboratory support. Status report, July 1, 1996–September 30, 1996. Rink, N. (comp.). Los Alamos National Lab., NM (United States). Mar 1997. 146p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97005289. Source: OSTI; NTIS; GPO Dep.

This document reports status and technical progress for Los Alamos 94-1 Research and Development projects. Updated schedule charts are shown in the appendix. This is the fourth status report published for Los Alamos National Laboratory 94-1 Research and Development Project Support. The Department of Energy Office of Environmental Management (DOE/EM) funds these projects in order to support the storage or disposal of legacy plutonium and plutonium-bearing materials resulting from weapons production throughout the DOE complex. This document also serves as an end-for-year review of projects and positions the program for FY97.

257
(LA–13233-MS)
LANL seismic screening method for existing buildings. Dickson, S.L. (and others); Feller, K.C.; Fritz de la Orta, G.O. Los Alamos National Lab., NM (United States). Jan 1997. 50p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97005288. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the Los Alamos National Laboratory (LANL) Seismic Screening Method is to provide a comprehensive, rational, and inexpensive method for evaluating the relative seismic integrity of a large building inventory using substantial life-safety as the minimum goal. The substantial life-safety goal is deemed to be satisfied if the extent of structural damage or nonstructural component damage does not pose a significant risk to human life. The screening is limited to Performance Category (PC) -0, -1, and -2 buildings and structures. Because of their higher performance objectives, PC-3 and PC-4 buildings automatically fail the LANL Seismic Screening Method and will be subject to a more detailed seismic analysis. The Laboratory has also designated that PC-0, PC-1, and PC-2 unreinforced masonry bearing wall and masonry infill shear wall buildings fail the LANL Seismic Screening Method because of their historically poor seismic performance or complex behavior. These building types are also recommended for a more detailed seismic analysis. The results of the LANL Seismic Screening Method are expressed in terms of separate scores for potential configuration or physical hazards (Phase One) and calculated capacity/demand ratios (Phase Two). This two-phase method allows the user to quickly identify buildings that have adequate seismic characteristics and structural capacity and screen them out from further evaluation. The resulting scores also provide a ranking of those buildings found to be inadequate. Thus, buildings not passing the screening can be rationally prioritized for further evaluation. For the purpose of complying with Executive Order 12941, the buildings failing the LANL Seismic Screening Method are deemed to have seismic deficiencies, and cost estimates for mitigation must be prepared. Mitigation techniques and cost-estimate guidelines are not included in the LANL Seismic Screening Method.

258
(LA–13242-MS)
Radionuclide contaminant analysis of small mammals at Area G, TA-54, Los Alamos National Laboratory, 1995. Bennett, K.; Biggs, J.; Fresquez, P. Los Alamos National Lab., NM (United States). Jan 1997. 24p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97003309. Source: OSTI; NTIS; INIS; GPO Dep.

At Los Alamos National Laboratory, small mammals were sampled at two waste burial sites (Site 1-recently disturbed and Site 2-partially disturbed) at Area G, Technical Area 54 and a control site on Frijoles Mesa (Site 4) in 1995. Our objectives were (1) to identify radionuclides that are present within surface and subsurface soils at waste burial sites, (2) to compare the amount of radionuclide uptake by small mammals at waste burial sites to a control site, and (3) to identify if the primary mode of contamination to small mammals is by surface contact or ingestion/inhalation. Three composite samples of at least rive animals per sample were collected at each site. Pelts and carcasses of each animal were separated and analyzed independently. Samples were analyzed for ^{241}Am, ^{90}Sr , ^{238}Pu, ^{239}Pu, total U, ^{137}Cs, and ^{3}H. Significantly higher (parametric West at p=0.05) levels of

total U, ^{241}Am, ^{238}Pu and ^{239}Pu were detected in pelts than in carcasses of small mammals at TA-54. Concentrations of other measured radionuclides in carcasses were nearly equal to or exceeded the mean concentrations in the pelts. Our results show higher concentrations in pelts compared to carcasses, which is similar to what has been found at waste burial/contaminated sites outside of Los Alamos National Laboratory. Site 1 had a significantly higher (alpha=0.05, P=0.0125) mean tritium concentration in carcasses than Site 2 or Site 4. In addition Site 1 also had a significantly higher (alpha=0.05, p=0.0024) mean tritium concentration in pelts than Site 2 or Site 4. Site 2 had a significantly higher (alpha=0.05, P=0.0499) mean ^{239}Pu concentration in carcasses than either Site 1 or Site 4.

259
(LA–13249-SR)
94-1 research and development project lead laboratory support. Status report, October 1–December 31, 1996. Rink, N.A. (comp.). Los Alamos National Lab., NM (United States). Jul 1997. 72p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97007823. Source: OSTI; NTIS; GPO Dep.

This status report is published for Los Alamos National Laboratory 94-1 Research and Development (R and D) projects. The Department of Energy Office of Environmental Management (DOE/EM) funds these projects in order to support the storage or disposal of legacy plutonium and plutonium-bearing materials that resulted from weapons production throughout the DOE complex. This report summarizes status and technical progress for Materials Identification and Surveillance; Stabilization Process Development; Surveillance and Monitoring; Core Technology; Separations; Materials Science; Synthesis and Structural Characterization of Plutonium(IV) and Plutonium(VI) Phosphates; Plutonium Phosphate Solution Chemistry; and Molten Salt/Nonaqueous Electrochemistry.

260
(LA–13259-MS)
Preliminary risk assessment of the Mexican Spotted Owl under a spatially-weighted foraging regime at the Los Alamos National Laboratory. Gallegos, A.F.; Gonzales, G.J.; Bennett, K.D.; Pratt, L.E. Los Alamos National Lab., NM (United States). Feb 1997. 69p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97005283. Source: OSTI; NTIS; INIS; GPO Dep.

The Record of Decision on the Dual Axis Radiographic Hydrodynamic Test Facility at the Los Alamos National Laboratory requires that the Department of Energy takes special precautions to protect the Mexican Spotted Owl (Strix occidentalis lucida). In order to do so, risk to the owl presented by radiological and nonradiological contaminants must be estimated. A preliminary risk assessment on the Mexican Spotted Owl in two Ecological Exposure Units (EEUs) was performed using a modified Environmental Protection Agency Quotient method, the FORTRAN model ECORSK4, and a geographic information system. Estimated doses to the owl under a spatially-weighted foraging regime were compared against toxicological reference doses generating hazard indices (HIs) and hazard quotients (HQs) for three risk source types. The average HI was 0.20 for EEU-21 and 0.0015 for EEU-40. Under the risk parameter assumptions made, hazard quotient results indicated no unacceptable risk to the owl, including a measure of cumulative effects from multiple contaminants that assumes a linear additive toxicity type. An HI of 1.0 was used as the evaluative criteria for determining the acceptability of risk. This value was exceeded (1.06) in only one of 200 simulated potential nest sites. Cesium-137, Ni, ^{239}Pu, Al and ^{234}U we're among the constituents with the highest partial HQs. Improving model realism by weighting simulated owl foraging based on distance from potential nest sites decreased the estimated risk by 72% (0.5 HI units) for EEU-21 and by 97.6% (6.3E-02 HI units) for EEU-40. Information on risk by specific geographical location was generated, which can be used to manage contaminated areas, owl habitat, facility siting, and/or facility operations in order to maintain risk from contaminants at acceptably low levels.

261
(LA–13332-PR)
Radionuclide concentrations in soils and vegetation at radioactive-waste disposal Area G during the 1996 growing season. Progress report. Fresquez, P.R.; Vold, E.L.; Naranjo, L. Jr. Los Alamos National Lab., NM (United States). Jul 1997. 110p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97008002. Source: OSTI; NTIS; INIS; GPO Dep.

Soil and overstory and understory vegetation (washed and unwashed) collected at eight locations within and around Area G–a low-level radioactive solid-waste disposal facility at Los Alamos National laboratory–were analyzed for ^{3}H, ^{90}Sr, ^{238}Pu, ^{239}Pu, ^{137}Cs, ^{234}U, ^{235}U, ^{238}U, ^{tot}U, ^{228}Ac, ^{214}Bi, ^{60}Co, ^{40}K, ^{54}Mn, ^{22}Na, ^{214}Pb, and ^{208}Tl. Also, heavy metals (Ag, As, Ba, Be, Cd, Cr, Hg, Ni, Pb, Sb, Se, and Tl) in soil and vegetation were determined. In general, most radionuclide concentrations, with the exception of ^{3}H and ^{239}Pu, in soils and washed and unwashed overstory and understory vegetation collected from within and around Area G were within upper limit background concentrations. Tritium was detected as high as 14,744 pCi mL^{-1} in understory vegetation collected from transuranic (TRU) waste pad #4, and the TRU waste pad area contained the highest levels of ^{239}Pu in soils and in understory vegetation as compared to other areas at Area G.

262
(LA–13345-MS)
Radionuclide contaminant analysis of small mammals at Area G, Technical Area 54, 1996 (with cumulative summary for 1994–1996). Biggs, J.R.; Bennett, K.D.; Fresquez, P.R. Los Alamos National Lab., NM (United States). Jul 1997. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97008001. Source: OSTI; NTIS; INIS; GPO Dep.

Small mammals were sampled at two waste burial sites at Area G, Technical Area (TA) 54 and a control site within the proposed Area G expansion area in 1996 to (1) identify radionuclides that are present within rodent tissues at waste burial sites, (2) to compare the amount of radionuclide uptake by small mammals at waste burial sites to a control

site, and (3) to identify the primary mode of contamination to small mammals, either through surface contact or ingestion/inhalation. Three composite samples of approximately five animals per sample were collected at each site. Pelts and carcasses of each animal were separated and analyzed independently. Samples were analyzed for ^{241}Am, ^{90}Sr, ^{238}Pu, ^{239}Pu, total U, ^{137}Cs, and ^{3}H. Higher levels of total U, ^{241}Am, ^{238}Pu, and ^{239}Pu were detected in pelts as compared to the carcasses of small mammals at TA-54. Concentrations of other measured radionuclides in carcasses were nearly equal to or exceeded the mean concentrations in the pelts. Due to low sample sizes in total number of animals captured, statistical analysis to compare site to site could not be conducted. However, mean concentrations of total U, ^{238}Pu, ^{239}Pu, and ^{137}Cs in rodent carcasses were higher at Site 1 than site 2 or the Control Site and ^{241}Am was higher at Site 2 than Site 1 or the Control Site.

263
(LA–97004943)
Los Alamos National Laboratory transuranic waste quality assurance project plan. Revision 1. Los Alamos National Lab., NM (United States). 14 Apr 1997. 150p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97004943. Source: OSTI; NTIS; INIS; GPO Dep.

This Transuranic (TRU) Waste Quality Assurance Project Plan (QAPjP) serves as the quality management plan for the characterization of transuranic waste in preparation for certification and transportation. The Transuranic Waste Characterization/Certification Program (TWCP) consists of personnel who sample and analyze waste, validate and report data; and provide project management, quality assurance, audit and assessment, and records management support, all in accordance with established requirements for disposal of TRU waste at the Waste Isolation Pilot Plant (WIPP) facility. This QAPjP addresses how the TWCP meets the quality requirements of the Carlsbad Area Office (CAO) Quality Assurance Program Description (QAPD) and the technical requirements of the Transuranic Waste Characterization Quality Assurance Program Plan (QAPP). The TWCP characterizes and certifies retrievably stored and newly generated TRU waste using the waste selection, testing, sampling, and analytical techniques and data quality objectives (DQOs) described in the QAPP, the Los Alamos National Laboratory Transuranic Waste Certification Plan (Certification Plan), and the CST Waste Management Facilities Waste Acceptance Criteria and Certification [Los Alamos National Laboratory (LANL) Waste Acceptance Criteria (WAC)]. At the present, the TWCP does not address remote-handled (RH) waste.

264
(LA-UR–95-4042)
Runoff and erosion from a rapidly eroding pinyon-juniper hillslope. Wilcox, B.P. (Los Alamos National Lab., NM (United States)); Davenport, D. W.; Pitlick, J.; Allen, C.D. Los Alamos National Lab., NM (United States). [1996]. 27p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960984–1: British Geomorphological Research Group symposium: hillslope process, Bristol (United Kingdom), 20-22 Sep 1996). Order Number DE96005509. Source: OSTI; NTIS; GPO Dep.

The dramatic acceleration of erosion associated with the expansion of pinyon-juniper woodlands over the past 100 years has been a widely recognized but poorly understood phenomenon. A more complete understanding will come only through long-term observations of erosion and related factors. To this end, we are conducting a study of a small (1-ha) catchment in a rapidly eroding pinyon-juniper woodland. Since July 1993, we have been collecting data on runoff, erosion, and weather conditions in the catchment, as well as on the topography, soils, and vegetation. Our preliminary results suggest that (1) the catchment is currently in a cycle of accelerated erosion that began concomitant with a shift from ponderosa pine forest to pinyon-juniper woodland that was initiated by a prolonged drought; (2) the intercanopy soils cannot be sustained at the current erosion rates and will be mostly stripped away in about a century; (3) large summer thunderstorms are the most important agents of erosion (4) erosion increases dramatically as the scale increases; (5) runoff makes up <10% of the water budget.

265
(LA-UR–95-4272)
Resource Conservation and Recovery Act permit modifications and the functional equivalency demonstration: a case study. Elsberry, K. (Los Alamos National Lab., NM (United States)); Garcia, P.; Carnes, R.; Kinker, J.; Loehr, C; Lyon, W. Los Alamos National Lab., NM (United States). [1996]. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960212–6: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96005604. Source: OSTI; NTIS; INIS; GPO Dep.

Hazardous waste operating permits issued under the Resource Conservation and Recovery Act (RCRA) often impose requirements that specific components and equipment be used. Consequently, changing these items, may first require that the owner/operator request a potentially time-consuming and costly permit modification. However, the owner/operator may demonstrate that a modification is not required because the planned changes are "functionally equivalent." The Controlled-Air Incinerator at Los Alamos National Laboratory is scheduled for maintenance and improvements. The incinerator's carbon adsorption unit/high efficiency particulate air filtration system, was redesigned to improve reliability and minimize maintenance. A study was performed to determine whether the redesigned unit would qualify as functionally equivalent to the original component. In performing this study, the following steps were taken: (a) the key performance factors were identified; (b) performance data describing the existing unit were obtained; (c) performance of both the existing and redesigned units was simulated; and (d) the performance data were compared to ascertain whether the components could qualify as functionally equivalent. In this case, the key performance data included gas residence time and distribution of flow over the activated carbon. Because both units were custom designed and fabricated, a simple comparison of manufacturers' specifications was impossible. Therefore, numerical simulation of each unit design was performed using the TEMPEST thermal-hydraulic computer code to model isothermal hydrodynamic performance under steady-state conditions. The results of residence time calculations from the model were coupled with flow proportion and sampled using a Monte

Carlo-style simulation to derive distributions that describe the predicted residence times.

266
(LA-UR–96-368)
The role of a detailed aqueous phase source release model in the LANL Area G performance assessment. Vold, E.L. (Los Alamos National Lab., NM (United States)); Hollis, D.; Longmire, P.; Springer, E.; Birdsell, K.; Shuman, R. Los Alamos National Lab., NM (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960212–69: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96008122. Source: OSTI; NTIS; INIS; GPO Dep.

The Performance Assessment for the LANL Low-Level Radioactive Waste (LLRW) Disposal Facility, Area G, is ongoing. A detailed review of the inventory data base records and the existing models for source release led to the development of a new modeling capability to describe the liquid phase aqueous transport from the waste package volumes. Inventory is sorted into four release form categories and screened in a comparison of leachate concentrations to the drinking water limit. Percolation through the disposal unit is prescribed in an independent surface water balance model incorporating site rainfall statistics. Waste package types and the disposal unit matrix have independently specified solubility limits and solid-liquid phase partition coefficients, or Kd values. Analytic solutions for inventory limited release of each nuclide in each of the four different waste package release forms are computed. Isotopic contributions are summed over elements to limit the waste package liquid phase concentrations to the elemental solubility limits. Time dependent releases from the waste packages for each nuclide which may be inventory or solubility limited are specified as model output which is provided as the source term to the unsaturated transport model. The waste package efflux is distributed over the 2-D unsaturated zone model grid points corresponding to the cross-sections for 5 representative disposal units within the mesa top. Results show the Area G release is dominated by the inventory in the rapid release waste form (Kd = 0), which percolates from the waste packages over 5–100 years and from the disposal unit over 50–1,000 years. Nuclides in waste package categories with larger Kd values are released proportionately slower. U and Th are the main nuclides of concern released as solubility limited nuclides from the historical inventory at Area G.

267
(LA-UR–96-378)
Chemical Exposure Assessment Program at Los Alamos National Laboratory: A risk based approach. Stephenson, D.J. Los Alamos National Lab., NM (United States). [1996]. 18p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960212–67: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96008124. Source: OSTI; NTIS; INIS; GPO Dep.

The University of California Contract And DOE Order 5480.10 require that Los Alamos National Laboratory (LANL) perform health hazard assessments/inventories of all employee workplaces. In response to this LANL has developed the Chemical Exposure Assessment Program. This program provides a systematic risk-based approach to anticipation, recognition, evaluation and control of chemical workplace exposures. Program implementation focuses resources on exposures with the highest risks for causing adverse health effects. Implementation guidance includes procedures for basic characterization, qualitative risk assessment, quantitative validation, and recommendations and reevaluation. Each component of the program is described. It is shown how a systematic method of assessment improves documentation, retrieval, and use of generated exposure information.

268
(LA-UR–96-0595)
Non-Thermal Plasma (NTP) session overview: Second International Symposium on Environmental Applications of Advanced Oxidation Technologies (AOTs). Rosocha, L.A. Los Alamos National Lab., NM (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960252–1: 2. international symposium on environmental applications of advanced oxidation technologies, San Francisco, CA (United States), 28 Feb - 1 Mar 1996). Order Number DE96006969. Source: OSTI; NTIS; INIS; GPO Dep.

Advanced Oxidation Technologies (used in pollution control and treating hazardous wastes) has expanded from using hydroxyl radicals to treat organic compounds in water, to using reductive free radicals as well, and to application to pollutants in both gases and aqueous media. Non-Thermal Plasma (NTP) is created in a gas by an electrical discharge or energetic electron injection. Highly reactive species (O atoms, OH, N radicals, plasma electrons) react with entrained hazardous organic chemicals in the gas, converting them to CO2, H2O, etc. NTP can be used to simultaneously remove different kinds of pollutants (eg, VOCs, SOx, NOx in flue gases). This paper presents an overview of NTP technology for pollution control and hazardous waste treatment; it is intended as an introduction to the NTP session of the symposium.

269
(LA-UR–96-732)
Contaminant analysis automation, an overview. Hollen, R.; Ramos, O. Jr. Los Alamos National Lab., NM (United States). [1996]. 3p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-9603129–5: 1996 New Mexico conference on the environment, Albuquerque, NM (United States), 12-14 Mar 1996). Order Number DE96009785. Source: OSTI; NTIS; INIS; GPO Dep.

To meet the environmental restoration and waste minimization goals of government and industry, several government laboratories, universities, and private companies have formed the Contaminant Analysis Automation (CAA) team. The goal of this consortium is to design and fabricate robotics systems that standardize and automate the hardware and software of the most common environmental chemical methods. In essence, the CAA team takes conventional, regulatory- approved (EPA Methods) chemical analysis processes and automates them. The automation consists of standard laboratory modules (SLMs) that perform the work in a much more efficient, accurate, and cost-effective manner.

270
(LA-UR–96-1051)
Mass transfer of SCWO processes: Molecular diffusion and mass transfer coefficients of inorganic nitrate species in sub- and supercritical water. Goemans, M.G.E. (Univ. of Texas, Austin, TX (United States). Dept. of Civil Engineering); Gloyna, E.F.; Buelow, S.J. Los Alamos National Lab., NM (United States). 1996. 13p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960252–2: 2. international symposium on environmental applications of advanced oxidation technologies, San Francisco, CA (United States), 28 Feb - 1 Mar 1996). Order Number DE96009771. Source: OSTI; NTIS; GPO Dep.

Molecular diffusion coefficients of lithium-, sodium-, potassium-, cesium-, calcium-, and strontium nitrate in subcritical water were determined by analysis of Taylor dispersion profiles. Pressures ranged from 300 to 500 bar at temperatures ranging from 25°C to 300°C. The reported diffusion values were determined at infinite dilution. Molecular diffusion coefficients were 10 to 20 times faster in near-critical subcritical water than in water at ambient temperature and pressure (ATP). These findings implied that the diffusion rates were more liquid like than they were gas like, hence experimental results were correlated with diffusion models for liquids. The subcritical diffusion data presented in this work, and supercritical diffusion results published elsewhere were correlated with hydrodynamic diffusion equations. Both the Wilke-Chang correlation and the Stokes-Einstein equation yielded predictions within 10% of the experimental results if the structure of the diffusing species could be estimated. The effect of the increased diffusion rates on mass transfer rates in supercritical water oxidation applications was quantified, with emphasis on heterogeneous oxidation processes. This study and results published elsewhere showed that diffusion limited conditions are much more likely to be encountered in SCWO processes than commonly acknowledged.

271
(LA-UR–96-1133)
RCRA permit modifications and the functional equivalency demonstration: A case study. Kinker, J. (Benchmark Environmental Corp., Albuquerque, NM (United States)); Lyon, W.; Carnes, R.; Loehr, C.; Elsberry, K.; Garcia, P. Los Alamos National Lab., NM (United States). [1996]. 16p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960535–1: 15. international conference on incineration and thermal treatment technologies, Savannah, GA (United States), 6-10 May 1996). Order Number DE96009031. Source: OSTI; NTIS; INIS; GPO Dep.

Hazardous waste operating permits issued under the Resource Conservation and Recovery Act (RCRA) often impose requirements, typically by reference to the original permit application, that specific components and equipment be used. Consequently, changing these items, even for the purpose of routine maintenance, may first require that the owner/operator request a potentially time-consuming and costly permit modification. However, the owner/operator may demonstrate that a modification is not required because the planned changes are functionally equivalent, as defined by RCRA, to the original specifications embodied by the permit. The Controlled-Air Incinerator at Los Alamos National Laboratory is scheduled for maintenance and improvements that involve replacement of components. The incinerator's carbon adsorption unit/high efficiency particulate air filtration system, in particular, was redesigned to improve reliability and minimize maintenance. A study was performed to determine whether the redesigned unit would qualify as functionally equivalent to the original component. in performing this study, the following steps were taken: (a) the key performance factors were identified; (b) performance data describing the existing unit were obtained; (c) performance of both the existing and redesigned units was simulated; and (d) the performance data were compared to ascertain whether the components could qualify as functionally equivalent.

272
(LA-UR–96-1428)
Real-time monitoring for alpha emitters in high-airflow environments. Koster, J.E.; MacArthur, D.W.; Bounds, J.A.; Rawool-Sullivan, M; Whitley, C.R.; Conaway, J.G.; Steadman, P.A. Los Alamos National Lab., NM (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960804–33: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96010492. Source: OSTI; NTIS; INIS; GPO Dep.

Key problems in detecting alpha contamination for site characterization and decontamination and decommissioning that remain to be solved include measurement of airborne contamination, material holdup within pipes, and leakage of material containers. These problems are very difficult using traditional alpha detectors and systems. The ionization detection method (long-range alpha detection of LRAD) offers a number of specific advantages for these environmental measurements. An LRAD system detects the air molecules ionized by alpha-emitting contamination rather than the alpha particles. Thus, LRAD-based detectors are not limited by the short range of alpha particles and can be used to detect contamination anywhere that air can penetrate. Extending this technology to large enclosures of long pipes requires a system optimized for large airflows. In this paper we will present designs and preliminary results for high-volume flow-through air monitors based on the LRAD technique. In addition, we will discuss the behavior of the monitors and their potential applications.

273
(LA-UR–96-1566)
A self-directing elastic backscatter lidar system for debris cloud tracking and characterization. Clark, D.A. (Los Alamos National Lab., NM (United States)); Dighe, K.A.; Tunnell, T.W. Los Alamos National Lab., NM (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960770–2: 18. international laser radar conference, Berlin (Germany), 22-26 Jul 1996). Order Number DE96011257. Source: OSTI; NTIS; GPO Dep.

An elastic backscatter lidar that utilizes the lidar signal itself to direct the system towards fast moving isolated aerosol clouds has been developed. However, detecting and tracking invisible transient effluents from unknown locations, though conceptually straightforward, has still remained experimentally challenging. Accurate cloud volume, cloud

density distribution, and track information have been obtained on small, fast moving, subvisible debris clouds resulting from above ground tests in which conventional explosives were detonated.

274
(LA-UR–96-1723)
Radionuclides in an underground environment. Thompson, J.L. Los Alamos National Lab., NM (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-9609156–1: International symposium on nuclear and radiochemistry, Saint Malo (France), Sep 1996). Order Number DE96011294. Source: OSTI; NTIS; INIS; GPO Dep.

In the 100 years since Becquerel recognized radioactivity, mankind has been very successful in producing large amounts of radioactive materials. We have been less successful in reaching a consensus on how to dispose of the billions of curies of fission products and transuranics resulting from nuclear weapons testing, electrical power generation, medical research, and a variety of other human endeavors. Many countries, including the United States, favor underground burial as a means of disposing of radioactive wastes. There are, however, serious questions about how such buried wastes may behave in the underground environment and particularly how they might eventually contaminate water, air and soil resources on which we are dependent. This paper describes research done in the United States in the state of Nevada on the behavior of radioactive materials placed underground. During the last thirty years, a series of "experiments" conducted for other purposes (testing of nuclear weapons) have resulted in a wide variety of fission products and actinides being injected in rock strata both above and below the water table. Variables which seem to control the movement of these radionuclides include the physical form (occlusion versus surface deposition), the chemical oxidation state, sorption by mineral phases of the host rock, and the hydrologic properties of the medium. The information gained from these studies should be relevant to planning for remediation of nuclear facilities elsewhere in the world and for long-term storage of nuclear wastes.

275
(LA-UR–96-2573)
Epithermal interrogation of fissile waste. Coop, K.L.; Hollas, C.L. Los Alamos National Lab., NM (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960767–42: 37. annual meeting of the Institute of Nuclear Materials Management, Naples, FL (United States), 28 Jul - 1 Aug 1996). Order Number DE96014209. Source: OSTI; NTIS; INIS; GPO Dep.

Self-shielding of interrogating thermal neutrons in lumps of fissile material can be a major source of error in transuranic waste assay using the widely employed differential dieaway technique. We are developing a new instrument, the combined thermal/epithermal neutron (CTEN) interrogation instrument to detect the occurrence of self- shielding and mitigate its effects. Neutrons are moderated in the graphite walls of the CTEN instrument to provide an interrogating flux of epithermal and thermal neutrons. The induced prompt fission neutrons are detected in proportional counters. We report the results of measurements made with the CTEN instrument, using minimal and highly self-shielding plutonium and uranium sources in 55 gallon drums containing a variety of mock waste matrices. Fissile isotopes and waste forms for which the method is most applicable, and limitations associated with the hydrogen content of the waste package/matrix are described.

276
(LA-UR–96-3312)
The removal of precious metals by conductive polymer filtration. Cournoyer, M.E. Los Alamos National Lab., NM (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-9610184–1: 14. membrane technology and separations planning conference, Newton, MA (United States), 30 Oct 1996). Order Number DE97000124. Source: OSTI; NTIS; GPO Dep.

The growing demand for platinum-group metals (PGM) within the DOE complex and in industry, the need for modern and clean processes, and the increasing volume of low-grade material for secondary PGM recovery has a direct impact on the industrial practice of recovering and refining precious metals. There is a tremendous need for advanced metal ion recovery and waste minimization techniques, since the currently used method of precipitation-dissolution is inadequate. Los Alamos has an integrated program in ligand-design and separations chemistry which has developed and evaluated a series of water- soluble metal-binding polymers for recovering actinides and toxic metals from variety of process streams. A natural extension of this work is to fabricate these metal-selective polymers into membrane based separation unites, i.e., hollow-fiber membranes. In the present investigation, the material for a novel hollow-fiber membrane is characterized and its selectivity for PGM reported. Energy and waste savings and economic competitiveness are also described.

277
(LA-UR–97-254)
Decontamination and size reduction of plutonium contaminated process exhaust ductwork and glove boxes. LaFrate, P.; Elliott, J.; Valasquez, M. Los Alamos National Lab., NM (United States). 15 Nov 1996. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-970335–39: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97004449. Source: OSTI; NTIS; INIS; GPO Dep.

The Los Alamos National Laboratory (LANL) Decommissioning Program has decontaminated and demolished two filter plenum buildings at Technical Area 21 (TA-21). During the project a former hot cell was retrofitted to perform decontamination and size reduction of highly Pu contaminated process exhaust (1,100 ft) and gloveboxes. Pu-238/239 concentrations were as high a 1 Ci per linear foot and averaged approximately 1 mCi/ft. The Project decontamination objective was to reduce the plutonium contamination on surfaces below transuranic levels. If possible, metal surfaces were decontaminated further to meet Science and Ecology Group (SEG) waste classification guidelines to enable the metal to be recycled at their facility in oak Ridge, Tennessee. Project surface contamination acceptance criteria for low-level radioactive waste (LLRW), transuranic waste, and SEG waste acceptance criteria will be presented. Ninety percent of all radioactive waste for the project was characterized as

LLRW. Twenty percent of this material was shipped to SEG. Process exhaust and glove boxes were brought to the project decontamination area, an old hot cell in Building 4 North. This paper focuses on process exhaust and glovebox decontamination methodology, size reduction techniques, waste characterization, airborne contamination monitoring, engineering controls, worker protection, lessons learned, and waste minimization. Decontamination objectives are discussed in detail.

278
(LA-UR–97-522)
Build Rocky Flats Environmental Technology site production prototype modular treatment system for stand alone core capability for residue unpack, sort, assay, repack. Hildner, R.A.; Zygmunt, S.J. Los Alamos National Lab., NM (United States). Jan 1997. 16p. Sponsored by US-DOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97004738. Source: OSTI; NTIS; INIS; GPO Dep.

This document describes a portable and modular suit of equipment that upfront and near-term accomplishes a sorting process that documents and removes Rocky Flats Environmental Technology Site (RFETS) residue and waste from site inventory.

279
(LA-UR–97-1160)
Preparation of high purity plutonium oxide for radiochemistry instrument calibration standards and working standards. Wong, A.S.; Stalnaker, N.D. Los Alamos National Lab., NM (United States). Apr 1997. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-970540–1: ICRM conference on radionuclide metrology and its applications, Gaithersburg, MD (United States), 19-23 May 1997). Order Number DE97007578. Source: OSTI; NTIS; INIS; GPO Dep.

Due to the lack of suitable high level National Institute of Standards and Technology (NIST) traceable plutonium solution standards from the NIST or commercial vendors, the CST-8 Radiochemistry team at Los Alamos National Laboratory (LANL) has prepared instrument calibration standards and working standards from a well-characterized plutonium oxide. All the aliquoting steps were performed gravimetrically. When a ^{241}Am standardized solution obtained from a commercial vendor was compared to these calibration solutions, the results agreed to within 0.04% for the total alpha activity. The aliquots of the plutonium standard solutions and dilutions were sealed in glass ampules for long term storage.

280
(LA-UR–97-1161)
Radiometric measurements on the fabrication of nondestructive assay standards for WIPP-Performance Demonstration Program. Wong, A.S.; Marshall, R.S. Los Alamos National Lab., NM (United States). Apr 1997. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-970424–13: 4. international conference on methods and applications of radioanalytical chemistry, Kona, HI (United States), 6-11 Apr 1997). Order Number DE97007173. Source: OSTI; NTIS; INIS; GPO Dep.

The Inorganic Elemental Analysis Group of LANL has prepared several different sets of working reference materials (WRMs). These WRMs are prepared by blending quantities of nuclear materials (plutonium, americium, and enriched uranium) with diatomaceous earth. The blends are encapsulated in stainless steel cylinders. These WRMs are being measured as blind controls in neutron and gamma based non-destructive assay (NDA) instruments. Radiometric measurements on the blending homogeneity and verification on a set of sixty three plutonium based WRMs are discussed in this paper.

281
(LA-UR–97-3306)
Guidance document for multi-facility recycle/reuse/free release of metals from radiological control areas. Gogol, S.; Starke, T. Los Alamos National Lab., NM (United States). 15 Aug 1997. 26p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-970854–: 13. pollution prevention conference, Atlanta, GA (United States), 26-28 Aug 1997). Order Number DE98001456. Source: OSTI; NTIS; INIS; GPO Dep.

Approximately 15% of the Low Level Waste (LLW) produced at Los Alamos consists of scrap metal equipment and materials. The majority of this material is produced by decommissioning and modification of existing facilities. To address this waste stream, Los Alamos has developed a scrap metal recycling program that is operated by the Environmental Stewardship Office to minimize the amount of LLW metal sent for LLW landfill disposal. Past practice has supported treating all waste metals generated within RCA's as contaminated. Through the metal recycling project, ESO is encouraging the use of alternatives to LLW disposal. Diverting RSM from waste landfill, disposal protects the environment, reduces the cost of operation, and reduces the cost of maintenance and operation at landfill sites. Waste minimization efforts also results in a twofold economic reward: The RSM has a market value and decontamination reduces the volume and therefore the amount of the radioactive waste to be buried within landfills.

282
(LA-UR–97-3351)
FEA stress analysis for SAFKEG 2863B. Puckett, A. Los Alamos National Lab., NM (United States). 15 Jul 1997. 96p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE98003286. Source: OSTI; NTIS; INIS; GPO Dep.

This report covers the evaluation of the structural design of the two stainless steel containment vessels in CROFT SAFKEG Model Number 2863B, for conformance to the design criteria of the NRC Regulatory Guide 7.6, NRC Regulatory Guide 7.8, and the applicable requirements of the ASME Boiler and Pressure Vessel Code, Section 3, and Section 8. The two containment vessels are designated Cans 2870 and 2871. Each of these containment vessels was analyzed for the loadings specified in chapter 2, Section 2.1.2 of the SARP. Structural assessment of Cans 2870 and 2871 due to loading considerations beyond the evaluation of pressure and temperature are presented. This report is organized as follows: (1) overview of the design of each containment vessel and pressure boundary; (2) brief description of both containment vessels; (3) discussion of

normal and accident conditions; (4) analysis assumptions; (5) detailed structural evaluation of each component of each containment vessel; (6) demonstration of compliance to Regulatory Guide 7.6 stress evaluations; (7) demonstration of compliance to Regulatory Guide 7.8 loading combinations; and (8) summary of the calculated stresses, comparison with design allowables, estimates of margins of safety and a summary of results and conclusions.

283
(LBL–37760)
Environmental health-risk assessment for tritium releases at the National Tritium Labeling Facility at Lawrence Berkeley National Laboratory. McKone, T.E. (Lawrence Livermore National Lab., CA (United States). Health and Ecological Assessment Div.); Brand, K.P.; Shan, C. Lawrence Berkeley National Lab., CA (United States). Apr 1997. 150p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC03-76SF00098. Order Number DE97006403. Source: OSTI; NTIS; INIS; GPO Dep.

This risk assessment calculates the probability of experiencing health effects, including cancer incidence due to tritium exposure for three groups of people: (1) LBNL workers near the LBNL facility–Building 75–that uses tritium; (2) other workers at LBNL and nearby neighbors; and (3) people who use the UC Berkeley campus area, and some Berkeley residents. All of these groups share the same probability of health effects from the background radiation from natural sources in the Berkeley area environment, including an increased risk of developing a cancer of 11,000 chances per million. In calculating risk the authors assumed continuous operation in Building 75 for at least a human lifetime. Under this assumption, LBNL workers located near Building 75 have an additional risk of 60 chances out of one million to suffer a cancer; other workers at LBNL and people who live near LBNL have an additional risk of six chances out of one million over a lifetime of exposure; and users of the UC Berkeley campus area and other residents of Berkeley have an additional risk of less than once chance out of one million over a lifetime.

284
(LBNL–38920)
A design study for the isolation of the 281-3H retention basin at the Savannah River Site using the viscous liquid barrier technology. Moridis, G.J. (Lawrence Berkeley National Lab., CA (United States). Earth Sciences Div.); Persoff, P.; Apps, J.; James, A.; Oldenburg, C.; McGrath, A.; Myer, L.; Pellerin, L.; Pruess, K. Lawrence Berkeley National Lab., CA (United States). Nov 1996. 134p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC03-76SF00098. Order Number DE97006644. Source: OSTI; NTIS; INIS; GPO Dep.

This report is a description of the design study for a pilot-scale field demonstration of the Viscous Liquid Barrier (VLB) technology, a new subsurface containment technology for waste isolation using a new generation of barrier liquids. The demonstration site was Retention Basin 281-3H, a shallow catchment basin at the Savannah River Site, which is contaminated mainly by radionuclides (^{137}Cs, ^{90}Sr, and ^{238}Pu). The goals of the field demonstration were (a) to demonstrate the ability to create a continuous subsurface barrier in order to isolate the contaminants, and (b) to demonstrate the continuity, performance, and integrity of the barrier. The site was characterized, and preliminary hydraulic conductivity data were obtained from core samples. Based on the site characteristics and the functional requirements, a conceptual model was developed, the barrier specifications were defined, and lance injection was selected as the emplacement method. The injection strategy for the subsurface conditions at the site was determined using numerical simulations. An appropriate variant of Colloidal Silica (CS) was selected as the barrier liquid based on its relative insensitivity to interactions with the site soils, and the formulation for optimum site performance was determined. A barrier verification strategy, including hydraulic, pneumatic, tracer, and geophysical methods, was developed. A lance water injection test was conducted in order to obtain representative estimates of the hydraulic conductivity and its distribution for the design of the barrier emplacement. The water injection test demonstrated the lack of permeable zones for CS injection, and a decision not to proceed with the barrier emplacement was reached.

285
(LBNL–39324)
Laboratory testing of closure cap repair techniques. Persoff, P. (Lawrence Berkeley National Lab., CA (United States)); Moridis, G.; Tuck, D.M. Lawrence Berkeley Lab., CA (United States). Oct 1996. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC03-76SF00098. (CONF-970208–17: International containment technology conference and exhibition, St. Petersburg, FL (United States), 9-12 Feb 1997). Order Number DE97007652. Source: OSTI; NTIS; INIS; GPO Dep.

Landfill design requires a low permeability closure cap as well as a low permeability liner. The Savannah River Site, in South Carolina, has approximately 85 acres of mixed waste landfills covered with compacted kaolin clay. Maintaining low permeability of the clay cap requires both that the permeability of the compacted clay itself remain low and that the integrity of the barrier be maintained. Barrier breaches typically result from penetration by roots or animals, and especially cracks caused by uneven settling or desiccation. In this study, clay layers, 0.81 m in diameter and 7.6 cm thick, were compacted in 7 lysimeters to simulate closure caps. The hydraulic conductivity of each layer was measured, and the compacted clay layers (CCL's) were cracked by drying. Then various repair techniques were applied and the effectiveness of each repair was assessed by remeasuring the hydraulic conductivity. Finally the repaired CCL was again dried and measured to determine how the repair responded to the conditions that caused the original failure. For a full report of this investigation see Persoff et al. Six repair techniques have been tested, four of which involve the use of injectable barrier liquids colloidal silica (CS) and polysiloxane (PSX) described below: (I) covering the crack with a bentonite geosynthetic clay liner (GCL), (ii) recompaction of new kaolinite at STD+3 moisture content joined to existing kaolinite that had dried and shrunk, (iii) direct injection of colloidal silica to a crack, (iv) injection of colloidal silica (CS) to wells in an overlying sand layer, (v) direct injection of polysiloxane to a crack, and (vi), injection of polysiloxane (PSX) to wells in an overlying soil layer.

286
(LBNL–39487)
Development of a design package for a viscous barrier at the Savannah River Site. Moridis, G.J. (Lawrence Berkeley National Lab., CA (United States). Earth Sciences Div.); James, A.; Oldenburg, C. Lawrence Berkeley National Lab., CA (United States). Oct 1996. 10p. Sponsored by US-DOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC03-76SF00098. (CONF-970208–10: International containment technology conference and exhibition, St. Petersburg, FL (United States), 9-12 Feb 1997). Order Number DE97003477. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes elements of a design for a pilot-scale field demonstration of a new subsurface containment technology for waste isolation developed at the Lawrence Berkeley National Laboratory (LBNL), which uses a new generation of barrier liquids for permeation grouting. The demonstration site was Retention Basin 281-3H, a shallow catchment basin at the Savannah River Site (SRS), originally built to control contaminated runoff for the H Reactor, and which has been contaminated mainly by radionuclides. The LBNL viscous barrier technology employs barrier liquids which, when injected into the subsurface, produce chemically benign nearly impermeable barriers through a very large increase in viscosity. The initially low-viscosity liquids are emplaced through multiple injection points in the subsurface and the intersecting plumes merge and completely surround the contaminant source and/or plume. Once in place, they gel or cure to form a nearly impermeable barrier. The barrier liquid to be used in this application is Colloidal Silica (CS), an aqueous suspension of silica microspheres in a stabilizing electrolyte. It has excellent durability characteristics, poses no health hazard, is practically unaffected by filtration, and is chemically and biologically benign.

287
(ORNL/ER–297/R1)
Inactive tanks remediation program strategy and plans for Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States); STEP, Inc., Oak Ridge, TN (United States). Mar 1997. 34p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97003859. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents plans and strategies for remediation of the liquid low-level waste (LLLW) tanks that have been removed from service (also known as inactive tanks) at Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. These plans and strategies will be carried out by the Environmental Restoration Program's Inactive LLLW Tank Program at ORNL. These tanks are defined as Category D tanks because they are existing tank systems without secondary containment that are removed from service. The approach to remediation of each tank or tank farm must be adapted in response to the specific circumstances of individual tank sites. The approach will be tailored to accommodate feedback on lessons learned from previous tank remediation activities and will not be a rigid step-by-step approach that must be conducted identically for every tank system. However, the approach will follow a multistep decision process. The overall objective of the Inactive Tank Program is to remediate all LLLW tanks that have been removed from service to the extent practicable in accordance with the FFA requirements. The Inactive Tank Program will focus on the remediation of the tank residues (i.e., contents after tank has been emptied) and tank shell. This strategy is discussed in detail in this report.

288
(ORNL/ER–338)
In Situ Modular Waste Retrieval and Treatment System. Walker, M.S. (Oak Ridge National Lab., TN (United States)). Oak Ridge National Lab., TN (United States); Machine Kinetics Corp., Knoxville, TN (United States). Oct 1996. 32p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97050801. Source: OSTI; NTIS; INIS; GPO Dep.

As part of the Comprehensive Environmental Response, Compensation, and Liability Act process from remediation of Waste Area Grouping (WAG 6) at ORNL, a public meeting was held for the Proposed Plan. It was recognized that contaminant releases from WAG 6 posed minimal potential risk to the public and the environment. The US DOE in conjunction with the US EPA and the TDEC agreed to defer remedial action at WAG 6 until higher risk release sites were first remediated. This report presents the results of a conceptual design for an In Situ Modular Retrieval and Treatment System able to excavate, shred, and process buried waste on site, with minimum disturbance and distribution of dust and debris. the system would bring appropriate levels of treatment to the waste then encapsulate and leave it in place. The system would be applicable to areas in which waste was disposed in long trenches.

289
(ORNL/ER–384)
Engineering-scale in situ vitrification tests of simulated Oak Ridge National Laboratory buried wastes. Oak Ridge National Lab., TN (United States). Dec 1996. 163p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97001633. Source: OSTI; NTIS; INIS; GPO Dep.

As part of the Comprehensive Environmental Response, Compensation, and Liability Act process for remediation of Waste Area Grouping (WAG) 6 at Oak Ridge National Laboratory, a public meeting was held on the proposed plan. It was recognized that contaminant releases from WAG 6 posed minimal potential risk to the public and environment. The US Department of Energy (DOE) in conjunction with the US Environmental Protection Agency and the Tennessee Department of Environment and Conservation agreed to defer remedial action at WAG 6 until higher risk release sites were first remediated.

290
(ORNL/ER–386)
Annual report on surveillance and maintenance activities at Oak Ridge National Laboratory, Oak Ridge, Tennessee, fiscal year 1996. Oak Ridge National Lab., TN (United States); CDM Federal Programs Corp., Oak Ridge, TN (United States); Stoller (S.M.) Corp., Oak Ridge, TN (United States). Nov 1996. 41p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97050732. Source: OSTI; NTIS; INIS; GPO Dep.

In fiscal year (FY) 1995, the sites and facilities from both the Remedial Action (RA) and Decontamination and Decommissioning (D and D) programs were combined to form the Oak Ridge National Laboratory (ORNL) Environmental Restoration (ER) Surveillance and Maintenance (S and M) Program. Surveillance and Maintenance activities were conducted throughout FY 1996 at the RA facilities. Overall, the RA S and M Program consists of approximately 650 acres that include 14 waste area groupings with approximately 200 sites. These sites include 46 major facilities, several leak and contaminated soil sites, 38 inactive tanks, approximately 50 environmental study areas and approximately 2,973 wells and boreholes. Site inspections were conducted at established frequencies on appropriate sites in the RA S and M Program in accordance with the established S and M FY 1996 Incentive Task Order (ITO).

291
(ORNL/ER–388)
Completion report for the isolation and remediation of inactive liquid low-level radioactive waste tanks LA-104, WC-7, and 4501-P at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States); Advanced Sciences, Inc., Oak Ridge, TN (United States). Dec 1996. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002919. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides documentation of the maintenance action completion for remediation of tanks LA-104, WC-7, and 4501-P at Oak Ridge National Laboratory. This report will serve as the remediation completion documentation for the request to remove these tanks from the Federal Facility Agreement listing.

292
(ORNL/ER–389)
Completion report for the isolation and remediation of inactive liquid low-level radioactive waste tanks 7562, H-209, and T-30 at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States); Advanced Sciences, Inc., Oak Ridge, TN (United States). Dec 1996. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002920. Source: OSTI; NTIS; INIS; GPO Dep.

A human health risk analysis was conducted on inactive tanks 7562, H-209 and T-30 to determine the method for remediating the tanks. Risk analysis results indicated that the health risk associated with these tanks were within or below the EPA range of concern of 1×10^{-4} to 1×10^{-6}. On the basis of these results, and with regulator approval, it was determined that either no action or in-place stabilization of the tanks would satisfy risk-based remediation goals. Therefore, a decision was made and approved by DOE to remediate these tanks in-place as a maintenance action. Tanks H-209 and T-30 were isolated from associated piping, electrical systems, and instrumentation and grouted in-place. Due to regulatory concerns over the location of tank 7562 relative to an area of subsurface soil contamination, tank 7562 was isolated from associated piping and instrumentation and left in-place empty. Completion of these maintenance actions has met the intent of the Federal Facility Agreement (FFA) for remediation of inactive tanks H-209 and T-30. EPA and Tennessee Department of Environment and Conservation (TDEC) will be requested to approve a change to the FFA removing tanks H-209 and T-30 from the Appendix F list of inactive tanks. The request for removal of tank 7562 from Appendix F will be submitted pending final disposition of the tank. Since the associated tank piping systems remain in-place, it will further be requested that these systems be included as individual sites in Appendix C of the FFA for future remedial consideration.

293
(ORNL/ER–391)
Site descriptions of environmental restoration units at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Kuhaida, A.J. Jr.; Parker, A.F. Oak Ridge National Lab., TN (United States). Feb 1997. 596p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97004970. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides summary information on Oak Ridge National Laboratory (ORNL) Environmental Restoration (ER) sites as listed in the Oak Ridge Reservation Federal Facility Agreement (FFA), dated January 1, 1992, Appendix C. The Oak Ridge National Laboratory was built in 1943 as part of the World War II Manhattan Project. The original mission of ORNL was to produce and chemically separate the first gram-quantities of plutonium as part of the national effort to produce the atomic bomb. The current mission of ORNL is to provide applied research and development in support of the U.S. Department of Energy (DOE) programs in nuclear fusion and fission, energy conservation, fossil fuels, and other energy technologies and to perform basic scientific research in selected areas of the physical, life, and environmental sciences. ER is also tasked with clean up or mitigation of environmental impacts resulting from past waste management practices on portions of the approximately 37,000 acres within the Oak Ridge Reservation (ORR). Other installations located within the ORR are the Gaseous Diffusion Plant (K-25) and the Y-12 plant. The remedial action strategy currently integrates state and federal regulations for efficient compliance and approaches for both investigations and remediation efforts on a Waste Area Grouping (WAG) basis. As defined in the ORR FFA Quarterly Report July - September 1995, a WAG is a grouping of potentially contaminated sites based on drainage area and similar waste characteristics. These contaminated sites are further divided into four categories based on existing information concerning whether the data are generated for scoping or remedial investigation (RI) purposes. These areas are as follows: (1) Operable Units (OU); (2) Characterization Areas (CA); (3) Remedial Site Evaluation (RSE) Areas; and (4) Removal Site Evaluation (RmSE) Areas.

294
(ORNL/ER–392)
Comprehensive work plan for Building 3001 storage canal at the Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Jan 1997. 36p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97003290. Source: OSTI; NTIS; INIS; GPO Dep.

This Comprehensive Work Plan describes the method of accomplishment to replace the shielding protection of the water in the canal with a controlled low strength material (CLSM) 4. The canal was used during the operation of the Oak Ridge Graphite Reactor in the 1940s and 1950s to transport spent fuel slugs and irradiated test materials from the reactor, under water to the hot cell in Building 3019 for further processing, packaging, and handling. After the reactor was shut down, the canal was used until 1990 to store some irradiated materials until they could be transferred to a Solid Waste Storage Area. This task has the following objectives and components: (1) minimize potential future risk to human health and the environment; (2) reduce surveillance and maintenance cost of the canal; (3) perform site preparation activities; (4) replace the water in the canal with a solid CLSM; (5) pump the water to the Process Waste Treatment System (PWTS) for further processing at the same rate that the CLSM is pumped under the water; (6) remove the water using a process that will protect the workers and the public in the visitors area from contamination while the CLSM is being pumped underneath the water; (7) painting a protective coating material over the CLSM after the CLSM has cured.

295
(ORNL/ER–394)
Comprehensive work plan for the Well Driller's Steam Cleaning Facility at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Feb 1997. 13p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97004298. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this Comprehensive Work Plan is to address the history of the site as well as the scope, roles and responsibilities, documentation, training, environmental compliance requirements, and field actions needed to close the Oak Ridge National Laboratory (ORNL) Well Driller's Steam Cleaning Facility, hereinafter referred to as the Facility. The Facility was constructed in 1989 to provide a central area suitable to conduct steam cleaning operations associated with cleaning drilling equipment, containment boxes, and related accessories. Three basins were constructed of crushed stone (with multiple plastic and fabric liners) over a soil foundation to collect drill cuttings and wastewater generated by the cleaning activities. The scope of this task will be to demolish the Facility by using a bulldozer and backhoe to recontour and dismantle the area.

296
(ORNL/ER–397)
Project health and safety plan for the Gunite and Associated Tanks at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Abston, J.P. Oak Ridge National Lab., TN (United States). Apr 1997. 97p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97003860. Source: OSTI; NTIS; INIS; GPO Dep.

The Lockheed Martin Energy Systems, Inc. (Energy Systems) policy is to provide a safe and healthful workplace for all employees and subcontractors. The accomplishment of this policy requires that operations at the Gunite and Associated Tanks (GAAT) in the North and South Tank Farms (NTF and STF) at the Department of Energy (DOE) Oak Ridge National Laboratory are guided by an overall plan and consistent proactive approach to health and safety (H and S) issues. The policy and procedures in this plan apply to *all* GAAT operations in the NTF and STF. The provisions of this plan are to be carried out whenever activities identifies s part of the GAAT are initiated that could be a threat to human health or the environment. This plan implements a policy and establishes criteria for the development of procedures for day-to-day operations to prevent or minimize any adverse impact to the environment and personnel safety and health and to meet standards that define acceptable management of hazardous and radioactive materials and wastes. The plan is written to utilize past experience and best management practices in order to minimize hazards to human health or the environment from events such as fires, explosions, falls, mechanical hazards, or any unplanned release of hazardous or radioactive materials to the air. This plan explains additional task-specific health and safety requirements such as the Site Safety and health Addendum and Activity Hazard Analysis, which should be used in concert with this plan and existing established procedures.

297
(ORNL/ER–398)
Findings of the wetland survey of the David Witherspoon, Inc., 1630 Site, South Knoxville, Knox County, Tennessee. Rosensteel, B.A. (JAYCOR Environmental, Oak Ridge, TN (United States)). Oak Ridge National Lab., TN (United States); JAYCOR Environmental, Oak Ridge, TN (United States). Mar 1997. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97003858. Source: OSTI; NTIS; GPO Dep.

In accordance with Department of Energy (DOE) Regulations surveys for wetland presence or absence were conducted in September 1996 on the DWI-1630 site (Witherspoon Landfill) located in South Knoxville, Knox County, Tennessee. The DWI-1630 site includes a closed, capped landfill area, areas of past disturbance adjacent to the capped area, and patches of hardwood forest. Wetlands were identified on the landfill cap and in a small bottomland that was formerly used for a retention pond in the southwest corner of the DWI-1630 site. The wetlands identified on the cap are man-induced, atypical situation wetlands. These areas have hydrophytic vegetation and wetland hydrology, but the soils do not have hydric characteristics. Wetland development appears to be due to a combination of the grading or subsidence of the clay landfill cap, the low permeability of the clay fill soil, and the absence of surface drainage outlets from the depressions. These atypical situation wetland areas may not be considered by the US Army Corps of Engineers or the State of Tennessee to be jurisdictional wetlands. The wetland in the former retention pond area has hydrophytic vegetation, wetland hydrology, and hydric soils and is a jurisdictional wetland.

298
(ORNL/ER–402)
Technical bases for the use of ClF_3 in the MSRE reactive gas removal project at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Trowbridge, L.D. Oak Ridge National Lab., TN (United States). Jun 1997. 58p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States).

DOE Contract AC05-96OR22464. Order Number DE97006917. Source: OSTI; NTIS; INIS; GPO Dep.

Nearly impermeable, non-volatile deposits in the Molten Salt Reactor Experiment (MSRE) off-gas piping are impeding the removal of reactive gases from that system. The deposits almost certainly consist of reduced uranium fluorides or of uranium oxyfluorides. Treatment with ClF_3 is a non-intrusive method capable of chemically converting these compounds back to UF_6, which can then be removed as a gas. This report discusses the technical bases for the use of ClF_3 treatments in this system. A variety of issues are examined, and where the necessary information exists or has been developed, the resolution discussed. The more important of these issues include the efficacy of ClF_3 at deposit removal under the conditions imposed by the MSRE system, materials compatibility of ClF_3 and its reaction products, and operational differences in the Reactive Gas Removal System imposed by the presence of ClF_3 and its products.

299
(ORNL/ER–405)
Limiting conditions document for the Oak Ridge Research Reactor (ORR), Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Aug 1997. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OS21400. Order Number DE97008736. Source: OSTI; NTIS; INIS; GPO Dep.

The ORR Limiting Conditions in this document define the limitations, surveillances, and administrative guidelines necessary to ensure safe conditions at this facility.

300
(ORNL/ER–412)
Sampling and Analysis Plan for the Gunite and Associated Tanks Treatability Study, wall coring and scraping in Tanks W-3 and W-4 (North Tank Farm), Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States); MACTEC, Inc., Germantown, MD (United States). Aug 1997. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97008454. Source: OSTI; NTIS; INIS; GPO Dep.

This plan documents the procedures for collecting and analyzing wall core and wall scraping samples from Tanks W-3 and W-4 in the North Tank Farm. This is in support of the Comprehensive Environmental Response, Compensation, and Liability Act Treatability Study of the Gunite and Associated Tanks at ORNL. The sampling and analysis will be in concert with sludge retrieval and sluicing of the tanks. Wall scraping and wall core samples will be collected from each quadrant in each tank by using a scraping sampler and a coring drill deployed by the Houdini robot vehicle. Each sample will be labeled, transported to the Radioactive Materials Analytical Laboratory and analyzed for physical/radiological characteristics, including total activity, gross alpha, gross beta, radioactive Sr + Cs, and other alpha and gamma emitting radionuclides. The Data Quality Objectives process, based on US EPA guidance (EPA QA/G-4, Sept. 1994), was applied to identify the objectives of this sampling and analysis. Results of the analysis will be used to validate predictions of a Sr concrete diffusion model, estimate the amount of radioactivity remaining in the tank shells, provide information to correlate with measurements taken by the Gunite Tank Isotope Mapping Probe and the Characterization End Effector, and estimate the performance of the wall cleaning system.

301
(ORNL/TM–13200)
Chemical modeling of waste sludges. Weber, C.F.; Beahm, E.C. Oak Ridge National Lab., TN (United States). Oct 1996. 58p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97050413. Source: OSTI; NTIS; INIS; GPO Dep.

The processing of waste from underground storage tanks at the Oak Ridge National Laboratory (ORNL) and other facilities will require an understanding of the chemical interactions of the waste with process chemicals. Two aspects of sludge treatment should be well delineated and predictable: (1) the distribution of chemical species between aqueous solutions and solids, and (2) potential problems due to chemical interactions that could result in process difficulties or safety concerns. It is likely that the treatment of waste tank sludge will begin with washing, followed by basic or acidic leaching. The dissolved materials will be in a solution that has a high ionic strength where activity coefficients are far from unity. Activity coefficients are needed in order to calculate solubilities. Several techniques are available for calculating these values, and each technique has its advantages and disadvantages. The techniques adopted and described here is the Pitzer method. Like any of the methods, prudent use of this approach requires that it be applied within concentration ranges where the experimental data were fit, and its use in large systems should be preceded by evaluating subsystems. While much attention must be given to the development of activity coefficients, other factors such as coprecipitation of species and Ostwald ripening must also be considered when one aims to interpret results of sludge tests or to predict results of treatment strategies. An understanding of sludge treatment processes begins with the sludge tests themselves and proceeds to a general interpretation with the aid of modeling. One could stop with only data from the sludge tests, in which case the table of data would become an implicit model. However, this would be a perilous approach in situations where processing difficulties could be costly or result in concerns for the environment or health and safety.

302
(ORNL/TM–13236)
Comparison of SW-846 method 3051 and SW-846 method 7471A for the preparation of solid waste samples for mercury determination. Giaquinto, J.M.; Essling, A.M.; Keller, J.M. Oak Ridge National Lab., TN (United States). [1996]. 17p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE96014278. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes experimental studies to evaluate the use of EPA SW-846 method 3051 for preparation and dissolution of solid samples for Hg analysis. The study showed that the method is effective in dissolution of four sample types without significant loss of Hg. Based on results of this study, method 3051 was used for analysis of high radioactive waste samples to obtain results for a number of RCRA

regulated metals without the need to utilize a separate sample preparation method (EPA SW-846 method 7471A) specific only for Hg.

303
(ORNL/TM–13269)
Implementation of a consolidated, standardized database of environmental measurements data. James, T.L. (Tennessee Univ., Knoxville, TN (United States). Energy, Environment and Resources Center); Zygmunt, B.C. Oak Ridge National Lab., TN (United States). Oct 1996. 39p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97050350. Source: OSTI; NTIS; INIS; GPO Dep.

This report discusses the benefits of a consolidated and standardized database; reasons for resistance to the consolidation of data; implementing a consolidated database, including attempts at standardization, deciding what to include in the consolidated database, establishing lists of valid values, and addressing quality assurance/quality control (QA/QC) issues; and the evolution of a consolidated database, which includes developing and training a user community, resolving configuration control issues, incorporating historical data, identifying emerging standards, and developing pointers to other data. OREIS is used to illustrate these topics.

304
(ORNL/TM–13351)
Statistical Description of Liquid Low-Level Waste System Transssuranic Wastes at Oak Ridge Nation Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Dec 1996. 190p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97051257. Source: OSTI; NTIS; INIS; GPO Dep.

The US DOE has presented plans for processing liquid low-level wastes (LLLW) located at Oak Ridge National Laboratory (ORNL) in the LLLW tank system. These wastes are among the most hazardous on the Oak Ridge reservation and exhibit both RCRA toxic and radiological hazards. The Tennessee Department of Health and Environment has mandated that the processing of these wastes must begin by the year 2002 and the the goal should be permanent disposal at a site off the Oak Ridge Reservation. To meet this schedule, DOE will solicit bids from various private sector companies for the construction of a processing facility on land located near the ORNL Melton Valley Storage Tanks to be operated by the private sector on a contract basis. This report will support the Request for Proposal process and will give potential vendors information about the wastes contained in the ORNL tank farm system. The report consolidates current data about the properties and composition of these wastes and presents methods to calculate the error bounds of the data in the best technically defensible manner possible. The report includes information for only the tank waste that is to be included in the request for proposal.

305
(ORNL/TM–13352)
Radiological assessment of worker doses during sludge mobilization and removal at the Melton Valley storage tanks. Kerr, G.D.; Coleman, R.L.; Kocher, D.C.; Wynn, C.C. Oak Ridge National Lab., TN (United States). 17 Dec 1996. 81p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97001616. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents an assessment of potential radiation doses to workers during mobilization and removal of contaminated sludges from the Melton Valley Storage Tanks at Oak Ridge National Laboratory. The assessment is based on (1) measurements of radionuclide concentrations in sludge and supernatant liquid samples from the waste storage tanks, (2) measurements of gamma radiation levels in various areas that will be accessed by workers during normal activities, (3) calculations of gamma radiation levels for particular exposure situations, especially when the available measurements are not applicable, and (4) assumed scenarios for worker activities in radiation areas. Only doses from external exposure are estimated in this assessment. Doses from internal exposure are assumed to be controlled by containment of radioactive materials or respiratory protection of workers and are not estimated.

306
(ORNL/TM–13401)
Performance assessment for the class L-II disposal facility. Oak Ridge National Lab., TN (United States). Mar 1997. 461p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE98051989. Source: OSTI; NTIS; GPO Dep.

This draft radiological performance assessment (PA) for the proposed Class L-II Disposal Facility (CIIDF) on the Oak Ridge Reservation (ORR) has been prepared to demonstrate compliance with the requirements of the US Department of Energy Order 5820.2A. This PA considers the disposal of low-level radioactive wastes (LLW) over the operating life of the facility and the long-term performance of the facility in providing protection to public health and the environment. The performance objectives contained in the order require that the facility be managed to accomplish the following: (1) Protect public health and safety in accordance with standards specified in environmental health orders and other DOE orders. (2) Ensure that external exposure to the waste and concentrations of radioactive material that may be released into surface water, groundwater, soil, plants, and animals results in an effective dose equivalent (EDE) that does not exceed 25 mrem/year to a member of the public. Releases to the atmosphere shall meet the requirements of 40 CFR Pt. 61. Reasonable effort should be made to maintain releases of radioactivity in effluents to the general environment as low as reasonably achievable. (1) Ensure that the committed EDEs received by individual who inadvertently may intrude into the facility after the loss of active institutional control (100 years) will not exceed 100 mrem/year for continuous exposure of 500 mrem for a single acute exposure. (4) Protect groundwater resources, consistent with federal, state, and local requirements.

307
(PNNL–11103)
Retrieval process development and enhancements project Fiscal year 1995: Simulant development technology task progress report. Golcar, G.R. (and others); Bontha, J.R.; Darab, J.G. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 64p. Sponsored by USDOE

Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052109. Source: OSTI; NTIS; INIS; GPO Dep.

The mission of the Retrieval Process Development and Enhancements (RPD&E) project is to develop an understanding of retrieval processes, including emerging and existing technologies, gather data on these technologies, and relate the data to specific tank problems such that end-users have the requisite technical bases to make retrieval and closure decisions. The development of waste simulants is an integral part of this effort. The work of the RPD&E simulant-development task is described in this document. The key FY95 accomplishments of the RPD&E simulant-development task are summarized below.

308
(PNNL–11108)
Low-activity waste envelope definitions for the TWRS Privatization Phase I Request For Proposal. Patello, G.K.; Lauerhass, L.; Myers, R.L.; Wiemers, K.D. Pacific Northwest Lab., Richland, WA (United States). Nov 1996. 318p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050701. Source: OSTI; NTIS; INIS; GPO Dep.

Radioactive waste has been stored in large underground storage tanks at the Hanford Site since 1944. Approximately 212 million liters of waste containing approximately 240,000 metric tons of processed chemicals and 177 mega-curies of radionuclides are now stored in 177 tanks. These caustic wastes are in the form of liquids, slurries, saltcakes, and sludge. In 1991, the Tank Waste Remediation System (TWRS) Program was established to manage, retrieve, treat, immobilize, and dispose of these wastes in a safe, environmentally sound, and cost-effective manner. The Department of Energy (DOE) has believes that it is feasible to privatize portions of the TWRS Program. Under the privatization strategy embodied in the Request for Proposal (RFP), DOE will purchase services from a contractor-owned, contractor-operated facility under a fixed-price contract. Phase I of the TWRS privatization strategy is a proof-of-concept/commercial demonstration-scale effort. The objectives of Phase I are to demonstrate the technical and business viability of using privatized facilities to treat Hanford tank waste; define and maintain required levels of radiological, nuclear, process, and occupational safety; maintain environmental protection and compliance; and substantially reduce life-cycle costs and time required to treat Hanford tank waste. Three low-activity waste (LAW) envelopes are identified for Phase I of the privatization contract and are representative of the range of Hanford double-shelled tank (DST) waste.

309
(PNNL–11176)
The Multimedia Environmental Pollutant Assessment System (MEPAS)®: Riverine pathway formulations. Whelan, G.; McDonald, J.P. Pacific Northwest National Lab., Richland, WA (United States). Nov 1996. 32p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050511. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the mathematical formulations used for contaminant fate and transport in the riverine pathway of the Multimedia Environmental Pollutant Assessment System (MEPAS). Of the many types of surface-water bodies (e.g., nontidal rivers, estuaries, lakes, open coasts, reservoirs, impoundments, etc.) in which contaminant fate and transport could be simulated, only a nontidal river model is currently incorporated into MEPAS. Nontidal rivers refer to freshwater bodies with unidirectional flow in definable channels. Because the MEPAS methodology is compositely coupled, other surface-water models can be added when deemed necessary.

310
(PNNL–11248)
The Multimedia Environmental Pollutant Assessment System (MEPAS)®: Source-term release formulations. Streile, G.P.; Shields, K.D.; Stroh, J.L.; Bagaasen, L.M.; Whelan, G.; McDonald, J.P.; Droppo, J.G.; Buck, J.W. Pacific Northwest National Lab., Richland, WA (United States). Nov 1996. 142p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050510. Source: OSTI; NTIS; INIS; GPO Dep.

This report is one of a series of reports that document the mathematical models in the Multimedia Environmental Pollutant Assessment System (MEPAS). Developed by Pacific Northwest National Laboratory for the US Department of Energy, MEPAS is an integrated impact assessment software implementation of physics-based fate and transport models in air, soil, and water media. Outputs are estimates of exposures and health risk assessments for radioactive and hazardous pollutants. Each of the MEPAS formulation documents covers a major MEPAS component such as source-term, atmospheric, vadose zone/groundwater, surface water, and health exposure/health impact assessment. Other MEPAS documentation reports cover the sensitivity/uncertainty formulations and the database parameter constituent property estimation methods. The pollutant source-term release component is documented in this report. MEPAS simulates the release of contaminants from a source, transport through the air, groundwater, surface water, or overland pathways, and transfer through food chains and exposure pathways to the exposed individual or population. For human health impacts, risks are computed for carcinogens and hazard quotients for noncarcinogens. MEPAS is implemented on a desktop computer with a user-friendly interface that allows the user to define the problem, input the required data, and execute the appropriate models for both deterministic and probabilistic analyses.

311
(PNNL–11409)
Fiscal year 1996 laboratory scale studies of the WVNS flowsheet for remediation of Tank 8D-1 and Tank 8D-2. Smith, H.D.; Smith, G.L.; Russell, R.L.; Patello, G.K. Pacific Northwest National Lab., Richland, WA (United States). Nov 1996. 55p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050694. Source: OSTI; NTIS; INIS; GPO Dep.

These tests simulated the West Valley (WV) tank heel removal flowsheet in which oxalic acid solution (OAS) is used to elute Cs from zeolite in tank 8D-1 for 28 h. The eluent is then transferred to tank 8D-2, to dissolve the waste sludge heel. Sequence for the tests were: elute 10 g of Cs-loaded zeolite for 28 h at 50 C at 40 L/kg- zeolite, using 8 wt% OAS;

decant used OAS and add 240 g waste slurry simulant, which was washed to <2g/L dissolved solids and containing 120-140 g total oxides/L; let the 3 test combinations (various Fe_2O_3) and control age at 50 C for 50 h; and after adjusting pH from 2.5 to 5, sampling at 0.25 to 16 h. Results include visual and analyses; data tables include compositions of the OAS after the Cs- zeolite contact, Cs eluted, supernate OAS in contact with sludge, and neutralized tests. Data have also been graphed for each element vs contact time. Cs elution data was consistent with >90% eluted; the OA conc. after Cs elution was also consistent with essentially no acid consumption. During contact with OAS at pH 2.5, the solution appears to have come into equilibrium with the sludge solid almost immediately; presence of additional Fe oxide appears to have decreased the Cr/Ni/Mn relative solubility. After neutralization, elements that form more insoluble hydroxides such as Fe, Ni, Mn, Ca, and Sr show lower conc. in supernatant; Si may also have been removed. Flowsheet testing confirms that OA is efficient for eluting Cs from zeolite and promotes dissolution of sludge heels in the WV tanks.

312
(PNNL–11472-Summ.)
Summary of the Hanford Site environmental report for calendar year 1996. Hanf, R.W.; O'Connor, G.P.; Dirkes, R.L. (eds.) (comps.). Pacific Northwest National Lab., Richland, WA (United States). Aug 1997. 52p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050965. Source: OSTI; INIS; NTIS; GPO Dep.

This report summarizes the 420-page Hanford Site Environmental Report for Calendar Year 1996. The Hanford Site environmental report is prepared annually to summarize environmental data and information, describe environmental management performance, demonstrate the status of compliance with environmental regulations, and highlight major environmental programs and efforts. The summary is designed to briefly: describe the Hanford Site and its mission; summarize the status in 1996 of compliance with environmental regulations; describe environmental programs at the Hanford Site; discuss estimated radionuclide exposure to the public from 1996 Hanford Site activities; present information on effluent monitoring and environmental surveillance, including groundwater protection and monitoring; and discuss activities to ensure quality.

313
(PNNL–11473)
Hanford Site environmental surveillance data report for calendar year 1996. Bisping, L.E. Pacific Northwest National Lab., Richland, WA (United States). Sep 1997. [300p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050964. Source: OSTI; NTIS; INIS; GPO Dep.

Environmental surveillance at the Hanford Site collects data that provides a historical record of radionuclide and radiation levels attributable to natural causes, worldwide fallout, and Hanford operations. Data are also collected to monitor several chemicals and metals in Columbia River water and sediment. In addition, Hanford Site wildlife samples were also collected for metals analysis. Pacific Northwest National Laboratory publishes an annual environmental report for the Hanford Site each calendar year. The Hanford Site Environmental Report for Calendar Year 1996 describes the site mission and activities, general environmental features, radiological and chemical releases from operations, status of compliance with environmental regulations, status of programs to accomplish compliance, and environmental monitoring activities and results. The report includes a summary of offsite and onsite environmental monitoring data collected during 1996 by PNNL's Environmental Monitoring Program. Appendix A of that report contains data summaries created from river monitoring and sediment data. This volume contains the actual raw data used to create the summaries. The data volume also includes Hanford Site drinking water radiological data.

314
(PNNL–11518)
Investigation of anatomical anomalies in Hanford Site mule deer. Tiller, B.L. (and others); Cadwell, L.L.; Poston, T.M. Pacific Northwest Lab., Richland, WA (United States). Mar 1997. 85p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052357. Source: OSTI; NTIS; INIS; GPO Dep.

Rocky Mountain mule deer (Odocoileus hemionus hemionus), common residents of the Hanford Site, are an important part of the shrub-steppe ecosystem as well as being valued for aesthetics and hunting. Because mule deer have been protected from hunting on the Site for 50 years, the herd has developed unique population characteristics, including a large number of old animals and males with either large or atypically developed antlers, in contrast to other herds in the semi-arid regions of the Northwest. Hanford Site mule deer have been studied since 1991 because of the herd's unique nature and high degree of public interest. A special study of the mule deer herd was initiated in 1993 after observations were made of a relatively large number of male deer with atypical, velvet-covered antlers. This report specifically describes our analyses of adult male deer found on the Site with atypical antlers. The report includes estimates of population densities and composition; home ranges, habitat uses, and dietary habits; natural and human-induced causes of mortality; and the herd's overall health and reproductive status.

315
(PNNL–11530)
Characterization report for the ferrocyanide safety issue. Pulsipher, B.A.; Burger, L.L.; Liebetrau, A.M.; Scheele, R.D. Pacific Northwest National Lab., Richland, WA (United States). Jun 1997. [100p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053570. Source: OSTI; NTIS; INIS; GPO Dep.

Recently PNNL was tasked by DOE to develop and demonstrate a risk-based strategic approach to characterizing Hanford's Nuclear Waste Tanks. This strategic approach was documented in a report entitled "A Risk-Based Focused Decision-Management Approach for Justifying Characterization of Hanford Tank Waste". In support of the general approach, a specific strategy for addressing each of the several safety issues associated with the tanks was developed. This report documents the approach for the Ferrocyanide Safety Issue. The purpose of this report is to describe a

structured logic diagram (SLD) for determining the risk associated with the ferrocyanide tank safety issue and provide the supporting information for the SLD. The SLD addresses the resolution of risks resulting from the presence of ferrocyanide layers within the Hanford tanks. The informational requirements for determining risk from any reaction stemming from ferrocyanide are outlined in the SLD. This report will describe the potential paths to a successful resolution of the ferrocyanide safety issue. Complete development of the intervention pathway is outside the scope of this current activity. General descriptions of the approach, key components of the SLD, and conclusions are provided in the body of this report. The complete SLD, descriptions of each box shown in the SLD, a discussion on how to fill data needs, and a list of contributors is provided in the appendices.

316
(PNNL–11533)
Characterization strategy report for the organic safety issues. Goheen, S.C. (and others); Campbell, J.A.; Fryxell, G.E. Pacific Northwest National Lab., Richland, WA (United States). Aug 1997. [100p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054184. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes a logical approach to resolving potential safety issues resulting from the presence of organic components in hanford tank wastes. The approach uses a structured logic diagram (SLD) to provide a pathway for quantifying organic safety issue risk. The scope of the report is limited to selected organics (i.e., solvents and complexants) that were added to the tanks and their degradation products. The greatest concern is the potential exothermic reactions that can occur between these components and oxidants, such as sodium nitrate, that are present in the waste tanks. The organic safety issue is described in a conceptual model that depicts key modes of failure-event reaction processes in tank systems and phase domains (domains are regions of the tank that have similar contents) that are depicted with the SLD. Applying this approach to quantify risk requires knowing the composition and distribution of the organic and inorganic components to determine (1) how much energy the waste would release in the various domains, (2) the toxicity of the region associated with a disruptive event, and (3) the probability of an initiating reaction. Five different characterization options are described, each providing a different level of quality in calculating the risks involved with organic safety issues. Recommendations include processing existing data through the SLD to estimate risk, developing models needed to link more complex characterization information for the purpose of estimating risk, and examining correlations between the characterization approaches for optimizing information quality while minimizing cost in estimating risk.

317
(PNNL–11549)
Tanks focus area site needs assessment FY 1997. Pacific Northwest Lab., Richland, WA (United States). Apr 1997. 215p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052562. Source: OSTI; NTIS; INIS; GPO Dep.

The Tanks Focus Area's (TFA's) mission is to manage an integrated technology development program that results in the application of technology to safely and efficiently accomplish tank waste remediation across the U.S. Department of Energy (DOE) complex. The TFA uses a systematic process for developing its annual program that draws from the tanks technology development needs expressed by four DOE tank waste sites - Hanford Site, Idaho National Engineering and Environmental Laboratory (INEEL), Oak Ridge Reservation (ORR), and Savannah River Site (SRS). The process is iterative and involves six steps: (1) Site needs identification and documentation, (2) Site communication of priority needs, (3) Technical response development, (4) Review technical responses, (5) Develop program planning documents, and (6) Review planning documents. This document describes the outcomes of the first two steps: site needs identification and documentation, and site communication of priority needs. It also describes the initial phases of the third and fourth steps: technical response development and review technical responses. Each site's Site Technology Coordination Group (STCG) was responsible for developing and delivering priority tank waste needs. This was accomplished using a standardized needs template developed by the National STCG. The standard template helped improve the needs submission process this year. The TFA received the site needs during December 1996 and January 1997.

318
(PNNL–11552)
Characterization and monitoring of 300 Area facility liquid waste streams during 1994 and 1995. Thompson, C.J.; Ballinger, M.Y.; Damberg, E.G.; Riley, R.G. Pacific Northwest National Lab., Richland, WA (United States). Jul 1997. [150p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054181. Source: OSTI; NTIS; INIS; GPO Dep.

Pacific Northwest National Laboratory's Facility Effluent Management Program characterized and monitored liquid waste streams from 300 Area buildings that are owned by the US Department of Energy and are operated by Pacific Northwest National Laboratory. The purpose of these measurements was to determine whether the waste streams would meet administrative controls that were put in place by the operators of the 300 Area Treated Effluent Disposal Facility. This report summarizes the data obtained between March 1994 and September 1995 on the following waters: liquid waste streams from Buildings 306, 320, 324, 325, 326, 327, 331, and 3,720; treated and untreated Columbia River water (influent); and water at the confluence of the waste streams (that is, end-of-pipe).

319
(PNNL–11557-2)
Hanford quarterly seismic report - 97B seismicity on and near the Hanford Site, Pasco Basin, Washington, January 1, 1997–March 31, 1997. Hartshorn, D.C.; Reidel, S.P. Pacific Northwest Lab., Richland, WA (United States). May 1997. 29p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053944. Source: OSTI; NTIS; INIS; GPO Dep.

Hanford Seismic Monitoring provides an uninterrupted collection of high-quality raw and processed seismic data from the Hanford Seismic Network (HSN) for the U.S. Department

of Energy and contractors. The staff also locates and identifies sources of seismic activity and monitors changes in the historical pattern of seismic activity at the Hanford Site. The data are compiled, archived, and published for use by the Hanford Site for activities ranging from waste management, Natural Phenomena Hazards assessments, and engineering design and construction. In addition, the seismic monitoring organizations works with the Hanford Site Emergency Services Organization to provide assistance in the event of an earthquake on the Hanford Site. The HSN and the Eastern Washington Regional Network (EWRN) consist of 41 individual sensor sites and 15 radio relay sites maintained by the Seismic Monitoring staff. Most stations and five relay sites are solar powered. The operational rate for the second quarter of FY97 for stations in the HSN was 97.23% and for stations of the EWRN was 99.93%. For fiscal year (FY) 1997 second quarter (97B), the acquisition computer triggered two hundred and forth-eight times. Of these triggers three were local earthquakes: one in the pre-basalt sediments, and two in the crystalline basement. The geologic and tectonic environments are discussed in the report.

320
(PNNL–11557-3)
Hanford quarterly seismic report - 97C seismicity on and near the Hanford Site, Pasco Basin, Washington. Quarterly report, April 1, 1997–June 30, 1997. Hartshorn, D.C.; Reidel, S.P.; Rohay, A.C. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 31p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054535. Source: OSTI; NTIS; GPO Dep.

Hanford Seismic Monitoring provides an uninterrupted collection of high-quality raw and processed seismic data from the Hanford Seismic Network (HSN) for the U.S. Department of Energy and contractors. The staff also locates and identifies sources of seismic activity and monitors changes in the historical pattern of seismic activity at the Hanford Site. The data are compiled, archived, and published for use by the Hanford Site for activities ranging from waste management, Natural Phenomena Hazards assessments, and engineering design and construction. In addition, the seismic monitoring organization works with the Hanford Site Emergency Services Organization to provide assistance in the event of an earthquake on the Hanford Site. The HSN and the Eastern Washington Regional Network (EWRN) consist of 41 individual sensor sites and 15 radio relay sites maintained by the Seismic Monitoring staff. Most stations and five relay sites are solar powered. The operational rate for the second quarter of FY97 for stations in the HSN was 100% and for stations of the EWRN was 99.99%. For fiscal year (FY) 1997 third quarter (97C), the acquisition computer triggered 183. Of these triggers twenty one were local earthquakes: sixteen in the Columbus River Basalt Group, one in the pre-basalt sediments, and four in the crystalline basement. The geologic and tectonic environments are discussed in the report.

321
(PNNL–11641)
Technical support for authorization of 242-A evaporator campaign 97-2, Hanford Site, Richland, Washington. Daling, P.M.; Lavender, J.C. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 18p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054313. Source: OSTI; NTIS; GPO Dep.

An analysis was performed to determine the acceptability of processing 242-A Evaporator/Crystallizer Campaign 97-2 feed. Inhalation unit liter doses (ULDs) were calculated using the methods and data described in the Tank Waste Remediation System Basis for Interim Operation (TWRS BIO) and 242-A Evaporator/Crystallizer Safety Analysis Report. The ULD calculated for the Campaign 97-2 slurry was found to be less than the TWRS BIO evaporator slurry ULD and so would be within the analyzed safety envelope defined in the TWRS BIO. The Evaporator slurry ULD established in the TWRS BIO and supporting documents was calculated using the bounding source strength defined in the 242-A Evaporator SAR. Consequently, the risks and consequences associated with the Campaign 97-2 slurry would be lower than those already accepted by DOE and documented in the TWRS BIO and 242-A Evaporator SAR. The direct radiation exposures from formation of a liquid pool of Campaign 97-2 slurry were demonstrated to be less than the exposures from a pool formed by bounding source strength evaporator slurry as defined in the 242-A Evaporator SAR. This was demonstrated via a comparison of the Campaign 97-2 slurry composition and the 242-A Evaporator SAR bounding source strength. It was concluded that the direct radiation exposures from Campaign 97-2 slurry would be within the analyzed safety envelope in the 242-A Evaporator SAR.

322
(PNNL–11651)
Investigation of potential polychlorinated biphenyl (PCB) contamination on Hanford site arc-loop roads. Patton, G.W.; Cooper, A.T.; Riley, R.G.; Lefkovitz, L.F.; Gilfoil, T.J. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 23p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054533. Source: OSTI; NTIS; GPO Dep.

Two roads on the Hanford Site, which had been treated during past Site operations with oil for dust suppression, were analyzed for potential polychlorinated biphenyl (PCB) contamination. The general locations of these roads are (1) off Washington State Route 240, north of Horn Rapids Dam, and (2) between the 200 East and 200 West areas, south of the 200 Area fire station. Each road had an intact crust of oil/tar on top of the underlying soil surface. A set of control samples were collected at an untreated soil site near the Prosser Barricade air sampling station. Samples were collected of the oil/tar surface crust, the soil immediately beneath the surface crust (0 - 3 cm below the crust), and a deeper soil sample (13 - 23 cm below the surface crust). Samples were collected at two locations on each road. The PCBs were extracted from the samples using a roller technique with methylene chloride, cleaned using column chromatography and high-pressure liquid chromatography, and analyzed by capillary gas chromatography using electron capture detection. The samples were analyzed for PCBs as the following technical mixtures: Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260. All samples at all locations were less than the following detection limits: surface crust (41 ug/kg dry weight) and soil (2.1 ug/kg dry weight). These concentrations are below the U.S. Environmental Protection Agency (EPA) Region IX preliminary remediation goals for PCBs in residential soil (66 ug/kg) and

well below the preliminary remediation goal for PCBs in industrial soil (340 ug/kg).

323
(PNNL–11660)
Minimum separation distances for natural gas pipeline and boilers in the 300 area, Hanford Site. Daling, P.M.; Graham, T.M. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 83p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054312. Source: OSTI; NTIS; GPO Dep.

The U.S. Department of Energy (DOE) is proposing actions to reduce energy expenditures and improve energy system reliability at the 300 Area of the Hanford Site. These actions include replacing the centralized heating system with heating units for individual buildings or groups of buildings, constructing a new natural gas distribution system to provide a fuel source for many of these units, and constructing a central control building to operate and maintain the system. The individual heating units will include steam boilers that are to be housed in individual annex buildings located at some distance away from nearby 300 Area nuclear facilities. This analysis develops the basis for siting the package boilers and natural gas distribution systems to be used to supply steam to 300 Area nuclear facilities. The effects of four potential fire and explosion scenarios involving the boiler and natural gas pipeline were quantified to determine minimum separation distances that would reduce the risks to nearby nuclear facilities. The resulting minimum separation distances are shown in Table ES.1.

324
(PNNL–11696)
Electrochemical reduction removal of technetium-99 from Hanford tank wastes. Lawrence, W.E.; Blanchard, D.L. Jr.; Kurath, D.E. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 34p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054531. Source: OSTI; NTIS; GPO Dep.

The removal of technetium (^{99}Tc) from Hanford tank waste supernatant liquids has been demonstrated using an electrochemical-based separation process. A potential cleanup strategy is to retrieve the waste and separate components into high-level and low-level waste fractions. However, some of the tanks contain technetium-99 (^{99}Tc) at concentrations deemed to be unacceptable for ultimate processing and disposal. Conventional extraction processes have been shown to be inefficient at removal of ^{99}Tc due to the presence of nonpertechnetate species. Electrochemical processing, has been shown to oxidize the nonextractable species and subsequently separate the ^{99}Tc by electrodeposition. The data obtained were used to support a comparison of ion exchange and electrochemical processing as removal methods. The electrochemical process has the flexibility to serve as a stand-alone process or to support conventional processes as a pretreatment step for the oxidation of nonextractable ^{99}Tc and/or organic decomplexation. A separation procedure developed by AEA Technologies (AEAT) for simulated Hanford tank supernatant liquids was adapted for the actual waste studies conducted at Pacific Northwest National Laboratory (PNNTL). Prior to electroreduction separation of ^{99}Tc from the supernatant liquid, an electrochemical oxidation was carried out in which nonpertechnetate or nonextractable ^{99}Tc was oxidized to more readily extractable species such as pertechnetate, and the organic content was decreased. After oxidation, an electroreduction was performed to remove the ^{99}Tc from the supernatant liquid as Tc or CO_2 deposited on the cathode.

325
(PNNL–11700)
Characterization of a sagebrush (Artemisia tridentata ssp. wyomingensis) die-off on the Handford Site. Cardenas, A.; Lewinsohn, J.; Auger, C.; Downs, J.L.; Cadwell, L.L.; Burrows, R. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 20p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050088. Source: OSTI; NTIS; INIS; GPO Dep.

The Hanford Site contains one of the few remaining contiguous areas of shrub-steppe habitat left in Washington State. This habitat is home to many native plant and wildlife species, some of which are threatened with extinction or are unique to the Site. The importance of the Hanford Site increases as other lands surrounding the Site are developed, and these native species and habitats are lost. Stands of Wyoming big sagebrush (Artemisia tridentata ssp. wyomingensis) on the Site are a particularly important component of shrub-steppe habitat, because a number of wildlife require big sagebrush for food and cover. Since 1993, researchers and field biologists have made anecdotal observations of dying and declining sagebrush in stands of shrubs near the 100 Areas. This study was initiated to delineate and document the general boundary where sagebrush stands appear to be declining. We mapped the areal extent of the die-off using a global positioning system and found that the central portion of the die-off encompasses 280 hectares. Shrub stand defoliation was estimated to be near or greater than 80% in this area. The remainder of the die-off area exhibits varying mixtures of completely defoliated, partially defoliated, and healthy-looking stands. Declining sagebrush stands comprise a total of 1776 hectares.

326
(PNNL–11766)
Electrically switched cesium ion exchange. FY 1997 annual report. Lilga, M.A. (and others); Orth, R.J.; Sukamto, J.P.H. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 71p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98051174. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes the Electrically Switched Ion Exchange (ESIX) separation technology being developed as an alternative to ion exchange for removing radionuclides from high-level waste. Progress in FY 1997 for specific applications of ESIX is also outlined. The ESIX technology, which combines ion exchange and electrochemistry, is geared toward producing electroactive films that are highly selective, regenerable, and long lasting. During the process, ion uptake and elution can be controlled directly by modulating the potential of an ion exchange film that has been electrochemically deposited onto a high surface area electrode. This method adds little sodium to the waste stream

and minimizes the secondary wastes associated with traditional ion exchange techniques. Development of the ESIX process is well underway for cesium removal using ferrocyanides as the electroactive films. Films having selectivity for perrhenate (a pertechnetate surrogate) over nitrate also have been deposited and tested. Based on the ferrocyanide film capacity, stability, rate of uptake, and selectivity shown during performance testing, it appears possible to retain a consistent rate of removal and elute cesium into the same elution solution over several load/unload cycles. In batch experiments, metal hexacyanoferrate films showed high selectivities for cesium in concentrated sodium solutions. Cesium uptake was unaffected by Na/Cs molar ratios of up to 2×10^4 , and reached equilibrium within 18 hours. During engineering design tests using 60 pores per inch, high surface area nickel electrodes, nickel ferrocyanide films displayed continued durability. losing less than 20% of their capacity after 1500 load/unload cycles. Bench-scale flow system studies showed no change in capacity or performance of the ESIX films at a flow rate up to 13 BV/h, the maximum flow rate tested, and breakthrough curves further supported once-through waste processing. 9 refs., 24 figs.

327
(PNNL-SA–27105)
Efficient separations and processing crosscutting program 1996 technical exchange meeting. Proceedings. Pacific Northwest Lab., Richland, WA (United States). [1996]. 143p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC06-76RL01830. (CONF-960158–: Efficient separations and processing crosscutting program 1996 technical meeting, Gaithersburg, MD (United States), 16-19 Jan 1996). Order Number DE96005494. Source: OSTI; NTIS; INIS; GPO Dep.

This document contains summaries of technology development presented at the 1996 Efficient Separations and Processing Crosscutting Program Technical Exchange Meeting. This meeting is held annually to promote a free exchange of ideas among technology developers, potential users and other interested parties within the EM community. During this meeting the following many separation processes technologies were discussed such as ion exchange, membrane separation, vacuum distillation, selective sorption, and solvent extraction. Other topics discussed include: waste forms; testing or inorganic sorbents for radionuclide and heavy metal removal; selective crystallization; and electrochemical treatment of liquid wastes. This is the leading abstract, individual papers have been indexed separately for the databases.

328
(RFP–5084)
RCRA Part B permit modifications for cost savings and increased flexibility at the Rocky Flats Environmental Technology Site. Jierree, C. (Rocky Mountain Remediation Services, Golden, CO (United States)); Ticknor, K. Rocky Mountain Remediation Services, Golden, CO (United States). Oct 1996. 2p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC34-90DP62349. (CONF-970335–9: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97001318. Source: OSTI; NTIS; INIS; GPO Dep.

With shrinking budgets and downsizing, a need for streamlined compliance initiatives became evident at the Rocky Flats Environmental Technology Site (RFETS). Therefore, Rocky Mountain Remediation Services (RMRS) at the RFETS successfully and quickly modified the RFETS RCRA Part B Permit to obtain significant cost savings and increased flexibility. This 'was accomplished by requesting operations personnel to suggest changes to the Part B Permit which did not diminish overall compliance and which would be most. cost beneficial. The U.S. Department of Energy (DOE) subsequently obtained approval of those changes from the Colorado Department of Public Health and the Environment (CDPHE).

329
(RFP–5095)
Facility overview for commercial application of selected Rocky Flats facilities. LRL Energy Services, Inc., San Diego, CA (United States). Nov 1996. 76p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC34-90RF62349. Order Number DE97006984. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this Facility Overview is to support the Rocky Flats Local Impacts Initiative's Request for Interest, to solicit interest from commercial corporations for utilizing buildings 865 and 883, and the equipment contained within each building, for a commercial venture. In the following sections, this document describes the Rocky Flats Site, the buildings available for lease, the equipment within these buildings, the site services available to a tenant, the human resources available to support operations in buildings 865 and 883, and the environmental condition of the buildings and property. In addition, a brief description is provided of the work performed to date to explore the potential products that might be manufactured in Buildings 865 and 883, and the markets for these products.

330
(RFP–5098-Pt.1)
Safety analysis and risk assessment handbook. Peterson, V.L. (and others); Colwell, R.G.; Dickey, R.L. EG and G Rocky Flats, Inc., Golden, CO (United States). 22 Apr 1997. 436p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC34-90RF62349. Order Number DE97008107. Source: OSTI; NTIS; INIS; GPO Dep.

This Safety Analysis and Risk Assessment Handbook (SARAH) provides guidance to the safety analyst at the Rocky Flats Environmental Technology Site (RFETS) in the preparation of safety analyses and risk assessments. Although the older guidance (the Rocky Flats Risk Assessment Guide) continues to be used for updating the Final Safety Analysis Reports developed in the mid-1980s, this new guidance is used with all new authorization basis documents. With the mission change at RFETS came the need to establish new authorization basis documents for its facilities, whose functions had changed. The methodology and databases for performing the evaluations that support the new authorization basis documents had to be standardized, to avoid the use of different approaches and/or databases for similar accidents in different facilities. This handbook presents this new standardized approach. The handbook begins with a discussion of the requirements of the different types of authorization basis documents and how to choose the one appropriate for the facility to be evaluated. It then walks the analyst through the process of identifying all the

potential hazards in the facility, classifying them, and choosing the ones that need to be analyzed further. It then discusses the methods for evaluating accident initiation and progression and covers the basic steps in a safety analysis, including consequence and frequency binning and risk ranking. The handbook lays out standardized approaches for determining the source terms of the various accidents (including airborne release fractions, leakpath factors, etc.), the atmospheric dispersion factors appropriate for Rocky Flats, and the methods for radiological and chemical consequence assessments. The radiological assessments use a radiological "template", a spreadsheet that incorporates the standard values of parameters, whereas the chemical assessments use the standard codes ARCHIE and ALOHA.

331
(RFP–5122)
Baseline report - tall upland shrubland at the Rocky Flats Environmental Technology Site. Dow Chemical U.S.A., Golden, CO (United States). Rocky Flats Div. Mar 1997. 62p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC34-90RF62349. Order Number DE97005991. Source: OSTI; NTIS; INIS; GPO Dep.

Rocky Flats Environmental Technology Site (Site) is located on the Colorado Piedmont east of the Front Range between Boulder and Golden. At an elevation of approximately 6,000 feet, the Site contains a unique ecotonal mixture of mountain and prairie plant species, resulting from the topography and close proximity to the mountain front. The Buffer Zone surrounding the Industrial Area is one of the largest remaining undeveloped areas of its kind along the Colorado Piedmont. A number of plant communities at the Site have been identified as increasingly rare and unique by Site ecologists and the Colorado Natural Heritage Program (CNHP). These include the xeric tallgrass prairie, tall upland shrubland, wetlands, and Great Plains riparian woodland communities. Many of these communities support populations of increasingly rare animals as well, including the Preble's meadow jumping mouse, grasshopper sparrow, loggerhead shrike, Merriam's shrew, black crowned night heron, and Hops blue and Argos skipper butterflies. One of the more interesting and important plant communities at the Site is the tall upland shrubland community. It has been generally overlooked by previous Site ecological studies, probably due to its relatively small size; only 34 acres total. Although mentioned in a plant community ordination study conducted by Clark et al. and also in the Site baseline ecological study, few data were available on this plant community before the present study.

332
(RFP–5141)
Evaluation of HEPA filter service life. Fretthold, J.K.; Stithem, A.R. Dow Chemical U.S.A., Golden, CO (United States). Rocky Flats Div. 14 Jul 1997. 92p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC34-90RF62349. Order Number DE97008614. Source: OSTI; NTIS; INIS; GPO Dep.

Rocky Flats Environmental Technology Site (RFETS), has approximately 10,000 High Efficiency Particulate Air (HEPA) Filters installed in a variety of filter plenums. These ventilation/filtration plenum systems are used to control the release of airborne particulate contaminates to the environment during normal operations and potential accidents. This report summarizes the results of destructive and non-destructive tests on HEPA filters obtained from a wide variety of ages and service conditions. These tests were performed to determine an acceptable service life criteria for HEPA filters used at Rocky Flats Environmental Technology Site (RFETS). A total of 140 filters of various ages (1972 to 1996) and service history (new, aged unused, used) were tested. For the purpose of this report, filter age from manufacture date/initial test date to the current sample date was used, as opposed to the actual time a filter was installed in an operating system.

333
(SAND–87-2685)
Construction of the thermal/structural interactions in situ tests at the Waste Isolation Pilot Plant (WIPP). Munson, D.E. (Sandia National Lab., Albuquerque, NM (United States)); Matalucci, R.V.; Hoag, D.L.; Blankenship D.A. Sandia National Labs., Albuquerque, NM (United States). Feb 1997. 225p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97004044. Source: OSTI; NTIS; INIS; GPO Dep.

The Department of Energy has constructed the Waste Isolation Pilot Plant (WIPP) to develop the technology for the disposal of radioactive waste from defense programs. Sandia National Laboratories has the responsibility for experimental activities at the WIPP and has emplaced several large-scale Thermal/Structural Interactions (TSI) in situ tests to validate techniques used to predict repository performance. The construction of the tests relied heavily on earlier excavations at the WIPP site to provide a basis for selecting excavation, surveying, and instrumentation methods, and achievable construction tolerances. The tests were constructed within close tolerances to provide consistent room dimensions and accurate placement of gages. This accuracy has contributed to the high quality of data generated which in turn has facilitated the comparison of test results to numerical predictions. The purpose of this report is to detail the construction activities of the TSI tests.

334
(SAND–87-2686)
Instrumentation of the thermal/structural interactions in situ tests at the Waste Isolation Pilot Plant (WIPP). Munson, D.E. (Sandia National Labs., Albuquerque, NM (United States). Repository Isolation Systems Div.); Hoag, D.L.; Blankenship, D.A.; DeYonge, W.F.; Schiermeister, D.M.; Jones, R.L.; Baird, G.T. Sandia National Labs., Albuquerque, NM (United States). Apr 1997. 194p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97007432. Source: OSTI; NTIS; INIS; GPO Dep.

The Department of Energy has constructed the Waste Isolation Pilot Plant (WIPP) to develop the technology for the disposal of radioactive waste from defense programs. Sandia National Laboratories had the responsibility for the experimental activities at the WIPP and fielded several large-scale Thermal/Structural Interactions (TSI) in situ tests to validate techniques used to predict repository performance. The instrumentation of these tests involved the placement of over 4,200 gages including room closure

gages, borehole extensometers, stress gages, borehole inclinometers, fixed reference gages, borehole strain gages, thermocouples, thermal flux meters, heater power gages, environmental gages, and ventilation gages. Most of the gages were remotely read instruments that were monitored by an automated data acquisition system, but manually read instruments were also used to provide early deformation information and to provide a redundancy of measurement for the remote gages. Instruments were selected that could operate in the harsh environment of the test rooms and that could accommodate the ranges of test room responses predicted by pretest calculations. Instruments were tested in the field prior to installation at the WIPP site and were modified to improve their performance. Other modifications were made to gages as the TSI tests progressed using knowledge gained from test maintenance. Quality assurance procedures were developed for all aspects of instrumentation including calibration, installation, and maintenance. The instrumentation performed exceptionally well and has produced a large quantity of quality information.

335
(SAND–90-0543)
SANTOS - a two-dimensional finite element program for the quasistatic, large deformation, inelastic response of solids. Stone, C.M. Sandia National Labs., Albuquerque, NM (United States). Jul 1997. 151p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97007938. Source: OSTI; NTIS; GPO Dep.

SANTOS is a finite element program designed to compute the quasistatic, large deformation, inelastic response of two-dimensional planar or axisymmetric solids. The code is derived from the transient dynamic code PRONTO 2D. The solution strategy used to compute the equilibrium states is based on a self-adaptive dynamic relaxation solution scheme, which is based on explicit central difference pseudo-time integration and artificial mass proportional damping. The element used in SANTOS is a uniform strain 4-node quadrilateral element with an hourglass control scheme to control the spurious deformation modes. Finite strain constitutive models for many common engineering materials are included. A robust master-slave contact algorithm for modeling sliding contact is implemented. An interface for coupling to an external code is also provided. 43 refs., 22 figs.

336
(SAND–94-0472/1)
Porosity, single-phase permeability, and capillary pressure data from preliminary laboratory experiments on selected samples from Marker Bed 139 at the Waste Isolation Pilot Plant. Volume 1 of 3: Main report, appendix A. Howarth, S.M.; Christian-Frear, T. Sandia National Labs., Albuquerque, NM (United States). Aug 1997. 274p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97009290. Source: OSTI; NTIS; INIS; GPO Dep.

Three groups of core samples from Marker Bed 139 of the Salado Formation at the Waste Isolation Pilot Plant (WIPP) were analyzed to provide data to support the development of numerical models used to predict the long-term hydrologic and structural response of the WIPP repository. These laboratory experiments, part of the FY93 Experimental Scoping Activities of the Salado Two-Phase Flow Laboratory Program, were designed to (1) generate WIPP-specific porosity and single-phase permeability data, (2) provide information needed to design and implement planned tests to measure two-phase flow properties, including threshold pressure, capillary pressure, and relative permeability, and (3) evaluate the suitability of using analog correlations for the Salado Formation to assess the long-term performance of the WIPP. This report contains a description of the boreholes core samples, the core preparation techniques used, sample sizes, testing procedures, test conditions, and results of porosity and single-phase permeability tests performed at three laboratories: TerraTek, Inc. (Salt Lake City, UT), RE/SPEC, Inc. (Rapid City, SD), and Core Laboratories-Special Core Analysis Laboratory (Carrollton, TX) for Rock Physics Associates. In addition, this report contains the only WIPP-specific two-phase-flow capillary-pressure data for twelve core samples. The WIPP-specific data generated in this laboratory study and in WIPP field-test programs and information from suitable analogs will form the basis for specification of single- and two-phase flow parameters for anhydrite markers beds for WIPP performance assessment calculations.

337
(SAND–94-0472/2)
Porosity, single-phase permeability, and capillary pressure data from preliminary laboratory experiments on selected samples from Marker Bed 139 at the Waste Isolation Pilot Plant. Volume 2 of 3: Appendix B. Howarth, S.M.; Christian-Frear, T. Sandia National Labs., Albuquerque, NM (United States). Aug 1997. 574p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97009289. Source: OSTI; NTIS; INIS; GPO Dep.

This volume contains the mineralogy, porosity, and permeability results from the Marker Bed 139 anhydrite specimens evaluated by RE/SPEC, Inc. for the Waste Isolation Pilot Plant.

338
(SAND–94-0472/3)
Porosity, single-phase permeability, and capillary pressure data from preliminary laboratory experiments on selected samples from Marker Bed 139 at the Waste Isolation Pilot Plant. Volume 3 of 3: Appendices C, D, E, and F. Howarth, S.M.; Christian-Frear, T. Sandia National Labs., Albuquerque, NM (United States). Aug 1997. 296p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97009288. Source: OSTI; NTIS; INIS; GPO Dep.

This volume contains the mineralogy, porosity, and permeability results from the Marker Bed 139 anhydrite specimens evaluated by TerraTek, Inc. for the Waste Isolation Pilot Plant. This volume also documents the brine recipe used by RE/SPEC, Inc., the parameter package submitted to Performance Assessment based on all the data, and a memo on the mixed Brooks and Corey two-phase characteristic curves.

339
(SAND–95-0596)
Modeling brine inflow to Room Q: A numerical investigation of flow mechanisms. Freeze, G.A. (INTERA Inc., Albuquerque, NM (United States)); Christian-Frear, T.L.; Webb, S.W. Sandia National Labs., Albuquerque, NM (United States). Apr 1997. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97006287. Source: OSTI; NTIS; INIS; GPO Dep.

A hydrologic modeling study was performed to gain insight into the flow mechanisms around Room Q. A summary of hydrologic and structural data and of predictive fluid flow models from Room Q are provided. Six years of measured data are available from the time of excavation. No brine accumulation in Room Q was measured in the first two years following excavation. However, there is considerable uncertainty associated with this early-time data due to inadequate sealing of the room. Brine may have been lost to evaporation or it may have flowed into newly created disturbed rock zone (DRZ) porosity resulting from excavation. Non-zero brine accumulation rates were measured from 2-5 years, but brine accumulation within the room dropped to zero after 5.5 years. A conceptual model for brine inflow to Room Q was developed which assumes far-field Darcy flow combined with an increasing DRZ pore volume. Numerical simulations employed TOUGH28W and used predictive DRZ porosity increase with time from SPECTROM-32 rock deformation simulations. Simulated brine inflow showed good agreement with measured brine accumulation rates for the first five years. Two important conclusions were drawn from the simulation results: (1) early-time brine inflow to the room can be reduced to zero if the DRZ pore volume increases with time, and (2) brine accumulation (inflow) rates from 2 to 5 years suggest a far-field permeability of 5×10^{-22} m^2 with a bulk rock compressibility of 5.4×10^{-12} Pa^{-1}. The early-time brine inflow to the room is very sensitive to the DRZ pore volume. The method for increasing DRZ porosity with time used in the TOUGH28W simulations may be too computationally intensive for use in WIPP Performance Assessment calculations. However, a simplified representation of this phenomena can be implemented in Performance Assessment calculations through the use of a fixed porosity DRZ region with a reduced initial brine saturation.

340
(SAND–95-1148C)
WIPP panel simulations with gas generation. DeVries, K.L. (RE/SPEC, Inc., Rapid City, SD (United States)); Callahan, G.D.; Munson, D.E. Sandia National Labs., Livermore, CA (United States). [1996]. 14p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606115–1: 4. conference on the mechanical behavior of salt, Montreal (Canada), 17-18 Jun 1996). Order Number DE96007339. Source: OSTI; NTIS; INIS; GPO Dep.

An important issue in nuclear waste repository performance is the potential for fracture development resulting in pathways for release of radionuclides beyond the confines of the repository. A series of demonstration calculations using structural finite element analyses are presented here to examine the effect of internal gas generation on the response of a sealed repository. From the calculated stress fields, the most probable location for a fracture to develop was determined to be within the pillars interior to the repository for the range of parameter values considered. If a fracture interconnects the rooms and panels of the repository, fracture opening produces significant additional void volume to limit the excess gas pressure to less than 1.0 MPa above the overburden pressure. Consequently, the potential for additional fracture development into the barrier pillar is greatly reduced, which provides further confidence that the waste will be contained within the repository.

341
(SAND–95-1151C)
Testing the disturbed zone around a rigid inclusion in salt. Knowles, M.K. (Sandia National Labs., Albuquerque, NM (United States)); Borns, D.; Fredrich, J.; Holcomb, D.; Price, R.; Zeuch, D.; Dale, T.; Van Pelt, R.S. Sandia National Labs., Albuquerque, NM (United States). [1996]. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606115–9: 4. conference on the mechanical behavior of salt, Montreal (Canada), 17-18 Jun 1996). Order Number DE97001444. Source: OSTI; NTIS; INIS; GPO Dep.

Deformational processes within a zone of rock surrounding excavations in salt result in alteration of the geophysical and hydrologic properties as compared to the undisturbed condition. The disturbed rock zone offers little resistance to fluid flow. It is hypothesized that rigid inclusions such as concrete seals will arrest and subsequently reverse the disturbance process and induce healing in the disturbed This experiment gathered in situ data that substantiates this hypothesis. A series of tests was conducted in a volume of rock surrounding concrete seals that were placed in a 1-m borehole approximately eight years ago. Fluid flow measurements, measurements of geophysical parameters of the surrounding rock and petrographic analyses on core samples were performed to characterize the rock. This paper presents the testing methodology and summarizes the data gathered from the field test program.

342
(SAND–95-1704C)
Brine release based on structural calculations of damage around an excavation at the Waste Isolation Pilot Plant (WIPP). Munson, D.E. (Sandia National Labs., Albuquerque, NM (United States)); Jensen, A.L.; Webb, S.W.; DeVries, K.L. Sandia National Labs., Albuquerque, NM (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960619–3: 2. North American rock mechanics symposium: tools and techniques in rock mechanics, Montreal (Canada), 19-21 Jun 1996). Order Number DE96007344. Source: OSTI; NTIS; INIS; GPO Dep.

In a large in situ experimntal circular room, brine inflow was measured over 5 years. After correcting for evaporation losses into mine ventilation air, the measurements gave data for a period of nearly 3 years. Predicted brine accumulation based on a mechanical "snow plow" model of the volume swept by creep-induced damage as calculated with the Multimechanism Deformation Coupled Fracture model was found to agree with experiment. Calculation suggests the damage zone at 5 years effectively exends only some 0.7 m into the salt around the room. Also, because the mecahnical model of brine release gives an adequate explanation of the measured data, the hydrological process of

brine flow appears to be rapid compared to the mechanical process of brine release.

343
(SAND–95-1998)
Summary of the systems prioritization method as a decision-aiding method for the waste isolation pilot plant. Boak, D.M. (and others); Prindle, N.H.; Lincoln, R. Sandia National Labs., Albuquerque, NM (United States). Dec 1996. 28p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97002712. Source: OSTI; NTIS; INIS; GPO Dep.

In March 1994, the U.S. Department of Energy Carlsbad Area Office (DOE/CAO) implemented a performance-based decision-aiding method to assist in programmatic prioritization within the Waste Isolation Pilot Plant (WIPP) Project with respect to applicable U.S. Environmental Protection Agency (EPA) long-term performance requirements in 40 CFR 191.13(a) (radionuclide containment requirements) and 40 CFR 268.6 (hazardous constituent concentration requirements). This method, the Systems Prioritization Method (SPM), was designed by Sandia National Laboratories (SNL) to: (1) identify programmatic options (activities) and their costs and durations; (2) analyze combinations of activities (activity sets) in terms of their predicted contribution to long-term performance of the WIPP disposal system; and (3) analyze cost, duration, and performance tradeoffs. The results of the second iteration of SPM (SPM-2) were the basis for recommendations to DOE/CAO in May 1995 for programmatic prioritization within the WIPP project. This paper presents a summary of the SPM implementation, key results, and lessons learned.

344
(SAND–95-1998C)
Summary of the systems prioritization method (SPM) as a decision-aiding tool for the Waste Isolation Pilot Plant. Boak, D.M. (Sandia National Labs., Albuquerque, NM (United States)); Prindle, N.H.; Lincoln, R.; Mendenhall, F.; Weiner, R.; Bills, R.A. Sandia National Labs., Albuquerque, NM (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960212–59-Summ.: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96008256. Source: OSTI; NTIS; INIS; GPO Dep.

In March 1994, the Department of Energy Carlsbad Area Office (DOE/CAO) implemented a performance-based planning method to assist in programmatic prioritization within the Waste Isolation Pilot Plant (WIPP) project with respect to applicable Environmental Protection Agency (EPA) long-term performance requirements stated in 40 CFR 191.13(a) and 40 CFR 268.6. This method, the Systems Prioritization Method (SPM), was designed by Sandia National Laboratories (SNL) to: (1) identify programmatic options (activities) and their costs and durations; (2) analyze potential combinations of activities in terms of predicted contribution to long-term performance; and (3) analyze cost, duration, and performance tradeoffs. SPM results were the basis for recommendations to DOE/CAO in May 1995 for prioritization within the WIPP project. This paper presents a summary of the SPM implementation, key results, and lessons learned.

345
(SAND–95-2015C)
The systems prioritization method (SPM) CD-ROM demonstration for Waste Management '96. Harris, C.L. (Sandia National Labs., Albuquerque, NM (United States)); Boak, D.M.; Prindle, N.H.; Beyeler, W. Sandia National Labs., Albuquerque, NM (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960212–60: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96008255. Source: OSTI; NTIS; INIS; GPO Dep.

In March 1994, the Department of Energy Carlsbad Area Office (DOE/CAO) implemented a performance-based planning method to assist in prioritization within the Waste Isolation Pilot Plant (WIPP). Probabilistic performance calculations were required for the Systems Prioritization Method (SPM) and roughly 46,700 combinations of activities were analyzed, generating a large volume of information to be documented, analyzed, and communicated. A self-contained information management system consisting of a relational database on a 600-megabyte CD-ROM was built to meet this need. The CD-ROM was used to store performance assessment results, data analysis and visualization tools, information about the activities, electronic copies of 40 ILFR 191 and 40 CFR 268, technical reference papers, and the final SPM report. Copies of the CD-ROM were distributed to interested members of the public, WIPP participants, and the Environmental Protection Agency (EPA).

346
(SAND–95-2660C)
Data qualification for the Waste Isolation Pilot Plant. Brown, R.D. (Harbridge House, Inc., Washington, DC (United States)); Harper-Slaboszewicz, V.J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 3p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960421–26: 7. annual international high-level radioactive waste management conference, Las Vegas, NV (United States), 29 Apr - 3 May 1996). Order Number DE96008254. Source: OSTI; NTIS; INIS; GPO Dep.

The Waste Isolation Pilot Plant (WIPP) site near Carlsbad, New Mexico, has been the subject of scientific and engineering investigations for more than twenty years. Data from these investigations are now being used as part of the process to certify compliance of the WIPP with the governing regulations. Some of these data were collected prior to the development and implementation of the quality assurance (QA) standards that are now being applied in the WIPP compliance certification process, and are considered "existing data" within the current QA program. This paper discusses the process for qualification of existing data (QED) defined for the WIPP project, the implementation of that process, and some of the results. This process incorporates many lessons learned, and should be useful to others in the radioactive waste management system who are dealing with "existing data."

347
(SAND–95-2983C)
Computational implementation of the multi-mechanism deformation coupled fracture model for salt. Koteras, J.R.; Munson, D.E. Sandia National Labs., Albuquerque, NM

(United States). 1996. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960619–7: 2. North American rock mechanics symposium: tools and techniques in rock mechanics, Montreal (Canada), 19-21 Jun 1996). Order Number DE96010857. Source: OSTI; NTIS; INIS; GPO Dep.

The Multi-Mechanism Deformation (M-D) model for creep in rock salt has been used in three-dimensional computations for the Waste Isolation Pilot Plant (WIPP), a potential waste, repository. These computational studies are relied upon to make key predictions about long-term behavior of the repository. Recently, the M-D model was extended to include creep-induced damage. The extended model, the Multi-Mechanism Deformation Coupled Fracture (MDCF) model, is considerably more complicated than the M-D model and required a different technology from that of the M-D model for a computational implementation.

348
(SAND–96-0195C)
Ultrafine cement grout for sealing underground nuclear waste repositories. Ahrens, E.H. (Sandia National Labs., Livermore, CA (United States)); Onofrei, M. Sandia National Labs., Livermore, CA (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960619–2: 2. North American rock mechanics symposium: tools and techniques in rock mechanics, Montreal (Canada), 19-21 Jun 1996). Order Number DE96007340. Source: OSTI; NTIS; INIS; GPO Dep.

Sealing fractures in nuclear waste repositories concerns all programs investigating deep burial as a means of disposal. Because the most likely mechanism for contaminant migration is by dissolution and movement through groundwater, sealing programs are seeking low-viscosity sealants that are chemically, mineralogically, and physically compatible with their host. This paper presents the results of collaborative work between Whitesell Laboratories, operated by Atomic Energy of Canada, Ltd., and Sandia National Laboratories; the work was undertaken in support of the Waste Isolation Pilot Plant (WIPP). This effort addresses the technology associated with long-term isolation of nuclear waste in a natural salt medium. The work presented is part of the plugging and sealing program, specifically the development and optimization of Ultrafine cementitious grout that can be injected to adequately lower excessive, strain-induced permeability in the Distributed Rock Zone (DRZ) surrounding underground excavations. Innovative equipment and procedures employed in the laboratory produced a usable cement-based grout whose particles are 90% smaller than 8 microns and average 4 microns. The process involved simultaneous wet pulverization and mixing. The grout was used for a successful in situ test underground at the WIPP. Injection of grout sealed microfractures as small as 8 microns and lowered the gas permeability of the DRZ by three orders of magnitude. Following the WIPP test, additional work produced an improved version of the grout containing particles 90% smaller than 6 microns and averaging 2 microns. This grout can be produced in the dry form at a competitive cost ready to mix.

349
(SAND–96-0209C)
A status report on the development and certification of the Beneficial Uses Shipping System (BUSS) cask. Yoshimura, H.R.; Bronowski, D.R. Sandia National Labs., Albuquerque, NM (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-951203–46: PATRAM '95: 11. international conference on packaging and transportation of radioactive materials, Las Vegas, NV (United States), 3-8 Dec 1995). Order Number DE96007663. Source: OSTI; NTIS; INIS; GPO Dep.

In the early 1980s, the US Department of Energy (DOE) implemented a program to encourage beneficial uses of nuclear byproduct materials, such as cesium-137 and strontium-90, created during the production of defense materials. Potential uses of the cesium-137 (^{137}CS) isotope included sterilizing medical products, maintaining the quality of certain food products, and disinfecting municipal sewage sludge. Strontium-90 (^{90}Sr) is a good heat source and has been used in thermoelectric generators and other products that require a constant supply of heat. During that same period, a proposed facility in Albuquerque, New Mexico, was designed to use cesium-137 to sterilize sewage sludge. To support the sewage sludge treatment facility, Sandia National Laboratories was funded by the DOE to develop a Nuclear Regulatory Commission (NRC)-certified Type B shipping container to transport cesium chloride (CsCl) or strontium fluoride (SrF_2) capsules produced by the Hanford Waste Encapsulation and Storage Facility (WESF) in the State of Washington. The primary purpose of the Beneficial Uses Shipping System (BUSS) cask is to provide shielding and confinement, as well as impact, puncture, and thermal protection for certified, special form contents during transport under normal and hypothetical accident conditions. The BUSS cask was designed to meet dimensional and weight constraints of the WESF and user facilities. Attaining as-low-as-reasonably-achievable (ALARA) radiation exposures in the design and operation of the transport system was a major design goal. Another goal was to obtain regulatory approval of the design by preparing a safety analysis report for packaging (SARP) (Yoshimura et al. 1993).

350
(SAND–96-0258C)
An assessment of simplified methods to determine damage from ship-to-ship collisions. Parks, M.B.; Ammerman, D.J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-951203–62: PATRAM '95: 11. international conference on packaging and transportation of radioactive materials, Las Vegas, NV (United States), 3-8 Dec 1995). Order Number DE96007667. Source: OSTI; NTIS; INIS; GPO Dep.

Sandia National Laboratories (SNL) is studying the safety of shipping, radioactive materials (RAM) by sea, the SeaRAM project (McConnell, et al. 1995), which is sponsored by the US Department of Energy (DOE). The project is concerned with the potential effects of ship collisions and fires on onboard RAM packages. Existing methodologies are being assessed to determine their adequacy to predict the effect of ship collisions and fires on RAM packages and to estimate whether or not a given accident might lead to a release of radioactivity. The eventual goal is to develop a set of validated methods, which have been checked by comparison with test data and/or detailed finite element analyses, for predicting the consequences of ship collisions and fires. These methods could then be used to provide input for overall risk assessments of RAM sea transport. The

emphasis of this paper is on methods for predicting- effects of ship collisions.

351
(SAND–96-0282C)
Analysis of a ship-to-ship collision. Porter, V.L.; Ammerman, D.J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-951203–63: PATRAM '95: 11. international conference on packaging and transportation of radioactive materials, Las Vegas, NV (United States), 3-8 Dec 1995). Order Number DE96007668. Source: OSTI; NTIS; INIS; GPO Dep.

Sandia National Laboratories is involved in a safety assessment for the shipment of radioactive material by sea. One part of this study is investigation of the consequences of ship-to-ship collisions. This paper describes two sets of finite element analyses performed to assess the structural response of a small freighter and the loading imparted to radioactive material (RAM) packages during several postulated collision scenarios with another ship. The first series of analyses was performed to evaluate the amount of penetration of the freighter hull by a striking ship of various masses and initial velocities. Although these analyses included a representation of a single RAM package, the package was not impacted during the collision so forces on the package could not be computed. Therefore, a second series of analyses incorporating a representation of a row of seven packages was performed to ensure direct package impact by the striking ship. Average forces on a package were evaluated for several initial velocities and masses of the striking ship. In addition to. providing insight to ship and package response during a few postulated ship collisions scenarios, these analyses will be used to benchmark simpler ship collision models used in probabilistic risk assessment analyses.

352
(SAND–96-0294C)
On-site vs off-site management of environmental restoration waste: A cost effectiveness analysis. Morse, M.A. (Terradigm, Inc., Albuquerque, NM (United States)); Aamodt, P.L.; Cox, W.B. Sandia National Labs., Albuquerque, NM (United States). [1996]. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960212–57: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96007341. Source: OSTI; NTIS; INIS; GPO Dep.

The Sandia National Laboratories Environmental Restoration Project is expected to generate relatively large volumes of hazardous waste as a result of cleanup operations. These volumes will exceed the Laboratories existing waste management capacity. This paper presents four options for managing remediation wastes, including three alternatives for on-site waste management utilizing a corrective action management unit (CAMU). Costs are estimated for each of the four options based on current volumetric estimates of hazardous waste. Cost equations are derived for each of the options with the variables being waste volumes, the major unknowns in the analysis. These equations provide a means to update cost estimates as volume estimates change. This approach may be helpful to others facing similar waste management decisions.

353
(SAND–96-0323C)
Transportation risks associated with moving special nuclear material from RFETS to Lowry AFB, Denver. Weiner, R.F. Sandia National Labs., Albuquerque, NM (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960804–2: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96005900. Source: OSTI; NTIS; INIS; GPO Dep.

Among the alternatives considered for the short-term disposition of special nuclear material now stored at the Rocky Flats Environmental Technology Site (RFETS)was transportation of the material offsite and disposition in an unused missile silo. Such silos may be available at the Lowry Air Force Base on the east side of Denver. Therefore, the risks of transporting the material under consideration were analyzed. The risks were analyzed using RADTRAN 4.0.18 (Neuhauser and Kanipe, 1992). The 40-km route from RFETS to Lowry maximized the use of limited-access divided highways (26 of the 40 km): the routes from RFETS to Denver and through Denver were on limited-access freeway, while the route from Denver to Lowry AFB was on secondary roads and is modeled using the RADTRAN "suburban" designation. Population densities were given in the HIGHWAY routing code available on TRANSNET, and used 1990 census figures. The source term was that given in an available file developed for RADTRAN by Sandia National Laboratories, and the shipment modeled contained 203 Curies of Pu-239 oxide and 47.9 Curies Pu-240 oxide. Radiation exposure at 1 meter from the container surface was 1.5 mrem/hr (transport index = 1.5). RADTRAN 4.0 and HIGHWAY are validated and verified codes; TRANSNET is the user interface.

354
(SAND–96-0341C)
Classification of poison inhalation hazard materials into severity groups. Griego, N.R.; Weiner, R.F. Sandia National Labs., Albuquerque, NM (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-951203–48: PATRAM '95: 11. international conference on packaging and transportation of radioactive materials, Las Vegas, NV (United States), 3-8 Dec 1995). Order Number DE96007423. Source: OSTI; NTIS; INIS; GPO Dep.

Approximately 1.5 billion tons of hazardous materials (hazmat) are transported in the US annually, and most reach their destinations safely. However, there are infrequent transportation accidents in which hazmat is released from its packaging. These accidental releases can potentially affect the health of the exposed population and damage the surrounding environment. Although these events are rare, they cause genuine public concern. Therefore, the US Department of Transportation Research & Special Programs Administration (DOT- RSPA) has sponsored a project to evaluate the protection provided by the current bulk (defined as larger than 118 gallons) packagings used to transport materials that have been classified as Poison Inhalation Hazards (PIH) and recommend performance standards for these PIH packagings. This project was limited to evaluating bulk packagings larger than 2000 gallons. This project involved classifying the PIH into severity categories so that only one set of packaging performance

criteria would be needed for each severity category rather than a separate set of performance criteria for each individual PIH. By grouping the PIH into Hazard Zones, Packaging Groups and performance standards for these Hazard Zones can be defined. Each Hazard Zone can correspond to a Packaging Group or, as in 49CFR173 for non-bulk packagings, one Packaging Group may cover more than one Hazard Zone. If the packaging groups are chosen to correspond to the classification categories presented in this report, then the maximum allowable leak rates used to define these categories could be used as the maximum allowable leak rates for the performance oriented packaging standards. The results discussed in this report are intended to provide quantitative guidance for the appropriate authorities to use in making these decisions.

355
(SAND–96-0370C)
Geospatial analyses and system architectures for the next generation of radioactive materials risk assessment and routing. Ganter, J.H. Sandia National Labs., Albuquerque, NM (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-951203–57: PATRAM '95: 11. international conference on packaging and transportation of radioactive materials, Las Vegas, NV (United States), 3-8 Dec 1995). Order Number DE96007427. Source: OSTI; NTIS; INIS; GPO Dep.

This paper suggests that inexorable changes in the society are presenting both challenges and a rich selection of technologies for responding to these challenges. The citizen is more demanding of environmental and personal protection, and of information. Simultaneously, the commercial and government information technologies markets are providing new technologies like commercial off-the-shelf (COTS) software, common datasets, "open" GIS, recordable CD-ROM, and the World Wide Web. Thus one has the raw ingredients for creating new techniques and tools for spatial analysis, and these tools can support participative study and decision-making. By carrying out a strategy of thorough and demonstrably correct science, design, and development, can move forward into a new generation of participative risk assessment and routing for radioactive and hazardous materials.

356
(SAND–96-0376C)
A constitutive model for representing coupled creep, fracture, and healing in rock salt. Chan, K.S. (Southwest Research Inst., San Antonio, TX (United States)); Bodner, S.R.; Munson, D.E.; Fossum, A.F. Sandia National Labs., Albuquerque, NM (United States). [1996]. 15p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606115–2: 4. conference on the mechanical behavior of salt, Montreal (Canada), 17-18 Jun 1996). Order Number DE96006991. Source: OSTI; NTIS; INIS; GPO Dep.

The development of a constitutive model for representing inelastic flow due to coupled creep, damage, and healing in rock salt is present in this paper. This model, referred to as Multimechanism Deformation Coupled Fracture model, has been formulated by considering individual mechanisms that include dislocation creep, shear damage, tensile damage, and damage healing. Applications of the model to representing the inelastic flow and fracture behavior of WIPP salt subjected to creep, quasi-static loading, and damage healing conditions are illustrated with comparisons of model calculations against experimental creep curves, stress-strain curves, strain recovery curves, time-to-rupture data, and fracture mechanism maps.

357
(SAND–96-0487C)
Implementation and verification of a coupled fire model as a thermal boundary condition within P3/THERMAL. Hensinger, D.M.; Gritzo, L.A.; Koski, J.A. Sandia National Labs., Albuquerque, NM (United States). [1996]. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606135–1: MacNeil Schwendler Corporation world users conference, Newport Beach, CA (United States), 3-7 Jun 1996). Order Number DE96006885. Source: OSTI; NTIS; INIS; GPO Dep.

A user-defined boundary condition subroutine has been implemented within P3/THERMAL to represent the heat flux between a noncombusting object and an engulfing fire. The heat flux calculations includes a simple 2D fire model in which energy and radiative heat transport equations are solved to produce estimates of the heat fluxes at the fire-object interface. These estimates reflect radiative coupling between a cold object and the flow of hot combustion gases which has been observed in fire experiments. The model uses a database of experimental pool fire measurements for far field boundary conditions and volumetric heat release rates. Taking into account the coupling between a structure and the fire is an improvement over the σT^4 approximation frequently used as a boundary condition for engineered system response and is the preliminary step in the development of a fire model with a predictive capability. This paper describes the implementation of the fire model as a P3/THERMAL boundary condition and presents the results of a verification calculation carried out using the model.

358
(SAND–96-0656C)
Ion exchange performance of commercial crystalline silicotitanates for cesium removal. Braun, R. (and others); Dangieri, T.J.; Fennelly, D.J. Sandia National Labs., Albuquerque, NM (United States). 1996. 19p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960212–65: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006974. Source: OSTI; NTIS; INIS; GPO Dep.

A new class of inorganic ion exchangers called crystalline silicotitanates (CST), invented by researchers at Sandia National Laboratories and Texas A&M University, has been commercialized in a joint Sandia-UOP effort. The original developmental materials exhibited high selectivity for the ion exchange of cesium, strontium, and several other radionuclides from highly alkaline solutions containing molar concentrations of Na^+. The materials also showed excellent chemical and radiation stability. Together, the high selectivity and stability of the CSTs made them excellent candidates for treatment of solutions such as the Hanford tank supernates and other DOE radwastes. Sandia National Laboratories and UOP have teamed under a Cooperative Research and Development Agreement (CRADA) to develop CSTs in the powdered form and in an engineered form suitable for column ion exchange use. A *continuous-flow*, column ion

exchange process is expected to be used to remove Cs and other radionuclides from the Hanford supernatant. The powder material invented by the Sandia and Texas A&M team consists of submicron-size particles. It is not designed for column ion exchange but may be used in other applications.

359
(SAND–96-0714C)
Investigation of RADTRAN Stop Model input parameters for truck stops. Griego, N.R.; Smith, J.D.; Neuhauser, K.S. Sandia National Labs., Albuquerque, NM (United States). [1996]. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960212–44: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006980. Source: OSTI; NTIS; INIS; GPO Dep.

RADTRAN is a computer code for estimating the risks and consequences as transport of radioactive materials (RAM). RADTRAN was developed and is maintained by Sandia National Laboratories for the US Department of Energy (DOE). For incident-free transportation, the dose to persons exposed while the shipment is stopped is frequently a major percentage of the overall dose. This dose is referred to as Stop Dose and is calculated by the Stop Model. Because stop dose is a significant portion of the overall dose associated with RAM transport, the values used as input for the Stop Model are important. Therefore, an investigation of typical values for RADTRAN Stop Parameters for truck stops was performed. The resulting data from these investigations were analyzed to provide mean values, standard deviations, and histograms. Hence, the mean values can be used when an analyst does not have a basis for selecting other input values for the Stop Model. In addition, the histograms and their characteristics can be used to guide statistical sampling techniques to measure sensitivity of the RADTRAN calculated Stop Dose to the uncertainties in the stop model input parameters. This paper discusses the details and presents the results of the investigation of stop model input parameters at truck stops.

360
(SAND–96-0715C)
Expected residence time model. Smith, J.D.; Neuhauser, K.S.; Kanipe, F.L. Sandia National Labs., Albuquerque, NM (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960212–43: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006979. Source: OSTI; NTIS; INIS; GPO Dep.

The Transportation Technology Department of Sandia National Laboratories develops analytical and computational tools for the US Department of Energy to assess the radiological consequences and risks from the transportation of radioactive materials by all modes. When large quantities of materials are to be transported movements may occur over an extended period of time in what is collectively referred as a "shipping campaign". Since the routes over which the shipments occur often remain the same, cumulative exposure to individuals inhabiting the population zones adjacent to the transport links must be estimated. However, individuals do not remain in the same residences throughout their lifetimes and, in fact, move quite often. To appropriately allocate exposures among populations over extended periods of time, perhaps years, requires a model that accounts for three population categories; (1) the original populations residing in the areas adjacent to the transport links, (2) individuals moving out and (3) individuals moving into residences in the designated areas. The model described here accounts for these conditions and will be incorporated as a user option in the RADTRAN computer code for transportation consequence and risk analysis (Reference 1). RADTRAN is a computer code for estimating the consequences and risks associated with the transport of radioactive materials.

361
(SAND–96-0749C)
Probabilistic risk assessment for the Sandia National Laboratories Technical Area V Liquid Waste Disposal System surface impoundments. Dawson, L.A. (Sandia National Labs., Albuquerque, NM (United States)); Eidson, A.F. Sandia National Labs., Albuquerque, NM (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960804–4: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96008252. Source: OSTI; NTIS; INIS; GPO Dep.

A probabilistic risk assessment was completed for a former radioactive waste disposal site. The site, two unlined surface impoundment, was designed as part of the Liquid Waste Disposal System (LWDS) to receive radioactive effluent from nuclear reactors in Technical Area-V (TA-V) at Sandia National Laboratories/New Mexico (SNL/NM). First, a statistical comparison of site sampling results to natural background, using EPA methods, and a spatial distribution analysis were performed. Risk assessment was conducted with SNL/NM's Probabilistic Risk Evaluation and Characterization Investigation System model. The risk assessment indicated that contamination from several constituents might have been high enough to require remediation. However, further analysis based on expected site closure activities and recent EPA guidance indicated that No Further Action was acceptable.

362
(SAND–96-0791C)
Evaluation of constitutive models for crushed salt. Callahan, G.D. (RE/SPEC, Inc., Rapid City, SD (United States)); Loken, M.C.; Hurtado, L.D.; Hansen, F.D. Sandia National Labs., Albuquerque, NM (United States). [1996]. 14p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606115–3: 4. conference on the mechanical behavior of salt, Montreal (Canada), 17-18 Jun 1996). Order Number DE96009175. Source: OSTI; NTIS; INIS; GPO Dep.

Three constitutive models are recommended as candidates for describing the deformation of crushed salt. These models are generalized to three-dimensional states of stress to include the effects of mean and deviatoric stress and modified to include effects of temperature, grain size, and moisture content. A database including hydrostatic consolidation and shear consolidation tests conducted on Waste Isolation Pilot Plant (WIPP) and southeastern New Mexico salt is used to determine material parameters for the models. To evaluate the capability of the models, parameter values obtained from fitting the complete database are used

to predict the individual tests. Finite element calculations of a WIPP shaft with emplaced crushed salt demonstrate the model predictions.

363
(SAND–96-0792C)
Large-scale dynamic compaction of natural salt. Hansen, F.D.; Ahrens, E.H. Sandia National Labs., Albuquerque, NM (United States). [1996]. 13p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606115–4: 4. conference on the mechanical behavior of salt, Montreal (Canada), 17-18 Jun 1996). Order Number DE96010849. Source: OSTI; NTIS; INIS; GPO Dep.

A large-scale dynamic compaction demonstration of natural salt was successfully completed. About 40 m^3 of salt were compacted in three, 2-m lifts by dropping a 9,000-kg weight from a height of 15 m in a systematic pattern to achieve desired compaction energy. To enhance compaction, 1 wt% water was added to the relatively dry mine-run salt. The average compacted mass fractional density was 0.90 of natural intact salt, and in situ nitrogen permeabilities averaged $9X10^{-14}m^2$. This established viability of dynamic compacting for placing salt shaft seal components. The demonstration also provided compacted salt parameters needed for shaft seal system design and performance assessments of the Waste Isolation Pilot Plant.

364
(SAND–96-0838C)
Properties of dynamically compacted WIPP salt. Brodsky, N.S. (Sandia National Labs., Albuquerque, NM (United States)); Hansen, F.D.; Pfeifle, T.W. Sandia National Labs., Albuquerque, NM (United States). [1996]. 14p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606115–6: 4. conference on the mechanical behavior of salt, Montreal (Canada), 17-18 Jun 1996). Order Number DE96011715. Source: OSTI; NTIS; INIS; GPO Dep.

Dynamic compaction of mine-run salt is being investigated for the Waste Isolation Pilot Plant (WIPP), where compacted salt is being considered for repository sealing applications. One large-scale and two intermediate-scale dynamic compaction demonstrations were conducted. Initial fractional densities of the compacted salt range form 0.85 to 0.90, and permeabilities vary. Dynamically-compacted specimens were further consolidated in the laboratory by application of hydrostatic pressure. Permeability as a function of density was determined, and consolidation microprocesses were studied. Experimental results, in conjunction with modeling results, indicate that the compacted salt will function as a viable seal material.

365
(SAND–96-0850C)
Multiattribute utility analysis as a framework for public participation siting a hazardous waste facility. Merkhofer, M.W. (Applied Decision Analysis, Inc., Menlo Park, CA (United States)); Conway, R.; Anderson, R.G. Sandia National Labs., Albuquerque, NM (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9605147–1: 1996 prioritization methodology workshop, Oakland, CA (United States), 14-15 May 1996). Order Number DE96008867. Source: OSTI; NTIS; INIS; GPO Dep.

How can the public play a role in decisions involving complicated scientific arguments? This paper describes a public participation exercise in which stakeholders used multiattribute utility analysis to select a site for a hazardous waste facility. Key to success was the ability to separate and address the two types of judgements inherent in environmental decisions: technical judgements on the likely consequences of alternative choices and value judgements on the importance or seriousness of those consequences. This enabled technical specialists to communicate the essential technical considerations and allowed stakeholders to establish the value judgements for the decision. Although rarely used in public participation, the multiattribute utility approach appears to provide a useful framework for the collaborative resolution of many complex environmental decision problems.

366
(SAND–96-0899C)
Application of a NAPL partitioning interwell tracer test (PITT) to support DNAPL remediation at the Sandia National Laboratories/New Mexico chemical waste landfill. Studer, J.E. (INTERA Inc., Albuquerque, NM (United States)); Mariner, P.; Jin, M. Sandia National Labs., Albuquerque, NM (United States). 1996. 37p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9605148–1: Superfund Hazwaste West, Las Vegas, NV (United States), 21 May - 5 Jun 1996). Order Number DE96008862. Source: OSTI; NTIS; INIS; GPO Dep.

Chlorinated solvents as dense non-aqueous phase liquid (DNAPL) are present at a large number of hazardous waste sites across the U.S. and world. DNAPL is difficult to detect in the subsurface, much less characterize to any degree of accuracy. Without proper site characterization, remedial decisions are often difficult to make and technically effective, cost-efficient remediations are even more difficult to obtain. A new non-aqueous phase liquid (NAPL) characterization technology that is superior to conventional technologies has been developed and applied at full-scale. This technology, referred to as the Partitioning Interwell Tracer Test (PITT), has been adopted from oil-field practices and tailored to environmental application in the vadose and saturated zones. A PITT has been applied for the first time at full-scale to characterize DNAPL in the vadose zone. The PITT was applied in December 1995 beneath two side-by-side organic disposal pits at Sandia National Laboratories/New Mexico (SNL/NM) RCRA Interim Status Chemical Waste Landfill (CWL), located in Albuquerque, New Mexico. DNAPL, consisting of a mixture of chlorinated solvents, aromatic hydrocarbons, and PCE oils, is known to exist in at least one of the two buried pits. The vadose zone PITT was conducted by injecting a slug of non-partitioning and NAPL-partitioning tracers into and through a zone of interest under a controlled forced gradient. The forced gradient was created by a balanced extraction of soil gas at a location 55 feet from the injector. The extracted gas stream was sampled over time to define tracer break-through curves. Soil gas sampling ports from multilevel monitoring installations were sampled to define break-through curves at specific locations and depths. Analytical instrumentation such as gas chromatographs and a photoacoustical analyzers operated autonomously, were used for tracer detection.

367
(SAND–96-1100C)
A shaft seal system for the Waste Isolation Pilot Plant. Hansen, F.D. (Sandia National Labs., Albuquerque, NM (United States)); Ahrens, E.H.; Dennis, A.W.; Hurtado, L.D.; Knowles, M.K.; Tillerson, J.R.; Thompson, T.W.; Galbraith, D. Sandia National Labs., Albuquerque, NM (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960804–35: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96011691. Source: OSTI; NTIS; INIS; GPO Dep.

As part of the demonstration of compliance with federal regulations, a shaft seal system has been designed for the Waste Isolation Pilot Plant. The system completely fills the 650 m shafts with components consisting of the common engineering materials, each of which possesses low permeability, longevity, and can be constructed using available technology. Design investigations couple rock mechanics and fluid flow analysis and tests of these materials within the natural geological setting, and demonstrate the effectiveness of the design.

368
(SAND–96-1254C)
Considerations in modeling groundwater inflow to underground respositories. Freeze, G.; Christian-Frear, T. Sandia National Labs., Albuquerque, NM (United States). [1996]. 3p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606257–1: *Top Seal* '96, Stockholm (Sweden), 9 Jun 1996). Order Number DE96012800. Source: OSTI; NTIS; INIS; GPO Dep.

Groundwater in and around underground radioactive waste repositories has several potential effects on repository performance. Repository excavation produces conditions where the repository is underpressured relative to the surrounding host rock, resulting in groundwater inflow to the repository. The presence of groundwater has been shown to enhance gas generation from emplaced waste forms, which expedites repository pressurization. Repository pressurization results in an increased driving force for dissolved radionuclide movement away from the repository. Repository excavation also produces a zone surrounding the repository having disturbed hydrologic and geochemical properties. Within the disturbed rock zone (DRZ), intrinsic permeability and porosity change over time due to the formation of microfractures and grain boundary dilation. Additionally, elastic and inelastic changes in pore volume may cause variation in the near-field fluid pressure and fluid saturation distributions that influence groundwater flow toward the repository excavation. Increased permeability, decreased pore-fluid pressure, and partially saturated conditions in the DRZ contribute to enhancing potential release pathways away from the repository. It is important for a repository performance assessment to consider chemical processes, hydrologic processes, as well as the complex coupling between these processes.

369
(SAND–96-1327C)
WIPP air-intake shaft disturbed-rock zone study. Dale, T. (INTERA Inc., Austin, TX (United States)); Hurtado, L.D. Sandia National Labs., Albuquerque, NM (United States). [1996]. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606115–8: 4. conference on the mechanical behavior of salt, Montreal (Canada), 17-18 Jun 1996). Order Number DE97001099. Source: OSTI; NTIS; INIS; GPO Dep.

The disturbed-rock zone surrounding the air-intake shaft at the Waste Isolation Pilot Plant (WIPP) site was investigated to determine the extent and the permeability of the disturbed-rock zone as a function of radial distance from the 6.1 m diameter shaft, at different elevations within the Salado. Gas- and brine-permeability tests were performed in the bedded halite of the Salado formation at two levels within the air-intake shaft. The gas- and brine-permeability test results demonstrated that the radial distance to an undisturbed formation permeability of 1×10^{-21} m^2 was less than 3.0 m.

370
(SAND–96-1651C)
Comparison of passive soil vapor survey techniques at a Tijeras Arroyo site, Sandia National Laboratories, Albuquerque, New Mexico. Eberle, C.S.; Wade, W.M.; Tharp, T.; Brinkman, J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960804–47: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96012953. Source: OSTI; NTIS; INIS; GPO Dep.

Soil vapor surveys were performed to characterize the approximate location of soil contaminants at a hazardous waste site. The samplers were from two separate companies and a comparison was made between the results of the two techniques. These results will be used to design further investigations at the site.

371
(SAND–96-1789C)
Salt-saturated concrete strength and permeability. Pfeifle, T.W. (RE/SPEC Inc., Rapid City, SD (United States)); Hansen, F.D.; Knowles, M.K. Sandia National Labs., Albuquerque, NM (United States). [1996]. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9611104–1: 4. ASCE Materials Engineering conference, Washington, DC (United States), 11-14 Nov 1996). Order Number DE97001321. Source: OSTI; NTIS; INIS; GPO Dep.

Laboratory-scale experiments applicable to the use of salt-saturated concrete as a seal material for a transuranic waste repository have been completed. Nitrogen gas permeability measurements were made using a flexible-wall permeameter, a confining pressure of 1 MPa, and gas pressure gradients ranging from 0.3 MPa to 0.75 MPa. Results show that salt-saturated concrete has very low intrinsic permeability with values ranging from 9.4×10^{-22} m^2 to 9.7×10^{-17} m^2. Strength and deformation characteristics were investigated under conditions of triaxial compression with confining pressures ranging from 0 to 15 MPa using either axial strain-rate or axial stress-rate control and show that the failure strength of concrete increases with confining pressure which can be adequately described through pressure-sensitive failure criteria. Axial, radial, and volumetric strains were also measured during each test and these

data were used to determine elastic properties. Experimental results are applicable in the design and analysis of scale-related functions and apply to other concrete structures subjected to compressive loadings such as dams and prestressed structural members.

372
(SAND–96-1921C)
Structural analysis in support of the waterborne transport of radioactive materials. Ammerman, D.J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960706–30: American Society of Mechanical Engineers (ASME) pressure vessels and piping conference, Montreal (Canada), 21-26 Jul 1996). Order Number DE96013237. Source: OSTI; NTIS; INIS; GPO Dep.

The safety of the transportation of radioactive materials by road and rail has been well studied and documented. However, the safety of waterborne transportation has received much less attention. Recent highly visible waterborne transportation campaigns have led to DOE and IAEA to focus attention on the safety of this transportation mode. In response, Sandia National Laboratories is conducting a program to establish a method to determine the safety of these shipments. As part of that program the mechanics involved in ship-to-ship collisions are being evaluated to determine the loadings imparted to radioactive material transportation packages during these collisions. This paper will report on the results of these evaluations.

373
(SAND–96-1922C)
Use of inelastic analysis to determine the response of packages to puncture accidents. Ammerman, D.J.; Ludwigsen, J.S. Sandia National Labs., Albuquerque, NM (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960706–29: American Society of Mechanical Engineers (ASME) pressure vessels and piping conference, Montreal (Canada), 21-26 Jul 1996). Order Number DE96013238. Source: OSTI; NTIS; INIS; GPO Dep.

The accurate analytical determination of the response of radioactive material transportation packages to the hypothetical puncture accident requires inelastic analysis techniques. Use of this improved analysis method recudes the reliance on empirical and approximate methods to determine the safety for puncture accidents. This paper will discuss how inelastic analysis techniques can be used to determine the stresses, strains and deformations resulting from puncture accidents for thin skin materials with different backing materials. A method will be discussed to assure safety for all of these types of packages.

374
(SAND–96-1968)
Bentonite as a waste isolation pilot plant shaft sealing material. Daemen, J. (Univ. of Nevada, Reno, NV (United States)); Ran, Chongwei. Sandia National Labs., Albuquerque, NM (United States). Dec 1996. 70p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97002706. Source: OSTI; NTIS; INIS; GPO Dep.

Current designs of the shaft sealing system for the Waste Isolation Pilot Plant (WIPP) propose using bentonite as a primary sealing component. The shaft sealing designs anticipate that compacted bentonite sealing components can perform through the 10,000-year regulatory period and beyond. To evaluate the acceptability of bentonite as a sealing material for the WIPP, this report identifies references that deal with the properties and characteristics of bentonite that may affect its behavior in the WIPP environment. This report reviews published studies that discuss using bentonite as sealing material for nuclear waste disposal, environmental restoration, toxic and chemical waste disposal, landfill liners, and applications in the petroleum industry. This report identifies the physical and chemical properties, stability and seal construction technologies of bentonite seals in shafts, especially in a saline brine environment. This report focuses on permeability, swelling pressure, strength, stiffness, longevity, and densification properties of bentonites.

375
(SAND–96-2011C)
Spent-fuel verification measurements using passive and active radiation techniques. Ewing, R.I.; Seager, K.D. Sandia National Labs., Albuquerque, NM (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960767–22: 37. annual meeting of the Institute of Nuclear Materials Management, Naples, FL (United States), 28 Jul - 1 Aug 1996). Order Number DE96013830. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes an evolutionary development process that will lead to spent fuel measurements that directly measure fissile reactivity. First, the Fork measurement system has been used to verify the burnup of pressurized water reactor (PWR) spent-fuel assemblies at U.S. nuclear utilities. Fork measurements have demonstrated the utility of the passive Fork system to verify reactor records with a single 100-second measurement on each assembly. Second, an Advanced Fork system incorporating collimated gamma-ray spectroscopy has been designed to permit advanced calibration techniques that are independent of reactor burnup records and to allow rapid axial scanning of spent fuel assemblies. Third, an Active Fork system incorporating a neutron source to interrogate spent fuel is proposed to provide the capability to measure fissile reactivity, when compared to measurements on fresh fuel assemblies of the same design. The Advanced and Active Fork systems have wide applicability to spent fuel verification for PWR, boiling water reactor (BWR), and U.S. Department of Energy (DOE) spent fuel.

376
(SAND–96-2117C)
Experimental measurement of a shipboard fire environment with simulated radioactive materials packages. Koski, J.A. (Sandia National Labs., Albuquerque, NM (United States). Transportation Systems Dept.); Wix, S.D.; Beene, D.E. Jr. Sandia National Labs., Albuquerque, NM (United States). [1996]. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-970698–1: Symposium on very large scale fires, St. Louis, MO (United States), 15-18 Jun 1997). Order Number DE97005386. Source: OSTI; NTIS; INIS; GPO Dep.

Results from a series of eight test fires ranging in size from 2.2 to 18.8 MW conducted aboard the Coast Guard fire test ship Mayo Lykes at Mobile, Alabama are presented and discussed. Tests aboard the break-bulk type cargo ship consisted of heptane spray fires simulating engine room and galley fires, wood crib fires simulating cargo hold fires, and pool fires staged for comparison to land-based regulatory fire results. Primary instrumentation for the tests consisted of two pipe calorimeters that simulated a typical package shape for radioactive materials packages. The calorimeters were both located adjacent to the fires and on the opposite side of the cargo hold bulkhead nearest the fire. The calorimeters were constructed from 1.5 m length sections of nominal 2 foot diameter schedule 60 steel pipe. Type K thermocouples were attached at 12 locations on the circumference and ends of the calorimeter. Fire heat fluxes to the calorimeter surfaces were estimated with the use of the Sandia SODDIT inverse heat conduction code. Experimental results from all types of tests are discussed, and some comparisons are made between the environments found on the ship and those found in land-based pool fire tests.

377
(SAND–96-2133)
The role of regional groundwater flow in the hydrogeology of the Culebra member of the Rustler formation at the Waste Isolation Pilot Plant (WIPP), southeastern New Mexico. Corbet, T.F. (Sandia National Lab., Albuquerque, NM (United States)); Knupp, P.M. Sandia National Labs., Albuquerque, NM (United States). Dec 1996. 203p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97002327. Source: OSTI; NTIS; INIS; GPO Dep.

Numerical simulation has been used to enhance conceptual understanding, of the hydrogeology of the Culebra Dolomite in the context of regional groundwater flow. The hydrogeology is of interest because this unit is a possible pathway for offsite migration of radionuclides from a proposed repository for defense-generated transuranic wastes (the Waste Isolation Pilot Plant). The numerical model used is three-dimensional, extends laterally to topographic features that form the actual boundaries of a regional groundwater system, and uses a free-surface upper boundary condition to simulate the effect of change in the rate of recharge on groundwater flow. Steady-state simulations were performed to examine the sensitivity of simulation results to assumed values for hydraulic conductivity and recharge rate. Transient simulations, covering the time period from 14,000 years in the past to 10,000 years in the future, provided insight into how patterns of groundwater flow respond to changes in climate. Simulation results suggest that rates and directions of Groundwater flow in the Culebra change with time due to interaction between recharge, movement of the water table, and the topography of the land surface. The gentle east-to-west slope of the land surface in the vicinity of the WIPP caused groundwater in the Culebra to flow toward and discharge into Nash Draw, a topographic depression. Modern-day flow directions in the Culebra reflect regional rather than local features of the topography. Changes in Groundwater flow, however, lagged behind changes in the rate of recharge. The present-day position of the water table is still adjusting to the decrease in recharge that ended 8,000 years ago. Contaminants introduced into the Culebra will travel toward the accessible environment along the Culebra rather than by leaking upward or downward into other units. Natural changes in flow over the next 10,000 years will be small and will mainly reflect future short-term wet periods.

378
(SAND–96-2290C)
The characterization and risk assessment of the 'Red Forest' radioactive waste burial site at Chernobyl Nuclear Power Plant. Bungai, D.A. (AN Ukrainskoj SSR, Kiev (Ukraine). Inst. Geologicheskikh Nauk); Skalskij, A.S.; Dzhepo, S.P.; Waters, R.D. Sandia National Labs., Albuquerque, NM (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9609272–1: Warsaw '96, Warsaw (Poland), 10-13 Sep 1996). Order Number DE96014888. Source: OSTI; NTIS; INIS; GPO Dep.

The 'Red Forest' radioactive waste burials created during emergency clean-up activities at Chernobyl Nuclear Power Plant represent a serious source of radioactive contamination of the local ground water system with 9OSr concentration in ground water exceeding the drinking water standard by 3-4 orders of magnitude. In this paper we present results of our hydrogeological and radiological 'Red Forest' site characterization studies, which allow us to estimate 9OSr subsurface migration parameters. We use then these parameters to assess long terrain radionuclide transport to groundwater and surface water, and to analyze associated health risks. Our analyses indicate that 9OSr transport via ground water pathway from 'Red Forest' burials to the adjacent Pripyat River is relatively insignificant due to slow release of 9OSr from the waste burials (less than 1% of inventory per year) and due to long enough ground water residence time in the subsurface, which allows substantial decay of the radioactive contaminant. Tins result and our previous analyses indicate, that though conditions of radioactive waste storage in burials do not satisfy Ukrainian regulation on radiation protection, health risks caused by radionuclide migration to ground water from 'Red Forest' burials do not justify application of expensive countermeasures.

379
(SAND–96-2399C)
Benchmarking of finite element codes for radioactive material transportation packages. Ammerman, D.J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-961105–13: 1996 international mechanical engineering congress and exhibition, Atlanta, GA (United States), 17-22 Nov 1996). Source: OSTI.

The increased power of computers and computer codes makes the use of nonlinear dynamic finite element analyses attractive for use as a tool used in the design and certification of radioactive material transportation packages. For this analysis technique to be acceptable it must be demonstrated. The technique has the ability to accurately capture the response of the packages to accident environments required by the regulations. The best method of demonstrating this ability is via a series of benchmark analyses. In this paper three benchmark problems involving significant inelastic deformations will be discussed. One of the problems has been analyzed using many different finite element codes. The other two problems involve comparison of finite element

calculations to the results form physical tests. The ability of the finite element method to accurately capture the response in these three problems indicates the method should be acceptable for radioactive material transportation package design and certification.

380
(SAND–96-2450C)
Demonstration of close-coupled barriers for subsurface containment of buried waste. Dwyer, B.P. (Sandia National Labs., Albuquerque, NM (United States)); Heiser, J.; Stewart, W. Sandia National Labs., Albuquerque, NM (United States). [1996]. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960804–57: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE97000752. Source: OSTI; NTIS; INIS; GPO Dep.

The primary objective of this project is to develop and demonstrate a close-coupled barrier for the containment of subsurface waste or contaminant migration. A close-coupled barrier is produced by first installing a conventional cement grout curtain followed by a thin inner lining of a polymer grout. The resultant barrier is a cement polymer composite that has economic benefits derived from the cement and performance benefits from the durable and resistant polymer layer. Close-coupled barrier technology is applicable for final, interim, or emergency containment of subsurface waste forms. Consequently, when considering the diversity of technology application, the construction emplacement and material technology maturity, general site operational requirements, and regulatory compliance incentives, the close-coupled barrier system provides an alternative for any hazardous or mixed waste remediation plan. This paper discusses the installation of a close-coupled barrier and the subsequent integrity verification.

381
(SAND–96-2538)
Hydrogen generation by metal corrosion in simulated Waste Isolation Pilot Plant environments. Final report. Telander, M.R. (Battelle Pacific Northwest Lab., Richland, WA (United States)); Westerman, R.E. Sandia National Labs., Albuquerque, NM (United States). Mar 1997. 202p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97005176. Source: OSTI; NTIS; INIS; GPO Dep.

The corrosion and gas-generation characteristics of four material types: low-carbon steel (the current waste packaging material for the Waste Isolation Pilot Plant), Cu-base and Ti-base (alternative packaging) materials, and Al-base (simulated waste) materials were determined in both the liquid and vapor phase of Brine A, a brine representative of an intergranular Salado Formation brine. Test environments consisted primarily of anoxic brine with overpressures of N_2, CO_2, H_2S, and H_2. Limited tests of low-carbon steel were also performed in simulated-backfill environments and in brine environments with pH values ranging from 3 to 11. Low-carbon steel reacted at a slow, measurable rate with anoxic brine, liberating H_2 on an equimolar basis with Fe reacted. Presence of CO_2 caused the initial reaction to proceed more rapidly, but CO_2-induced passivation stopped the reaction if the CO_2 were present in sufficient quantities. Addition of H_2S to a CO_2-passivated system caused reversal of the passivation. Low-carbon steel immersed in brine with H_2S showed no reaction, apparently because of passivation of the steel by formation of FeS. Addition of CO_2 to an H_2S-passivated system did not reverse the passivation. Cu- and Ti-base materials showed essentially no corrosion when exposed to brine and overpressures of N_2, CO_2, and H_2S except for the rapid and complete reaction between Cu-base materials and H_2S. The Al-base materials reacted at approximately the same rate as low-carbon steel when immersed in anoxic Brine A; considerably more rapidly in the presence of CO_2 or H_2S; and much more rapidly when iron was present in the system as a brine contaminant. High-purity Al was much more susceptible to corrosion than the 6061 alloy. No significant reaction took place on any material in any environment in the vapor-phase exposures.

382
(SAND–96-2582)
Microbial gas generation under expected Waste Isolation Pilot Plant repository conditions. Francis, A.J. (Brookhaven National Lab., Upton, NY (United States). Dept. of Applied Science); Gillow, J.B.; Giles, M.R. Sandia National Labs., Albuquerque, NM (United States). Mar 1997. 243p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97004909. Source: OSTI; NTIS; INIS; GPO Dep.

Gas generation from the microbial degradation of the organic constituents of transuranic waste under conditions expected at the Waste Isolation Pilot Plant (WIPP) repository was investigated at Brookhaven National Laboratory. The biodegradation of mixed cellulosics (various types of paper) and electron-beam irradiated plastic and rubber materials (polyethylene, polyvinylchloride, neoprene, hypalon, and leaded hypalon) was examined. The rate of gas production from cellulose biodegradation in inundated samples incubated for 1,228 days at 30 C was biphasic, with an initial rapid rate up to approximately 600 days incubation, followed by a slower rate. The rate of total gas production in anaerobic samples containing mixed inoculum was as follows: 0.002 mL/g cellulose/day without nutrients; 0.004 mL/g cellulose/day with nutrients; and 0.01 mL/g cellulose/day in the presence of excess nitrate. Carbon dioxide production proceeded at a rate of 0.009 { micro} mol/g cellulose/day in anaerobic samples without nutrients, 0.05 { micro} mol/g cellulose/day in the presence of nutrients, and 0.2 { micro} mol/g cellulose/day with excess nitrate. Adding nutrients and excess nitrate stimulated denitrification, as evidenced by the accumulation of N_2O in the headspace (200 { micro} mol/g cellulose). The addition of the potential backfill bentonite increased the rate of CO_2 production to 0.3 { micro} mol/g cellulose/day in anaerobic samples with excess nitrate. Analysis of the solution showed that lactic, acetic, propionic, butyric, and valeric acids were produced due to cellulose degradation. Samples incubated under anaerobic humid conditions for 415 days produced CO_2 at a rate of 0.2 { micro} mol/g cellulose/day in the absence of nutrients, and 1 { micro} mol/g cellulose/day in the presence of bentonite and nutrients. There was no evidence of biodegradation of electron-beam irradiated plastic and rubber.

383
(SAND–96-2629)
Wellbore enlargement investigation: Potential analogs to the Waste Isolation Pilot Plant during inadvertent intrusion of the repository. Boak, D.M. (and others); Dotson, L.; Aguilar, R. Sandia National Labs., Albuquerque, NM (United States). Jan 1997. 73p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97003149. Source: OSTI; NTIS; INIS; GPO Dep.

This study involved the evaluation and documentation of cases in which petroleum wellbores were enlarged beyond the nominal hole diameter as a consequence of erosion during exploratory drilling, particularly as a function of gas flow into the wellbore during blowout conditions. A primary objective was to identify analogs to potential wellbore enlargement at the Waste Isolation Pilot Plant (WIPP) during inadvertent human intrusion. Secondary objectives were to identify drilling scenarios associated with enlargement, determine the physical extent of enlargement, and establish the physical properties of the formation in which the enlargement occurred. No analogs of sufficient quality to establish quantitative limits on wellbore enlargement at the WIPP disposal system were identified. However, some information was obtained regarding the frequency of petroleum well blowouts and the likelihood that such blowouts would bridge downhole, self-limiting the surface release of disposal-system material. Further work would be necessary, however, to determine the conditions under which bridging could occur and the extent to which the bridging might be applicable to WIPP. In addition, data on casing sizes of petroleum boreholes in the WIPP vicinity support the use of a 12-$\frac{1}{4}$ inch borehole size in WIPP performance assessment calculations. Finally, although data are limited, there was no evidence of significant wellbore enlargement in any of three blowouts that occur-red in wellbores in the Delaware Basin (South Culebra Bluff Unit No. 1, Energy Research and Development Administration (ERDA) 6, and WIPP 12).

384
(SAND–96-2654C)
A conceptual performance assessment model of the dissolved actinide source term for the WIPP. Weiner, R.F.; Stockman, C.T.; Wang, Y.; Novak, C.F. Sandia National Labs., Albuquerque, NM (United States). [1996]. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960911–7: Canadian Nuclear Society (CNS) international conference on deep geological disposal of radioactive waste, Winnipeg (Canada), 15-18 Sep 1996). Order Number DE97004628. Source: OSTI; NTIS; INIS; GPO Dep.

This paper presents a performance assessment model of dissolved actinide concentrations for the Waste Isolation Pilot Plant (WIPP). The model assesses the concentration of each actinide oxidation state and combines these concentrations with an oxidation state distribution. The chemical behavior of actinides in the same oxidation state is presumed to be very similar for almost all situations, but exceptions arising from experimental evidence are accommodated. The code BRAGFLO calculates the gas pressure, brine mass, gas volume, and mass of remaining Fe and cellulosics for each time step and computational cell. The total CO_2 in the repository and dissolved $Ca(OH)_2$ is estimated. Lookup tables are constructed for pmH and $f(CO_2)$ as a function of brine type and volume, moles of CO_2, and $Ca(OH)_2$. Amounts of five soluble complexants are considered. A model based on the formulation of Harvie et al. produces tables of solubilities for each actinide oxidation state as a function of pmH, $f(CO_2)$, brine composition, and complexant. Experimental data yield lookup tables of fractions of Th, U, Np, Pu, and Am in each oxidation state as a function of $f(CO_2)$ and complexant. The tables are then used to provide a concentration of a particular actinide at particular values of pmH and $f(CO_2)$. Under steady-state conditions, the oxidation state of each actinide that is most stable in the particular chemical environment controls the concentration of that actinide in solution. In the absence of steady-state conditions, the oxidation state distribution of interest is that of the dissolved actinide, and the oxidation states may be treated as if they were separate compounds.

385
(SAND–96-2662C)
Solar power tower development: Recent experiences. Tyner, C. (and others); Kolb, G.; Prairie, M. Sandia National Labs., Albuquerque, NM (United States). 1996. 21p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States);Arizona Public Service Co., Phoenix, AZ (United States);California Energy Resources Conservation and Development Commission, Sacramento, CA (United DOE Contract AC04-94AL85000. (CONF-961016–1: 8. international symposium on solar thermal concentrating technologies: solar thermal power stations and solar chemistry, Cologne (Germany), 6-11 Oct 1996). Order Number DE97001098. Source: OSTI; NTIS; GPO Dep.

Recent experiences with the 10 MW_e Solar Two and the 2.5 MW_t TSA (Technology Program Solar Air Receiver) demonstration plants are reported. The heat transfer fluids used in these solar power towers are molten-nitrate salt and atmospheric air, respectively. Lessons learned and suggested technology improvements for next-generation plants are categorized according to subsystem. The next steps to be taken in the commercialization process for each these new power plant technologies is also presented.

386
(SAND–96-2735C)
Rationale for the H-19 and H-11 tracer tests at the WIPP site. Beauheim, R.L.; Meigs, L.C.; Davies, P.B. Sandia National Labs., Albuquerque, NM (United States). 1996. 13p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9608182–1: 1. geotrap workshop, Cologne (Germany), 28-30 Aug 1996). Order Number DE97002648. Source: OSTI; NTIS; INIS; GPO Dep.

The Waste Isolation Pilot Plant (WIPP) is a repository for transuranic wastes constructed in bedded Permian-age halite in the Delaware Basin, a sedimentary basin in southeastern New Mexico, USA. A drilling scenario has been identified during performance assessment (PA) that could lead to the release of radionuclides to the Culebra Dolomite Member of the Rustler Formation, the most transmissive water-saturated unit above the repository horizon. Were this to occur, the radionuclides would need to be largely contained within the Culebra (or neighboring strata) within the WIPP-site boundary through the period lasting for 10,000

years after repository closure for WIPP to remain in compliance with applicable regulations on allowable releases. Thus, processes affecting transport of radionuclides within the Culebra are of importance to PA.

387
(SAND–96-2736)
Automation of ORIGEN2 calculations for the transuranic waste baseline inventory database using a pre-processor and a post-processor. Liscum-Powell, J. (Sandia National Labs., Albuquerque, NM (United States). Nuclear Safety and Systems Analysis). Sandia National Labs., Albuquerque, NM (United States). Jun 1997. 144p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97007212. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the work described in this report was to automate ORIGEN2 calculations for the Waste Isolation Pilot Plant (WIPP) Transuranic Waste Baseline Inventory Database (WTWBID); this was done by developing a pre-processor to generate ORIGEN2 input files from WWBID inventory files and a post-processor to remove excess information from the ORIGEN2 output files. The calculations performed with ORIGEN2 estimate the radioactive decay and buildup of various radionuclides in the waste streams identified in the WTWBID. The resulting radionuclide inventories are needed for performance assessment calculations for the WIPP site. The work resulted in the development of PreORG, which requires interaction with the user to generate ORIGEN2 input files on a site-by-site basis, and PostORG, which processes ORIGEN2 output into more manageable files. Both programs are written in the FORTRAN 77 computer language. After running PreORG, the user will run ORIGEN2 to generate the desired data; upon completion of ORIGEN2 calculations, the user can run PostORG to process the output to make it more manageable. All the programs run on a 386 PC or higher with a math co-processor or a computer platform running under VMS operating system. The pre- and post-processors for ORIGEN2 were generated for use with Rev. 1 data of the WTWBID and can also be used with Rev. 2 and 3 data of the TWBID (Transuranic Waste Baseline Inventory Database).

388
(SAND–96-2765)
Laboratory creep and mechanical tests on salt data report (1975-1996): Waste Isolation Pilot Plant (WIPP) thermal/structural interactions program. Mellegard, K.D. (RE/SPEC Inc., Rapid City, SD (United States)); Munson, D.E. Sandia National Labs., Albuquerque, NM (United States). Feb 1997. 523p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97004048. Source: OSTI; NTIS; INIS; GPO Dep.

The Waste Isolation Pilot Plant (WIPP), a facility located in a bedded salt formation in Carlsbad, New Mexico, is being used by the U.S. Department of Energy to demonstrate the technology for safe handling and disposal of transuranic wastes produced by defense activities in the United States. In support of that demonstration, mechanical tests on salt were conducted in the laboratory to characterize material behavior at the stresses and temperatures expected for a nuclear waste repository. Many of those laboratory test programs have been carried out in the RE/SPEC Inc. rock mechanics laboratory in Rapid City, South Dakota; the first program being authorized in 1975 followed by additional testing programs that continue to the present. All of the WIPP laboratory data generated on salt at RE/SPEC Inc. over the last 20 years is presented in this data report. A variety of test procedures were used in performance of the work including quasi-static triaxial compression tests, constant stress (creep) tests, damage recovery tests, and multiaxial creep tests. The detailed data is presented in individual plots for each specimen tested. Typically, the controlled test conditions applied to each specimen are presented in a plot followed by additional plots of the measured specimen response. Extensive tables are included to summarize the tests that were performed. Both the tables and the plots contain cross-references to the technical reports where the data were originally reported. Also included are general descriptions of laboratory facilities, equipment, and procedures used to perform the work.

389
(SAND–96-2812C)
Multi-robots to micro-surgery: Selected robotic applications at Sandia National Laboratories. Bennett, P.C. (Sandia National Labs., Albuquerque, NM (United States). Intelligent Systems and Robotics Center). Sandia National Labs., Albuquerque, NM (United States). [1996]. 17p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-961241–1: ETAR '96: 1996 emerging technologies in advanced robotics, London (United Kingdom), 2-3 Dec 1996). Order Number DE97001314. Source: OSTI; NTIS; GPO Dep.

The Intelligent Systems and Robotics Center (ISRC) at Sandia National Laboratories is a multi-program organization, pursuing research, development and applications in a wide range of field. Activities range from large-scale applications such as nuclear facility dismantlement for the US Department of Energy (DOE), to aircraft inspection and refurbishment, to automated script and program generation for robotic manufacturing and assembly, to miniature robotic devices and sensors for remote sensing and micro-surgery. This paper describes six activities in the large and small scale that are underway and either nearing technology transfer stage or seeking industrial partners to continue application development. The topics of the applications include multiple arm coordination for intuitively maneuvering large, ungainly work pieces; simulation, analysis and graphical training capability for CP-5 research reactor dismantlement; miniature robots with volumes of 16 cubic centimeters and less developed for inspection and sensor deployment; and biomedical sensors to enhance automated prosthetic device production and fill laparoscopic surgery information gap.

390
(SAND–96-2881C)
Rocinante, a virtual collaborative visualizer. McDonald, M.J. (Sandia National Labs., Albuquerque, NM (United States). Intelligent Systems and Robotics Center); Ice, L.G. Sandia National Labs., Albuquerque, NM (United States). [1996]. 6p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-970464–4: 7. American Nuclear Society topical meeting on

robotics and remote systems, Augusta, GA (United States), 27 Apr - 1 May 1997). Order Number DE97001212. Source: OSTI; NTIS; INIS; GPO Dep.

With the goal of improving the ability of people around the world to share the development and use of intelligent systems, Sandia National Laboratories' Intelligent Systems and Robotics Center is developing new Virtual Collaborative Engineering (VCE) and Virtual Collaborative Control (VCC) technologies. A key area of VCE and VCC research is in shared visualization of virtual environments. This paper describes a Virtual Collaborative Visualizer (VCV), named Rocinante, that Sandia developed for VCE and VCC applications. Rocinante allows multiple participants to simultaneously view dynamic geometrically-defined environments. Each viewer can exclude extraneous detail or include additional information in the scene as desired. Shared information can be saved and later replayed in a stand-alone mode. Rocinante automatically scales visualization requirements with computer system capabilities. Models with 30,000 polygons and 4 Megabytes of texture display at 12 to 15 frames per second (fps) on an SGI Onyx and at 3 to 8 fps (without texture) on Indigo 2 Extreme computers. In its networked mode, Rocinante synchronizes its local geometric model with remote simulators and sensory systems by monitoring data transmitted through UDP packets. Rocinante's scalability and performance make it an ideal VCC tool. Users throughout the country can monitor robot motions and the thinking behind their motion planners and simulators.

391
(SAND–96-2894C)
Laboratory evaluation of colloidal actinide transport at the Waste Isolation Pilot Plant (WIPP): 1. crushed-dolomite column flow... Yelton, W.G.; Behl, Y.K.; Kelly, J.W.; Dunn, M.; Gillow, J.B.; Francis, A.J.; Papenguth, H.W. Sandia National Labs., Albuquerque, NM (United States). [1996]. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960807–14: 212. national meeting of the American Chemical Society (ACS), Orlando, FL (United States), 25-30 Aug 1996). Order Number DE97002997. Source: OSTI; NTIS; INIS; GPO Dep.

Colloid-facilitated transport of Pu, Am, U, Th, and Np has been recognized as a potentially important phenomenon affecting the performance of the Waste Isolation Pilot Plant (WIPP) facility being developed for safe disposal of transuranic radioactive waste. In a human intrusion scenario, actinide-bearing colloidal particles may be released from the repository and be transported by brines (approximately 0.8 to 3 molal ionic strength) through the Culebra, a thin fractured microcrystalline (mean grain size 2 micrometers) dolomite aquifer overlying the repository. Transport experiments were conducted using sieved, uniformly packed crushed Culebra rock or nonporous dolomite cleavage rhombohedra. Experiments with mineral fragments and fixed and live WIPP-relevant bacteria cultures showed significant levels of retardation due to physical filtration effects. Humic substances were not attenuated by the Culebra dolomite. Comparison of elution curves of latex microspheres in columns prepared with microcrystalline rock and nonporous rock showed minimal effect of Culebra micropores on colloid transport. These data form part of the basis to parameterize numerical codes being used to evaluate the performance of the WIPP.

392
(SAND–96-2953)
Performance planning and measurement for DOE EM-International Technology Integration Program. A report on a performance measurement development workshop for DOE's environmental management international technology integration program. Jordan, G.B.; Reed, J.H.; Wyler, L.D. Sandia National Labs., Albuquerque, NM (United States). Mar 1997. 28p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97005175. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the process and results from an effort to develop metrics for program accomplishments for the FY 1997 budget submission of the U.S. Department of Energy Environmental Management International Technology Integration Program (EM-ITI). The four-step process included interviews with key EM-ITI staff, the development of a strawman program logic chart, and all day facilitated workshop with EM-ITI staff during which preliminary performance plans and measures were developed and refined, and a series of follow-on discussions and activities including a cross-organizational project data base. The effort helped EM-ITI to crystallize and develop a unified vision of their future which they can effectively communicate to their own management and their internal and external customers. The effort sets the stage for responding to the Government Performance and Results Act. The metrics developed may be applicable to other international technology integration programs. Metrics were chosen in areas of eight general performance goals for 1997-1998: (1) number of forums provided for the exchange of information, (2) formal agreements signed, (3) new partners identified, (4) customers reached and satisfied, (5, 6) dollars leveraged by EM technology focus area and from foreign research, (7) number of foreign technologies identified for potential use in remediation of DOE sites, and (8) projects advanced through the pipeline.

393
(SAND–96-2963C)
Error analysis of quartz crystal resonator applications. Lucklum, R. (Otto-von-Guericke-Univ., Magdeburg (Germany)); Behling, C.; Hauptmann, P.; Cernosek, R.W.; Martin, S.J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 5p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States);German Research Foundation (Germany);Germany, Government of (Germany). DOE Contract AC04-94AL85000. Contract Lu605/2-1; Contract 01 RA 9603/1. (CONF-970646–8: 9. international conference on solid-state sensors and actuators, Chicago, IL (United States), 16-19 Jun 1997). Order Number DE97005369. Source: OSTI; NTIS; GPO Dep.

Quartz crystal resonators in chemical sensing applications are usually configured as the frequency determining element of an electrical oscillator. By contrast, the shear modulus determination of a polymer coating needs a complete impedance analysis. The first part of this contribution reports the error made if common approximations are used to relate the frequency shift to the sorbed mass. In the second part the authors discuss different error sources in the procedure to determine shear parameters.

394
(SAND–96-2966)
Characterizing large strain crush response of redwood. Cramer, S.M. (Univ. of Wisconsin, Madison, WI (United States). Dept. of Civil and Environmental Engineering); Hermanson, J.C.; McMurtry, W.M. Sandia National Labs., Albuquerque, NM (United States). Dec 1996. 66p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97002700. Source: OSTI; NTIS; INIS; GPO Dep.

Containers for the transportation of hazardous and radioactive materials incorporate redwood in impact limiters. Redwood is an excellent energy absorber, but only the most rudimentary information exists on its crush properties. The objectives of the study were to fill the information gap by collecting triaxial load-deformation data for redwood; to use these data to characterize redwood crush, assess current wood failure theories, provide developments toward a complete stress-strain theory for redwood; and to review the literature on strain-rate effects on redwood crush performance. The load-deformation responses of redwood at temperature conditions corresponding to ambient (70°F), 150°F, and −20°F conditions were measured in approximately 100 confined compression tests for crush levels leading to material densification. Data analysis provided a more complete description of redwood crush performance and a basis for assessing proposed general orthotropic stress-strain relationships for redwood. A review of existing literature indicated that strain-rate effects cause at most a 20 percent increase in crush stress parallel to grain.

395
(SAND–97-0194)
Conceptual model for transport processes in the Culebra Dolomite Member, Rustler Formation. Holt, R.M. (Holt Hydrogeology, Placitas, NM (United States)). Sandia National Labs., Albuquerque, NM (United States). Aug 1997. 153p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97009143. Source: OSTI; NTIS; INIS; GPO Dep.

The Culebra Dolomite Member of the Rustler Formation represents a possible pathway for contaminants from the Waste Isolation Pilot Plant underground repository to the accessible environment. The geologic character of the Culebra is consistent with a double-porosity, multiple-rate model for transport in which the medium is conceptualized as consisting of advective porosity, where solutes are carried by the groundwater flow, and fracture-bounded zones of diffusive porosity, where solutes move through slow advection or diffusion. As the advective travel length or travel time increases, the nature of transport within a double-porosity medium changes. This behavior is important for chemical sorption, because the specific surface area per unit mass of the diffusive porosity is much greater than in the advective porosity. Culebra transport experiments conducted at two different length scales show behavior consistent with a multiple-rate, double-porosity conceptual model for Culebra transport. Tracer tests conducted on intact core samples from the Culebra show no evidence of significant diffusion, suggesting that at the core scale the Culebra can be modeled as a single-porosity medium where only the advective porosity participates in transport. Field tracer tests conducted in the Culebra show strong double-porosity behavior that is best explained using a multiple-rate model.

396
(SAND–97-0271C)
Use of MgO to mitigate the effect of microbial CO_2 production in the Waste Isolation Pilot Plant. Wang, Y. (Sandia National Labs., Albuquerque, NM (United States). WIPP Chemical and Disposal Room Dept.); Brush, L.H.; Bynum, R.V. Sandia National Labs., Albuquerque, NM (United States). 29 Jan 1997. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-970335–30: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97004382. Source: OSTI; NTIS; INIS; GPO Dep.

The Waste Isolation Pilot Plant (WIPP), located in a salt bed in southern New Mexico, is designed by US Department of Energy to demonstrate the safe and permanent disposal of design-basis transuranic waste. WIPP performance assessment requires consideration of radionuclide release in brines in the event of inadvertent human intrusion. The mobility of radionuclides depends on chemical factors such as brine pmH (-log molality of H^+) and CO_2 fugacity. According to current waste inventory estimates, a large quantity ($\sim 10^9$ moles C) of organic materials will be emplaced in the WIPP. Those organic material will potentially be degraded by halophilic or halotolerant microorganisms in the presence of liquid water in the repository, especially if a large volume of brine is introduced into the repository by human intrusions. Organic material biodegradation will produce a large amount of CO_2, which will acidify the WIPP brine and thus significantly increase the mobility of actinides. This communication addresses (1) the rate of organic material biodegradation and the quantity of CO_2 to be possibly generated, (2) the effect of microbial CO_2 production on overall WIPP performance, and (3) the mechanism of using MgO to mitigate this effect.

397
(SAND–97-0506)
Experimental determination of the shipboard fire environment for simulated radioactive material packages. Koski, J.A. (and others); Bobbe, J.G.; Arviso, M. Sandia National Labs., Albuquerque, NM (United States). Mar 1997. 155p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97005347. Source: OSTI; NTIS; INIS; GPO Dep.

A series of eight fire tests with simulated radioactive material shipping containers aboard the test ship Mayo Lykes, a break-bulk freighter, is described. The tests simulate three basic types of fires: engine room fires, cargo fires and open pool fires. Detailed results from the tests include temperatures, heat fluxes and air flows measured during the fires. The first examination of the results indicates that shipboard fires are not significantly different from fires encountered in land transport. 13 refs., 15 figs., 11 tabs.

398
(SAND–97-0794)
Waste isolation pilot plant disposal room model. Butcher, B.M. Sandia National Labs., Albuquerque, NM

(United States). Aug 1997. 127p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE98001092. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes development of the conceptual and mathematical models for the part of the Waste Isolation Pilot Plant (WIPP) repository performance assessment that is concerned with what happens to the waste over long times after the repository is decommissioned. These models, collectively referred to as the "Disposal Room Model," describe the repository closure process during which deformation of the surrounding salt consolidates the waste. First, the relationship of repository closure to demonstration of compliance with the Environmental Protection Agency (EPA) standard (40 CFR 191 Appendix C) and how sensitive performance results are to it are examined. Next, a detailed description is provided of the elements of the disposal region, and properties selected for the salt, waste, and other potential disposal features such as backfill. Included in the discussion is an explanation of how the various models were developed over time. Other aspects of closure analysis, such as the waste flow model and method of analysis, are also described. Finally, the closure predictions used in the final performance assessment analysis for the WIPP Compliance Certification Application are summarized.

399
(SAND–97-0795)
Final disposal room structural response calculations. Stone, C.M. (Sandia National Labs., Albuquerque, NM (United States). Engineering and Manufacturing Mechanics Dept.). Sandia National Labs., Albuquerque, NM (United States). Aug 1997. 47p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97007988. Source: OSTI; NTIS; INIS; GPO Dep.

Finite element calculations have been performed to determine the structural response of waste-filled disposal rooms at the WIPP for a period of 10,000 years after emplacement of the waste. The calculations were performed to generate the porosity surface data for the final set of compliance calculations. The most recent reference data for the stratigraphy, waste characterization, gas generation potential, and nonlinear material response have been brought together for this final set of calculations.

400
(SAND–97-0796)
A summary of the sources of input parameter values for the Waste Isolation Pilot Plant final porosity surface calculations. Butcher, B.M. Sandia National Labs., Albuquerque, NM (United States). Aug 1997. 195p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97008659. Source: OSTI; NTIS; INIS; GPO Dep.

A summary of the input parameter values used in final predictions of closure and waste densification in the Waste Isolation Pilot Plant disposal room is presented, along with supporting references. These predictions are referred to as the final porosity surface data and will be used for WIPP performance calculations supporting the Compliance Certification Application to be submitted to the U.S. Environmental Protection Agency. The report includes tables and list all of the input parameter values, references citing their source, and in some cases references to more complete descriptions of considerations leading to the selection of values.

401
(SAND–97-1130)
Comments on a paper tilted 'The sea transport of vitrified high-level radioactive wastes: Unresolved safety issues'. Sprung, J.L. (and others); McConnell, P.E.; Nigrey, P.J.; Ammerman, D.J. Sandia National Labs., Albuquerque, NM (United States). May 1997. 35p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97006215. Source: OSTI; NTIS; INIS; GPO Dep.

The cited paper estimates the consequences that might occur should a purpose-built ship transporting Vitrified High Level Waste (VHLW) be involved in a severe collision that causes the VHLW canisters in one Type-B package to spill onto the floor of a major ocean fishing region. Release of radioactivity from VHLW glass logs, failure of elastomer cask seals, failure of VHLW canisters due to stress corrosion cracking (SCC), and the probabilities of the hypothesized accident scenario, of catastrophic cask failure, and of cask recovery from the sea are all discussed.

402
(SAND–97-1425)
Verification of the integrity of barriers using gas diffusion. Ward, D.B. (SPECTRA Research Inst., Albuquerque, NM (United States)); Williams, C.V. Sandia National Labs., Albuquerque, NM (United States). Jun 1997. 50p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97007818. Source: OSTI; NTIS; INIS; GPO Dep.

In-situ barrier materials and designs are being developed for containment of high risk contamination as an alternative to immediate removal or remediation. The intent of these designs is to prevent the movement of contaminants in either the liquid or vapor phase by long-term containment, essentially buying time until the contaminant depletes naturally or a remediation can be implemented. The integrity of the resultant soil-binder mixture is typically assessed by a number of destructive laboratory tests (leaching, compressive strength, mechanical stability with respect to wetting and freeze-thaw cycles) which as a group are used to infer the likelihood of favorable long-term performance of the barrier. The need exists for a minimally intrusive yet quantifiable methods for assessment of a barrier's integrity after emplacement, and monitoring of the barrier's performance over its lifetime. Here, the authors evaluate non-destructive measurements of inert-gas diffusion (specifically, SF_6) as an indicator of waste-form integrity. The goals of this project are to show that diffusivity can be measured in core samples of soil jet-grouted with Portland cement, validate the experimental method through measurements on samples, and to calculate aqueous diffusivities from a series of diffusion measurements. This study shows that it is practical to measure SF_6 diffusion rates in the laboratory on samples of grout (Portland cement and soil) typical of what might be used in a barrier. Diffusion of SF_6 through grout (Portland cement and soil) is at least an order of magnitude slower than through air. The use of this tracer should be sensitive

to the presence of fractures, voids, or other discontinuities in the grout/soil structure. Field-scale measurements should be practical on time-scales of a few days.

403
(SAND–97-2028)
Final report of the environmental measurement-while-drilling-gamma ray spectrometer system technology demonstration at the Savannah River Site F-Area Retention Basin. Lockwood, G.J.; Normann, R.A.; Williams, C.V. Sandia National Labs., Albuquerque, NM (United States). Aug 1997. 34p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97009201. Source: OSTI; NTIS; INIS; GPO Dep.

The environmental measurement-while-drilling-gamma ray spectrometer (EMWD-GRS) system represents an innovative blend of new and existing technology that provides real-time environmental and drill bit data during drilling operations. The EMWD-GRS technology was demonstrated at Savannah River Site F-Area Retention Basin. The EMWD-GRS technology demonstration consisted of continuously monitoring for gamma-radiation-producing contamination while drilling two horizontal boreholes below the backfilled retention basin. These boreholes passed near previously sampled vertical borehole locations where concentrations of contaminant levels of cesium had been measured. Contaminant levels continuously recorded by the EMWD-GRs system during drilling are compared to contaminant levels previously determined through quantitative laboratory analysis of soil samples.

404
(SAND–97-2320/1)
Final report: survey and removal of radioactive surface contamination at environmental restoration sites, Sandia National Laboratories/New Mexico. Volume 1. Lambert, K.A. (Brown and Root Environmental, Albuquerque, NM (United States)); Mitchell, M.M.; Jean, D.; Brown, C.; Byrd, C.S. Sandia National Labs., Albuquerque, NM (United States). Sep 1997. 301p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE98000780. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the survey and removal of radioactive surface contamination at Sandia's Environmental Restoration (ER) sites. Radiological characterization was performed as a prerequisite to beginning the Resource Conservation and Recovery Act (RCRA) corrective action process. The removal of radioactive surface contamination was performed in order to reduce potential impacts to human health and the environment. The predominant radiological contaminant of concern was depleted uranium (DU). Between October 1993 and November 1996 scanning surface radiation surveys, using gamma scintillometers, were conducted at 65 sites covering approximately 908 acres. A total of 9,518 radiation anomalies were detected at 38 sites. Cleanup activities were conducted between October 1994 and November 1996. A total of 9,122 anomalies were removed and 2,072 waste drums were generated. The majority of anomalies not removed were associated with a site that has subsurface contamination beyond the scope of this project. Verification soil samples (1,008 total samples) were collected from anomalies during cleanup activities and confirm that the soil concentration achieved in the field were far below the target cleanup level of 230 pCi/g of U-238 (the primary constituent of DU) in the soil. Cleanup was completed at 21 sites and no further radiological action is required. Seventeen sites were not completed since cleanup activities wee precluded by ongoing site activity or were beyond the original project scope.

405
(SAND–97-2320/2)
Final report: survey and removal of radioactive surface contamination at environmental restoration sites, Sandia National Laboratories/New Mexico. Volume 2. Lambert, K.A. (Brown and Root Environmental, Albuquerque, NM (United States)); Mitchell, M.M.; Jean, D.; Brown, C.; Byrd, C.S. Sandia National Labs., Albuquerque, NM (United States). Sep 1997. 1190p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE98000781. Source: OSTI; NTIS; INIS; GPO Dep.

This report contains the Appendices A-L including Voluntary Corrective Measure Plans, Waste Management Plans, Task-Specific Health and Safety Plan, Analytical Laboratory Procedures, Soil Sample Results, In-Situ Gamma Spectroscopy Results, Radionuclide Activity Summary, TCLP Soil Sample Results, Waste Characterization Memoranda, Waste Drum Inventory Data, Radiological Risk Assessment, and Summary of Site-Specific Recommendations.

406
(USGS-OFR–96-170)
Micrometeorological data for energy-budget studies near Rogers Spring, Ash Meadows National Wildlife Refuge, Nye County, Nevada, 1994. Nichols, W.D.; Rapp, T.R. USDOE Nevada Operations Office, Las Vegas, NV (United States). [1996]. 52p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AI08-91NV11040. Order Number DE96009969. Source: OSTI; NTIS; INIS; GPO Dep.

Contains diskette.

The data were collected at two sites near Rogers Spring for use in energy-budget studies beginning in 1994. The data collected at each site included net radiation, air temperature at two heights, dew- point temperature at two heights, windspeed at two heights, soil heat flux, and soil temperature in the interval between the land surface and the buried heat-flux plates.

407
(WHC-SA–3037-FP)
The regulatory approach for spent nuclear storage and conditioning facility: The Hanford example. Sellers, E.D. (USDOE Richland Operations Office, WA (United States)); Mooers, G.C. III; Daschke, K.D.; Driggers, S.A.; Timmins, D.C. Westinghouse Hanford Co., Richland, WA (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC06-87RL10930. (CONF-960212–54: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006879. Source: OSTI; NTIS; INIS; GPO Dep.

Hearings held before the House Subcommittee on Energy and Mineral Resources in March 1994, requested that officials of federal agencies and other experts explore options for providing regulatory oversight of the US Department of Energy (DOE) facilities and operations. On January, 25, 1995, the DOE, supported by the White House Office of Environmental Quality and the Office of Management and Budget, formally initiated an Advisory Committee on External Regulation of DOE Nuclear Safety. In concert with this initiative and public opinion, the DOE Richland Operations Office has initiated the K Basin Spent Nuclear Fuel Project – Regulatory Policy. The DOE has established a program to move the spent nuclear fuel presently stored in the K Basins to a new storage facility located in the 200 East Area of the Hanford Site. New facilities will be designed and constructed for safe conditioning and interim storage of the fuel. In implementing this Policy, DOE endeavors to achieve in these new facilities "nuclear safety equivalency" to comparable US Nuclear Regulatory Commission (NRC)-licensed facilities. The DOE has established this Policy to take a proactive approach to better align its facilities to the requirements of the NRC, anticipating the future possibility of external regulation. The Policy, supplemented by other DOE rules and directives, form the foundation of an enhanced regulatory, program that will be implemented through the DOE K Basin Spent Nuclear Fuel Project (the Project).

408
(WSRC-MS–95-0421)
Operation of a bushing melter system designed for actinide vitrification. Ramsey, W.G. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-960212–50: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006491. Source: OSTI; NTIS; INIS; GPO Dep.

The Westinghouse Savannah River Company is developing a melter system to vitrify actinide materials. The melter system will used to vitrify the americium and curium solution which is currently stored in one of the Savannah River Site's (SRS) processing canyons. This solution is one of the materials designated by the Defense Nuclear Facilities Safety Board (DNFSB) to be dispositioned as part of the DNFSB recommendation 94-1. The Am/Cm solution contains an extremely large fraction (>2 kilograms of Cm and 10 kilograms of Am) of t he United States's total inventory of both elements. They have an estimated value on the order of one billion dollars - if they are processed through the DOE Isotope Sales program at the Oak Ridge National Laboratory. It is therefore deemed highly desirable to transfer the material to Oak Ridge in a form which can allow for recovery of the material. A commercial glass composition has been demonstrated to be compatible with up to 40 weight percent of the Am/Cm solution contents. This glass is also selectively attacked by nitric acid. This allows the actinide to be recovered by common separation processes.

409
(WSRC-MS–96-0119)
Heat transfer aspects of interim dry storage of aluminum-clad spent nuclear fuel. Guerrero, H.N.; Eghbali, D.; Lee, S.Y.; Steeper, T.J. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-9606116–49: *Annual* meeting of the American Nuclear Society (ANS), Reno, NV (United States), 16-20 Jun 1996). Order Number DE96011040. Source: OSTI; NTIS; INIS; GPO Dep.

The consequences of some special characteristics of aluminum-clad DOE spent nuclear fuel and special issues regarding DOE requirements on the heat transfer aspects of there interim dry storage are discussed. For the objective of future licensing of the dry storage facility, a spent fuel technology program is initiated to obtain prototypical data for benchmarking computer codes. This program consisted of separate effects tests on full scale mockup of a Materials Testing Reactor (MTR) spent fuel assembly and integral canister tests of a canister containing mockup fuel assembles in a wind tunnel. The effects of canister power, air flow velocity, type of fill gas, canister orientation and vacuum conditions were obtained. Comparisons of pretest predictions from candidate computational fluid dynamics codes with the test results were excellent.

410
(WSRC-MS–96-0142)
Estimation of stresses near edges and corners in large spent fuel shipping containers. Gupta, N.K. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-960706–19: American Society of Mechanical Engineers (ASME) pressure vessels and piping conference, Montreal (Canada), 21-26 Jul 1996). Order Number DE96011039. Source: OSTI; NTIS; INIS; GPO Dep.

Spent fuel is transported in shipping containers which are lined with thick layers of lead to minimize radiation levels. The lead is poured in the space formed by the inner and outer steel walls of the container. This type of construction results in well defined edges and corners. Current regulations require detailed structural evaluation of these containers to meet the established guidelines. These regulations also require that any fatigue evaluation consider a stress concentration factor of 4 to 5 to determine the fatigue life of the shipping container. These containers develop large thermal stresses near edges and corners due to large differences in thermal coefficients of expansion between lead and steel. In this paper, the discontinuity formed by the welds in the edges and corners is treated as a groove and the existing formulations of deep grooves and notches are used to calculate a realistic value of the stress concentration factor.

411
(WSRC-RP–97-292)
Stainless Steel RSM Beneficial Reuse technical feasibility to business reality. Boettinger, W.L.; Mishra, G. Westinghouse Savannah River Co., Aiken, SC (United States). Aug 1997. 30p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. (CONF-970830–: Beneficial Reuse '97: 5. annual conference on the recycle and reuse of radioactive scrap metal, Knoxville, TN (United States), 5-7 Aug 1997). Order Number DE97053832. Source: OSTI; NTIS; INIS; GPO Dep.

The Stainless Steel Beneficial Reuse Program began in 1994 as a demonstration funded by the DOE Office of Science and Technology. The purpose was to assess the practicality of stainless steel radioactive scrap metal (RSM) recycle. Technical feasibility has been demonstrated through the production of a number of products made from recycled RSM. A solid business foundation is yet to be achieved. However, a business environment is beginning to develop as multiple markets and applications for RSM are surfacing around the Complex. The criteria for a successful business reality includes: - affordable programs, - a continuing production base from which to expand, - real products needs, - adequate RSM supply, and - a multi-year program This program currently sponsored by SRS and DOE-ORO to fabricate Defense Waste Processing Facility (DWPF) canisters from RSM provides an activity that satisfies these criteria. The program status is discussed. A comparison of the cost of DWPF canisters fabricated from recycled RSM and virgin metal is presented. The comparison is a function of several factors: disposal costs, the fabrication cost of virgin metal canisters, the fabrication cost of recycled RSM canisters, free release decontamination costs, and the cost to accumulate the RSM. These variables are analyzed and the relationship established to show the break-even point for various values of each parameter.

412
(WSRC-TR–96-0350)
Summary of three dimensional pump testing of a fractured rock aquifer in the western Siberian Basin. Nichols, R.L. (Westinghouse Savannah River Co., Aiken, SC (United States)); Looney, B.B.; Eddy-Dilek, C.A.; Drozhko, E.G.; Glalolenko, Y.V.; Mokrov, Y.G.; Ivanov, I.A.; Glagolev, A.V.; Vasil'kova, N.A. Westinghouse Savannah River Co., Aiken, SC (United States). 30 Oct 1996. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States);Russian Atomic Energy Commission, Moscow (Russian Federation). DOE Contract AC09-96SR18500. Order Number DE97004960. Source: OSTI; NTIS; INIS; GPO Dep.

A group of scientists from the Savannah River Technology Center and Russia successfully completed a 17 day field investigation of a fractured rock aquifer at the MAYAK PA nuclear production facility in Russia. The test site is located in the western Siberian Basin near the floodplain of the Mishelyak river. The fractured rock aquifer is composed of orphyrites, tuff, tuffbreccia and lava and is overlain by 0.5–12 meters of elluvial and alluvial sediments. A network of 3 uncased wells (176, 1/96, and 2/96) was used to conduct the tests. Wells 176 and 2/96 were used as observation wells and the centrally located well 1/96 was used as the pumping well. Six packers were installed and inflated in each of the observation wells at a depth of up to 85 meters. The use of 6 packers in each well resulted in isolating 7 zones for monitoring. The packers were inflated to different pressures to accommodate the increasing hydrostatic pressure. A straddle packer assembly was installed in the pumping well to allow testing of each of the individual zones isolated in the observation wells. A constant rate pumping test was run on each of the 7 zones. The results of the pumping tests are included in Appendix A. The test provided new information about the nature of the fractured rock aquifers in the vicinity of the Mishelyak river and will be key information in understanding the behavior of contaminants originating from process wastes discharged to Lake Karachi. Results from the tests will be analyzed to determine the hydraulic properties of different zones within the fractured rock aquifer and to determine the most cost effective clean-up approach for the site.

413
(WSRC-TR–96-0416)
Evaluation of the Purge Water Management System (PWMS) monitor well sampling technology at SRS. Hiergesell, R.A. (Westinghouse Savannah River Company, AIKEN, SC (United States)); Cardoso-Neto, J.E.; Williams, D.W. Westinghouse Savannah River Co., Aiken, SC (United States). 2 Jan 1997. 26p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-89SR18035. Order Number DE97060106. Source: OSTI; NTIS; INIS; GPO Dep.

Due to the complex issues surrounding Investigation Derived Waste (IDW) at SRS, the Environmental Restoration Division has been exploring new technologies to deal with the purge water generated during monitoring well sampling. Standard procedures for sampling generates copious amounts of purge water that must be managed as hazardous waste, when containing hazardous and/or radiological contaminants exceeding certain threshold levels. SRS has obtained Regulator approval to field test an innovative surface release prevention mechanism to manage purge water. This mechanism is referred to as the Purge Water Management System (PWMS) and consists of a collapsible bladder situated within a rigid metal tank.

414
(WSRC-TR–97-0260)
Accelerator production of tritium pollution prevention design assessment. Reynolds, R. (Westinghouse Savannah River Co., Aiken, SC (United States)); Nowacki, P.; Sheetz, S.O.; Lanik, P. Westinghouse Savannah River Co., Aiken, SC (United States). 18 Sep 1997. 200p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98051761. Source: OSTI; NTIS; INIS; GPO Dep.

This Pollution Prevention Design Assessment (PPDA) provides data for cost-benefit analysis of the potential environmental impact of the APT, is an integral part of pollution prevention/waste minimization, and is required by DOE for any activity generating radioactive, hazardous, and mixed wastes. It will also better position the APT to meet future requirements, since it is anticipated that regulatory and other requirements will continue to become more restrictive and demanding.

415
(Y/ER–276)
Surveillance and maintenance report on decontamination and decommissioning and remedial action activities at the Oak Ridge Y-12 plant, Oak Ridge, Tennessee. Fiscal year 1996. King, H.L.; Sollenberger, M.L.; Sparkman, D.E.; Reynolds, R.M.; Wayland, G.S. Oak Ridge Y-12 Plant, TN (United States). Dec 1996. 49p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97001828. Source: OSTI; NTIS; INIS; GPO Dep.

The Oak Ridge Y-12 Plant Decontamination and Decommissioning (D&D) and Remedial Action (RA) programs are part of the Environmental Restoration (ER) Division and are funded by the Office of Environmental Management (EM-40). Building 9201-4 (known as Alpha-4), three sites located within Building 9201-3 (the Oil Storage Tank, the Molten Salt Reactor Experiment Fuel Handling Facility, and the Coolant Salt Technology Facility), and Building 9419-1 (the Decontamination Facility) are currently the facilities at the Y-12 Plant included in the D&D program. The RA program provides surveillance and maintenance (S&M) and program management of ER sites at the Y-12 Plant, including selected sites listed in Appendix C of the Federal Facilities Agreement (FFA), sites listed in the Hazardous and Solid Waste Amendment (HSWA) permit Solid Waste Management Unit (SWM-U) list, and sites currently closed or undergoing post-closure activities under the Resource Conservation and Recovery Act of 1976 (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). This report communicates the status of the program plans and specific S&M activities for the D&D and RA programs.

416
(Y/ER–280)
Quality Assurance Plan for the Upper East Fork Poplar Creek Characterization Area, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). Dec 1996. 26p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002414. Source: OSTI; NTIS; INIS; GPO Dep.

This quality assurance plan summarizes requirements for conducting work on the Upper East 9 Fork Poplar Creek (UEFPC) Characterization Area (CA). The reader is referred to the Expanded Task Work Agreement for Upper East Fork Poplar Creek Characterization Area, Remedial Investigation/ Feasibility Study (RI/FS) for details regarding the activities, roles, and responsibilities summarized here. UEFPC is designated a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site and thus requires a remedial investigation (RI) and a feasibility study (FS). The RI objectives are to evaluate the nature and extent of known and suspected contaminates, to provide data to perform baseline ecological and human health risk assessments, and to support development and evaluation of remedial alternatives for the FS,. Existing data will be used as much as possible. Additional sampling may be required to fill data gaps. The goal of the RI is to prioritize the major sources of contaminants to exit pathways and to understand their characteristics for risk characterization and development of remedial alternatives. The FS objectives are to investigate technologies and develop and evaluate alternatives based on 2031 CERCLA guidance.

417
(Y/ER–292)
Hydraulic testing plan for the Bear Creek Valley Treatability Study, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). Sep 1997. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OS21400. Order Number DE97009320. Source: OSTI; NTIS; INIS; GPO Dep.

The Bear Creek Valley (BCV) Treatability Study is intended to provide site-specific data defining potential treatability technologies applicable to contaminated groundwater and surface water. The ultimate goal of this effort is to install a treatment system that will remove uranium, technetium, nitrate, and several metals from groundwater before it reaches Bear Creek. This project directly supports the BCV Feasibility Study. Part of the Treatability Study, Phase II Hydraulic Performance Testing, will produce hydraulic and treatment performance data required to design a long-term treatment system. This effort consists of the installation and testing of two groundwater collection systems: a trench in the vicinity of GW-835 and an angled pumping well adjacent to NT-1. Pumping tests and evaluations of gradients under ambient conditions will provide data for full-scale design of treatment systems. In addition to hydraulic performance, in situ treatment chemistry data will be obtained from monitoring wells installed in the reactive media section of the trench. The in situ treatment work is not part of this test plan. This Hydraulic Testing Plan describes the location and installation of the trench and NT-1 wells, the locations and purpose of the monitoring wells, and the procedures for the pumping tests of the trench and NT-1 wells.

418
(Y/ER/MS–3)
Post construction report for Lower East Fork Poplar Creek Project, Phase 1, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States); Foster-Wheeler Environmental Corp., Oak Ridge, TN (United States). Nov 1996. 34p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002918. Source: OSTI; NTIS; INIS; GPO Dep.

This Phase 1 Remedial Action (RA) effort was conducted in accordance with the Record of Decision (ROD) for Lower East Fork Poplar Creek (LEFPC) as a Comprehensive Environmental Response, Compensation, and Liability Act action. The LEFPC, Phase 1 RA removed approximately 5,560 yd^3 of mercury-contaminated soils, $\geq$ 400 ppm, from selected portions of the National Oceanographic and Atmospheric Administration (NOAA) site LEFPC floodplain from July 8, 1996–September 14, 1996. During excavation activities, pockets of elevated radiologically contaminated soils (greater than 35 pCi/g) were located by the continuous monitoring of the excavation areas and contaminated soils with radiological monitoring instruments. Through characterization sampling it has been determined that $\sim$ 90 yd^3 are less than 35 pCi/g uranium contaminated and will be transported to the Y-12 Landfill V for disposal and the remaining $\sim$40 yd^3 do not meet the WAC for radiological constituents included in the Special Waste Permit for Landfill V. The radiologically contaminated soil will be placed in 21st Century containers for storage at the K-25 site.

419
(Y/ER/MS–11)
Best management practices plan for installation of and monitoring at temporary Weirs at NT-4, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). Jun 1997. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97006918. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the installation of temporary weirs at NT-4 is to collect empirical surface water discharge data for the tributary during baseflow conditions and following rainfall events, during the spring and summer of 1997 in support of the Department of Energy's (DOE's) Oak Ridge Reservation Waste Management Alternatives Evaluation project. The duration of surface-water monitoring activities is not planned to exceed 6 months. A minimum of four temporary weirs will be installed along the length of NT-4 in the locations indicated on Attachment A. The design specifications and locations for the weirs will be provided by the DOE prime contractor for the Oak Ridge Reservation Waste Management Alternatives Evaluation project. The weirs will be fabricated by the Y-12 labor forces of Lockheed Martin Energy Systems (LMES). The Environmental Compliance Organization (ECO) of LMES will perform data collection in addition to weir installation, inspection, maintenance, and removal. Flow meters that collect data at five minute intervals will be installed on each weir and visual measurements using staff gauges mounted on each weir will also be performed.

SUBSURFACE CONTAMINANTS

420
(ANL/CMT/CP–89578)
SEM/EDS analysis of boron in waste glasses with ultra-thin window detector and digital pulse processor. Luo, J.S.; Wolf, S.F.; Ebert, W.L.; Bates, J.K. Argonne National Lab., IL (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9608108–2: 30. annual meeting of Microbeam Analysis Society, Minneapolis, MN (United States), 11-15 Aug 1996). Order Number DE96012707. Source: OSTI; NTIS; INIS; GPO Dep.

Analysis of boron in waste glasses and in the reaction products that form during the reaction of glass is important for understanding the reaction kinetics and mechanism of glass corrosion. Two borosilicate waste glasses (1.55 and 3.47 wt% B) have been analyzed by SEM/EDS. The 1.55 wt% is the lowest B concentration detected with EDS. However, the B peaks severely overlap with the C peaks due to the carbon films used for conductive layers, but this problem can be solved by subtracting the C peaks, and possibly even lower B content could be detected by EDS with the digital pulse processor.

421
(ANL/CMT/CP–89579)
Corroded spent nuclear fuel examined with EELS. Buck, E.C.; Dietz, N.L.; Bates, J.K. Argonne National Lab., IL (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9608108–1: 30. annual meeting of Microbeam Analysis Society, Minneapolis, MN (United States), 11-15 Aug 1996). Order Number DE96012706. Source: OSTI; NTIS; INIS; GPO Dep.

Samples, exposed to dripping simulated groundwater, were prepared by ultramicrotomy for TEM. The alteration phase was identified as a layered Cs Mo uranyl oxide hydrate, structurally related to phases of the becquerelite group uranium minerals. Second-difference EELS of rare earth elements within the corroded particle detected low levels of TRUs.

422
(ANL/CMT/CP–89865)
Chemistry and kinetics of waste glass corrosion. Bates, J.K. Argonne National Lab., IL (United States). 1996. 3p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9605162–1: National Academy of Sciences (NAS) on glass as a waste form and vitrification technology: an international workshop, Washington, DC (United States), 13 May 1996). Order Number DE96009424. Source: OSTI; NTIS; INIS; GPO Dep.

Under repository disposal conditions, the reaction of glass with water comprises the source term for release of radionuclides to the near-field environment. An understanding of glass reaction and the manner by which radionuclides are released is needed to design the waste package and to evaluate the total performance of the repository. The ASTM Standard C-1174-91 provides a general methodology for obtaining information related to the behavior of glass. This paper reviews the application of this standard to glass reaction. In the first step in the ASTM approach, the researcher identifies the materials and the conditions under which the long-term behavior is to be determined. Glass compositions have undergone a genesis over the past 15 years in response to concerns about feed streams, processing, and durability. A range of borosilicate compositions has been identified, but as new applications for vitrification occur, for example, immobilization of weapons plutonium and residue from plutonium processing, different compositions must be evaluated. The repository environment depends on the spatial emplacement of waste containers (glass and spent fuel), and both "hot" and "cold" scenarios have been proposed for the Yucca Mountain site. Regardless of the exact configuration, the near-field hydrology is expected to be unsaturated: that is, the waste packages are contacted initially by water vapor, and ultimately by small amounts of dripping or standing water. The behavior of glass can be studied as a function of composition within the constraints the environmental conditions place on the physical parameters that affect glass reaction (temperature, radiation field, groundwater composition, etc.). In the second step, the researcher reviews the literature and proposes a reaction pathway by which glass reacts in an unsaturated environment.

423
(ANL/EMO/RP–91327)
Preliminary Engineering Report contaminated groundwater seeps 317/319/ENE area. Argonne National Lab., IL (United States). 1 Oct 1996. 72p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97000714. Source: OSTI; NTIS; INIS; GPO Dep.

When the Resource Conservation and Recovery Act Facility Investigation (RFI) in the 317/319/ENE Area of Argonne National Laboratory-East (ANL-E) was being completed, groundwater was discovered moving to the surface through a series of seeps. The seeps are located approximately 600 ft south of the ANL fence line in Waterfall Glen Forest Preserve. Samples of this water were collected and analyzed for selected parameters. Two of five seeps sampled were found to contain detectable levels of organic contaminants. Three chemical species were identified: chloroform (14-25 μg/L), carbon tetrachloride (56-340 μg/L), and

tetrachloroethylene (3-6 μg/L). The other seeps did not contain detectable levels of volatile organic compounds (VOCs). The water issuing from these two contaminated seeps flows into a narrow ravine, where it is visible as a trickle of water flowing through sand and gravel deposits on the floor of the ravine. Approximately 100-ft downstream of the seep area, the contaminated water is no longer visible, having drained back into the soil in the bed of the ravine. Figure 1 shows the location of the 317/319/ENE Area in relation to the ANL-E site and the Waterfall Glen Forest Preserve.

424
(ANL/EMO/RP–91390)
Inspection and monitoring plan, contaminated groundwater seeps 317/319/ENE Area, Argonne National Laboratory. Argonne National Lab., IL (United States). 11 Oct 1996. 25p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97002325. Source: OSTI; NTIS; INIS; GPO Dep.

During the course of completing the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) in the 317/319/East-Northeast (ENE) Area of Argonne National Laboratory-East (ANL-E), groundwater was discovered moving to the surface through a series of groundwater seeps. The seeps are located in a ravine approximately 600 ft south of the ANL-E fence line in Waterfall Glen Forest Preserve. Samples of the seep water were collected and analyzed for selected parameters. Two of the five seeps sampled were found to contain detectable levels of organic contaminants. Three chemical species were identified: chloroform (14–25 { *micro*} g/L), carbon tetrachloride (56–340 { micro} g/L), and tetrachloroethylene (3–6 { micro} g/L). The other seeps did not contain detectable levels of volatile organics. The nature of the contaminants in the seeps will also be monitored on a regular basis. Samples of surface water flowing through the bottom of the ravine and groundwater emanating from the seeps will be collected and analyzed for chemical and radioactive constituents. The results of the routine sampling will be compared with the concentrations used in the risk assessment. If the concentrations exceed those used in the risk assessment, the risk calculations will be revised by using the higher numbers. This revised analysis will determine if additional actions are warranted.

425
(ANL/ER/CP–89797)
Incorporation of pollution prevention principles in environmental methods. Erickson, M.D.; Alvarado, J.S.; Lu, C.-S.; Peterson, D.P.; Silzer, J. Argonne National Lab., IL (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9607123–3: 12. annual waste testing and quality assurance symposium, Washington, DC (United States), 22-24 Jul 1996). Order Number DE96012687. Source: OSTI; NTIS; GPO Dep.

The principles of pollution prevention (P2) have not been sufficiently incorporated into analytical methods. In this paper, we focus on the needs for and the benefits of incorporating the principles of P2 into environmental analytical methods.

426
(ANL/ES/CP–91223)
An innovative funnel and gate approach to groundwater remediation. Johnson, D.O. (Argonne National Lab., IL (United States). Energy Systems Div.); Wilkey, M.L.; Willis, J.M.; Breaux, L.; McKinsey, T. Argonne National Lab., IL (United States). [1996]. 6p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9609162–1: 3. international symposium and exhibition on environmental contamination in Central and Eastern Europe, Warsaw (Poland), 10-13 Sep 1996). Order Number DE97000903. Source: OSTI; NTIS; INIS; GPO Dep.

The US Department of Energy, office of Science and Technology (EM-50) sponsored a demonstration project of the Barrier Member Containment Corporation's patented EnviroWall™ system at the Savannah River site. With this system, contaminated groundwater can be funneled into a treatment system without pumping the contaminated water to the surface. The EnviroWall™ barrier and pass-through system, an innovative product of sic years of research and development, provides a means to enhance groundwater flow on the upgradient side of an impermeable wall and direct it to an in situ treatment system. The EnviroWall™ system is adaptable to most site conditions. Remedial applications range form plume containment to more robust designs that incorporate groundwater manipulation coupled with in situ treatment. Several key innovations of the EnviroWall™ system include the following: a method for guide box installation; a means for using interlocking seals at vertical seams; a down-hole video camera for inspecting seams and panels, installation of horizontal- and vertical-collection systems; installation of vertical monitoring wells and instrumentation on each side of the barrier; site-specific backfill design; and a pass-through system for funneling groundwater into a treatment system.

427
(ANL/ESD/TM–139)
Assessing environmental risk of the retired filter bed area, Battelle West Jefferson. Miller, S.F. (and others); Thompson, M.D.; Glennon, M.A. Argonne National Lab., IL (United States). Apr 1997. 152p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97009355. Source: OSTI; NTIS; INIS; GPO Dep.

Initial investigations conducted by the U.S. Department of Energy, Chicago Operations Office, and by Argonne National Laboratory used seismic refraction profiling, electrical resistivity depth sounding, conductivity profiling, magnetic gradiometry, and ground-penetrating radar to study environmental geophysics in the area of the Battelle West Jefferson site's radiologically contaminated retired filter beds. The investigators used a combination of nonintrusive technologies and innovative drilling techniques to assess environmental risk at the filter beds and to improve understanding of the geology of the Big Darby Creek floodplain. The geophysical investigation, which showed that the preferred groundwater pathway is associated with a laterally extensive deposit of silty sand to sand that is less than 12 ft deep in the floodplain area, also guided the location of cone penetrometer test sites and piezometer installation. Cone penetrometer testing was useful for comparing continuous logging data with surface geophysical data in establishing correlations among unconsolidated materials.

428
(BHI–00536-Rev.)
Final report for the dismantlement and interim stabilization of the 107-C, 107-KE, and 107-KW retention basins. Smith, D.L. Bechtel Hanford, Inc., Richland, WA (United States). [1996]. 45p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE96005930. Source: OSTI; NTIS; INIS; GPO Dep.

This final report provides a general description of the activities performed to dismantle and interim stabilize the 107-C, 107-KE, and 107-KW retention basins. These activities were performed as part of the Radiation Area Remedial Action Project. Dismantlement and interim stabilization were required to minimize wind and biotic transport vectors at these sites until final remediation occurs.

429
(BHI–00616-Rev.)
216-T-4 interim stabilization final report. Smith, D.L. Bechtel Hanford, Inc., Richland, WA (United States). [1996]. 47p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE96005931. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides a general description of the activities performed for the interim stabilization of the 216-T-4-1 ditch, 216-T-4-2 ditch, and 216-T-4-2 pond. Interim stabilization was required to reduce the amount of surface-contaminated acres and to minimize the migration of radioactive contamination. Work associated with the 216-T4-1 ditch and 216-T-4-2 pond was performed by the Radiation Area Remedial Action (RARA) Project. Work associated with the 216-T-4-2 ditch was done concurrently but was funded by Westinghouse Hanford Company (WHC) Tank Waste Remediation Systems (TWRS).

430
(BHI–00952-02)
200-ZP-1 Interim remedial measure. Quarterly progress report, October–December 1996. Buckmaster, M.A. (and others); Ford, B.H.; McMahon, W.J. Bechtel Hanford, Inc., Richland, WA (United States). Mar 1997. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052431. Source: OSTI; NTIS; GPO Dep.

A groundwater pump-and-treat system is being operated at the 200-ZP-1 Operable Unit under authority of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement). The purpose of the pump-and-treat system is (1) to minimize further migration of the high-concentration portion of the carbon tetrachloride plume and the co-contaminants chloroform and trichloroethylene in the 200-ZP-1 Operable Unit; and (2) to provide data to evaluate final remedy selection. This report summarizes and evaluates treatment, hydraulic, and hydrochemistry data collected for the 200-ZP-1 interim remedial measure from October through December 1996.

431
(BHI–00967-Rev.1)
Assessment of the chromium plume west of the 100-D/DR reactors. Connelly, M.P. (CH2M Hill Hanford, Inc. (United States)). Bechtel Hanford, Inc., Richland, WA (United States). Jun 1997. 48p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97053964. Source: OSTI; NTIS; INIS; GPO Dep.

Sampling of the Columbia River substrate pore water in November 1995 revealed chromium concentrations in excess of 630 g/L in the river bed offshore of the 100-D/DR area. Shoreline drive point sampling at multiple depths also revealed chromium concentrations increasing with depth to a maximum of 869 g/L at approximately 3.05 m below the water table. Because the 1907-DR Process Sewer Outfall is located at the point where the highest concentrations of chromium were found, it was thought that the sewer outfall could be the source of chromium for these drive point and pore water samples. Historical records show that the outfall structure was demolished in fiscal year 1978. The area was then covered and leveled to blend in with the adjacent riverbank.

432
(BHI–00971)
Revegetation manual for the environmental restoration contractor. McLendon, T.; Redente, E.F. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 226p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052373. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this manual is to provide guidance and general guidelines for the revegetation of remediation waste sites and other disturbed areas on the Hanford Site. Specific revegetation plans will be developed using guidance from this manual. Locations, resources, and funding will dictate the specific revegetation design at each disturbed area. Disturbances have occurred to some of the ecological communities of the Hanford Site. Many of these disturbances are the result of operations of the Hanford Site, including Comprehensive Environmental Response, Compensation, and Liability Act of 1980 waste sites on small portions of the Hanford Site. There were, however, extensive disturbances to the native vegetation prior to operations of the facility. These resulted from cultivation, grazing, fire, and the introduction of exotics. Revegetation planning must take into account these early disturbances, as well as the later ones.

433
(BHI–00972)
Remedial action and waste disposal project – 100-DR-1 remedial action readiness assessment report. April, J.G.; Ard, J.A.; Corpuz, F.M.; DeMers, S.K.; Donahoe, R.L.; Frank, J.M.; Hobbs, B.J.; Roeck, F.V. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 147p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052368. Source: OSTI; NTIS; INIS; GPO Dep.

This readiness assessment report presents the results of the project readiness assessment for the 100-DR-1 source sites remediation. The assessment was conducted at the conclusion of a series of project activities that began in August 1996. These activities included confirming the completion of project-specific procedures, training of staff, obtaining support equipment, receipt of subcontractor submittals, and mobilization and construction of site support systems.

434
(BHI–01001)
Site specific health and safety plan for drilling in support of in situ redox manipulation. Tuttle, B.G. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052429. Source: OSTI; NTIS; INIS; GPO Dep.

This document contains the Site Specific Health and Safety Plan for Drilling in support of the In Situ REDOX Manipulation in the 100-HR-3 Operable Unit. Approximately eight wells will be drilled in the 100-D/DR Area using rotary, sonic, or cable tool drilling methods. Split-spoon sampling will be done in conjunction with the drilling. The drilling may be spread out over several months. Included in this document are checklists for health and safety procedures.

435
(BNL–63797)
Subsurface barrier integrity verification using perfluorocarbon tracers. Sullivan, T.M.; Heiser, J.; Milian, L.; Senum, G. Brookhaven National Lab., Upton, NY (United States). Dec 1996. 52p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC02-76CH00016. Order Number DE97002798. Source: OSTI; NTIS; GPO Dep.

Subsurface barriers are an extremely promising remediation option to many waste management problems. Gas phase tracers include perfluorocarbon tracers (PFT's) and chlorofluorocarbon tracers (CFC's). Both have been applied for leak detection in subsurface systems. The focus of this report is to describe the barrier verification tests conducted using PFT's and analysis of the data from the tests. PFT verification tests have been performed on a simulated waste pit at the Hanford Geotechnical facility and on an actual waste pit at Brookhaven National Laboratory (BNL). The objective of these tests were to demonstrate the proof-of-concept that PFT technology can be used to determine if small breaches form in the barrier and for estimating the effectiveness of the barrier in preventing migration of the gas tracer to the monitoring wells. The subsurface barrier systems created at Hanford and BNL are described. The experimental results and the analysis of the data follow. Based on the findings of this study, conclusions are offered and suggestions for future work are presented.

436
(BNL–64217)
Deriving cleanup guidelines for radionuclides at Brookhaven National Laboratory. Meinhold, A.F.; Morris, S.C.; Dionne, B.; Moskowitz, P.D. Brookhaven National Lab., Upton, NY (United States). Jan 1997. 188p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC02-76CH00016. Order Number DE97004563. Source: OSTI; NTIS; INIS; GPO Dep.

Past activities at Brookhaven National Laboratory (BNL) resulted in soil and groundwater contamination. As a result, BNL was designated a Superfund site under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). BNL's Office of Environmental Restoration (OER) is overseeing environmental restoration activities at the Laboratory. With the exception of radium, there are no regulations or guidelines to establish cleanup guidelines for radionuclides in soils at BNL. BNL must derive radionuclide soil cleanup guidelines for a number of Operable Units (OUs) and Areas of Concern (AOCs). These guidelines are required by DOE under a proposed regulation for radiation protection of public health and the environment as well as to satisfy the requirements of CERCLA. The objective of this report is to propose a standard approach to deriving risk-based cleanup guidelines for radionuclides in soil at BNL. Implementation of the approach is briefly discussed.

437
(CONF-960110–1)
Operating limit evaluation for disposal of uranium enrichment plant wastes. Lee, D.W.; Kocher, D.C.; Wang, J.C. Oak Ridge National Lab., TN (United States). [1996]. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From 29. midyear topical meeting of the Health Physics Society: naturally occuring and accelerator produced radioactive material - regulation and risk assessment; Scottsdale, AZ (United States); 7-10 Jan 1996. Order Number DE96004924. Source: OSTI; NTIS; INIS; GPO Dep.

A proposed solid waste landfill at Paducah Gaseous Diffusion Plant (PGDP) will accept wastes generated during normal plant operations that are considered to be non-radioactive. However, nearly all solid waste from any source or facility contains small amounts of radioactive material, due to the presence in most materials of trace quantities of such naturally occurring radionuclides as uranium and thorium. This paper describes an evaluation of operating limits, which are protective of public health and the environment, that would allow waste materials containing small amounts of radioactive material to be sent to a new solid waste landfill at PGDP. The operating limits are expressed as limits on concentrations of radionuclides in waste materials that could be sent to the landfill based on a site-specific analysis of the performance of the facility. These limits are advantageous to PGDP and DOE for several reasons. Most importantly, substantial cost savings in the management of waste is achieved. In addition, certain liabilities that could result from shipment of wastes to a commercial off-site solid waste landfill are avoided. Finally, assurance that disposal operations at the PGDP landfill are protective of public health and the environment is provided by establishing verifiable operating limits for small amounts of radioactive material; rather than relying solely on administrative controls. The operating limit determined in this study has been presented to the Commonwealth of Kentucky and accepted as a condition to be attached to the operating permit for the solid waste landfill.

438
(CONF-960265–1)
Integration of biotechnology in remediation and pollution prevention activities. Strong-Gunderson, J.M. (Oak Ridge National Lab., TN (United States). Environmental Sciences Div.). Oak Ridge National Lab., TN (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From Environmental quality, innovative technologies and sustainable economic development: a NAFTA perspective; Mexico City (Mexico); 7-10 Feb 1996. Order Number DE96005439. Source: OSTI; NTIS; INIS; GPO Dep.

The North American Free Trade Agreement/North American Agreement on Environmental Cooperation provides a

mechanism for an international collaboration between the US, Canada, and Mexico to jointly develop, modify, or refine technologies that remediate or protect the environment. These countries have a vested interest in this type of collaboration because contaminants do not respect the boundaries of a manufacturing site, region, city, state, or country. The Environmental Sciences Division (ESD) at Oak Ridge National Laboratory (ORNL) consists of a diverse group of individuals who address a variety of environmental issues. ESD is involved in basic and applied research on the fate, transport, and remediation of contaminants; environmental assessment; environmental engineering; and demonstrations of advanced remediation technologies. The remediation and protection of the environment includes water, air, and soils for organic, inorganic, and radioactive contaminants. In addition to remediating contaminated sites, research also focuses on life-cycle analyses of industrial processes and the production of green technologies. The author focuses this discussion on subsurface remediation and pollution prevention; however, the research activities encompass water, soil and air and many of the technologies are applicable to all environments. The discussion focuses on the integration of biotechnology with remediation activities and subsequently linking these biological processes to other remediation technologies.

439
(CONF-9607137–2)
Applications of low-cost radio-controlled airplanes to environmental restoration at Oak Ridge National Laboratory. Nyquist, J.E. Oak Ridge National Lab., TN (United States). [1996]. 13p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From Association for unmanned vehicle systems; Orlando, FL (United States); 15-19 Jul 1996. Order Number DE96014696. Source: OSTI; NTIS; INIS; GPO Dep.

The US DOE is endeavoring to clean up contamination created by the disposal of chemical and nuclear waste on the Oak Ridge Reservation (ORR), Tennessee, with an emphasis on minimizing off-site migration of contaminated surface and ground water. The task is complicated by inadequate disposal records and by the complexity of the local geology. Remote sensing data, including aerial photography and geophysics, have played an important role in the ORR site characterization. Are there advantages to collecting remote sensing data using Unmanned Aerial Vehicles (UAV's)? In this paper, I will discuss the applications of UAV's being explored at Oak Ridge National Laboratory (ORNL) under the sponsorship of the Department of Energy's Office of Science and technology. These applications are : aerial photography, magnetic mapping, and Very Low Frequency (VLF) electromagnetic mapping.

440
(CONF-960804–8)
Discovery, interception, and treatment of a groundwater plume: Oak Ridge National Laboratory. Lee, R. (Oak Ridge National Lab., TN (United States). Energy Div.); Ketelle, D. Oak Ridge National Lab., TN (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From SPECTRUM '96: international conference on nuclear and hazardous waste management; Seattle, WA (United States); 18-23 Aug 1996. Order Number DE96009633. Source: OSTI; NTIS; INIS; GPO Dep.

A radiological groundwater plume was discovered to be discharging into a surface stream and portions of the storm drain network at Oak Ridge National Laboratory (ORNL). A CERCLA removal action was initiated to address the discharges. The plume was found to be migrating 65 degrees oblique to the overall hydraulic gradient and was identified only after historic data were analyzed and field tests were performed under the working hypothesis of stratabound flow and transport. A detailed geologic and hydrologic analysis was performed that accurately predicted the 3-dimensional plume configuration from a single point datum where significantly elevated contaminant levels were found in a bedrock core hole. Subsequent sampling found that direct discharges of contamination existed in the stream only in the location of the predicted stratum. The affected storm drain outfall discharges were suspected to be the major contributors to ^{90}Sr surface water risk from ORNL. Thus, the selected removal action focused on eliminating the known seepage to the storm drain network. Intercept system operations reduced the total surface water ^{90}Sr flux by about 90%. Ongoing investigations seek to identify the source of the plume with the hope that the intercept system may eventually be deactivated. However, the efficiency of the system exceeded expectations and demonstrated that a good understanding of the hydrodynamics is a prerequisite to success. The relatively trouble free operation of the system also indicates that simple technologies can serve as effective measures to address immediate problems.

441
(CONF-970148–3)
Comprehensive supernate treatment. Egan, B.Z. (Oak Ridge National Lab., TN (United States). Chemical Technology Div.); Collins, J.L.; Davidson, D.J.; Anderson, K.K.; Chase, C.W. Oak Ridge National Lab., TN (United States). 6 Dec 1996. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. From Efficient Separations and Processing (ESP) Crosscutting Program FY 1997 technical exchange meeting; Gaithersburg, MD (United States); 28-30 Jan 1997. Order Number DE97001739. Source: OSTI; NTIS; INIS; GPO Dep.

This task involves the recovery of the liquid (supernatant or supernate) portions of Oak Ridge National Laboratory (ORNL) Melton Valley Storage Tank waste in a hot cell and treatment of the supernate to separate and remove the radionuclides. The supernate is utilized in testing various sorbent materials for removing cesium, strontium, and technetium from the highly alkaline, saline solutions. Batch tests are used to evaluate and select the most promising materials for supernate treatment to reduce the amount of waste for final disposal. Once the sorbents have been selected based on the results from the batch tests, small column tests are made to verify the batch data. Additional data from these tests can be used for process design. The sorption tests emphasize evaluation of newly developed sorbents and engineered forms of sorbents. Methods are also evaluated for recovering the radionuclides from the sorbents, including evaluating conditions for eluting ion exchange resins. A final report will summarize the results and compare the results with those of other investigators, along with recommendations for separating and concentrating radionuclides from DOE storage tank supernates at Oak Ridge and other sites. Documentation of the data and the significance of the findings will be compared, and recommendations will

be provided to likely users of the data in EM-30. This program also provides input to the supernate treatment process demonstration projects at ORNL.

442
(DOE/AL/62350–24F-REV1-ATTACH.2)
Remedial action selection report Maybell, Colorado, site. Final report. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Dec 1996. 100p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97001792. Source: OSTI; NTIS; INIS; GPO Dep.

The Maybell uranium mill tailings site is 25 miles (mi) (40 kilometers [km]) west of the town of Craig, Colorado, in Moffat County, in the northwestern part of the state. The unincorporated town of Maybell is 5 road mi (8 km) southwest of the site. The site is 2.5 mi (4 km) northeast of the Yampa River on relatively flat terrain broken by low, flat-topped mesas. U.S. Highway 40 runs east-west 2 mi (3.2 km) south of the site. The designated site covers approximately 110 acres (ac) (45 hectares [ha]) and consists of a concave-shaped tailings pile and rubble from the demolition of the mill buildings buried in the former mill area. The site is situated between Johnson Wash to the east and Rob Pit Mine to the west. Numerous reclaimed and unreclaimed mines are in the immediate vicinity. Aerial photographs (included at the end of this executive summary) show evidence of mining activity around the Maybell site. Contaminated materials at the Maybell processing site include the tailings pile, which has an average depth of 20 feet (ft) (6 meters [ml]) and contains 2.8 million cubic yards (yd^3) (2.1 million cubic meters [m^3]) of tailings. The former mill processing area is on the north side of the site and contains 20,000 yd 3 (15,000 m^3) of contaminated demolition debris. Off-pile contamination is present and includes areas adjacent to the tailings pile, as well as contamination dispersed by wind and surface water flow. The volume of off-pile contamination to be placed in the disposal cell is 550,000 yd^3(420,000 m^3). The total volume of contaminated materials to be disposed of as part of the remedial action is estimated to be 3.37 million yd^3 (2.58 million m^3).

443
(DOE/AL/62350–89-Rev.1)
Long-term surveillance plan for the Green River, Utah, disposal site. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Jun 1997. 105p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE98000104. Source: OSTI; NTIS; INIS; GPO Dep.

The long-term surveillance plan (LTSP) for the Green River, Utah, Uranium Mill Tailings Remedial Action (UMTRA) Project disposal site describes the surveillance activities for the Green River disposal cell. The U.S. Department of Energy (DOE) will carry out these activities to ensure that the disposal cell continues to function as designed. This final LTSP was prepared as a requirement for acceptance under the U.S. Nuclear Regulatory Commission (NRC) general license for custody and long-term care of residual radioactive materials (RRM). This LTSP documents whether the land and interests are owned by the United States or an Indian tribe and details how the long-term care of the disposal site will be carried out. The Green River, Utah, LTSP is based on the DOE's Guidance for Implementing the UMTRA Project Long-term Surveillance Program (DOE, 1992a).

444
(DOE/AL/62350–236)
Long-term surveillance plan for the Burro Canyon disposal cell, Slick Rock, Colorado. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Nov 1996. 43p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97001801. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plant (LTSP) describes the US Department of energy's (DOE) long-term care program for the Uranium Mill Tailings Remediation Action (UMTRA) Project's burro Canyon disposal cell in San Miguel County, Colorado. This LTSP describes the long-term surveillance program the DOE will implement to ensure that the Burro Canyon disposal cell performs as designed. The program is based on site inspections to identify threats to disposal cell integrity. No ground water monitoring will be required at the Burro Canyon disposal cell because the ground water protection strategy is supplemental standards based on low-yield from the upper-most aquifer.

445
(DOE/AL/62350–238)
Work plan for phase 1A paleochannel studies at the Cheney disposal cell, Grand Junction, Colorado: Draft. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Nov 1996. [200p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97001800. Source: OSTI; NTIS; INIS; GPO Dep.

This document will serve as a Work Plan for continuing paleochannel characterization activities at the Cheney disposal site near Grand Junction, Colorado. Elevated levels of nitrate were encountered in ground water from two monitor wells installed in alluvial paleochannels near the Cheney disposal cell in 1994. This triggered a series of investigations (Phase 1) designed to determine the source of nitrate and other chemical constituents in ground water at the site. A comprehensive summary of the Phase 1 field investigations (limited to passive monitoring and modeling studies) conducted by the Remedial Action Contractor (RAC) and Technical Assistance Contractor (TAC) to date is provided in Section 2.0 of this document. Results of Phase 1 were inconclusive regarding the potential interaction between the disposal cell and the paleochannels, so additional Phase 1A investigations are planned. Recommendations for Phase 1A tasks and possible future activities are discussed in Section 3.0. Detailed information on the implementation of the proposed Phase 1A tasks appears in Section 4.0 and will provide the basis for Statements of Work (SOW) for each of these tasks. A detailed sampling plan is provided to ensure quality and a consistency with previous data collection efforts.

446
(DOE/AL/62350–050510-GRNO)
Modification No. 2 to the remedial action plan and site design for stabilization of the inactive uranium mill tailings site at Green River, Utah: Final. Jacobs Engineering

Group, Inc., Albuquerque, NM (United States). Nov 1996. 360p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97001802. Source: OSTI; NTIS; INIS; GPO Dep.

Portions of the final Remedial Action Plan (RAP) for the Green River site, Volumes 1 and 2, Appendix B of the Cooperative Agreement No. DE-FC04-81AL16257, March 1991 (DOE, 1991) have been modified. The changes to the RAP are designated as RAP Modification No. 2. These changes have been placed in a three-ring binder that will supplement the original RAP (DOE, 1991), and include the following: addendum to the Executive Summary; Section 3.5 (Ground Water part of the Site Characterization Summary); Section 4.0 (Site Design); Section5.0 (Water Resources Protection Strategy Summary); Appendix D.5 (Ground Water Hydrology); and Appendix E (Ground Water Protection Strategy). In addition to these revisions, there have been editorial changes that clarify the text, but do not change the meaning. Also, certain sections of the document, which are included in the submittal for ease of review and continuity, have been updated to reflect the final ground water protection standards and the current UMTRA Project format and content of RAPs.

447
(DOE/AL/62350–T11)
DOE responses to CDH October 1993 comments on the Remedical Action Plan for the Naturita, Colorado, Umtra Site. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Oct 1996. 17p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97001055. Source: OSTI; NTIS; INIS; GPO Dep.

This document includes the October 1993 comments provided by the Colorado Department of Health (CDH) on the Department of Energy (DOE) Preliminary Final Remedial Action Plan for the Naturita, Colorado, UMTRA Site. DOE's responses are included after each CDH comment.

448
(DOE/ID/12735–T37)
Projects at the Western Environmental Technology Office. Quarterly technical progress report, July 1, 1995–September 30, 1995. MSE, Inc., Butte, MT (United States). [1996]. 36p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC22-88ID12735. Order Number DE96004110. Source: OSTI; NTIS; INIS; GPO Dep.

The goal of this project is to demonstrate the technical and economic feasibility of commercializing a biotechnology that uses plants to remediate soils, sediments, surface waters, and groundwaters contaminated by heavy metals and radionuclides. This technology, known as phytoremediation, is particularly suited to remediation of soils or water where low levels of contaminants are widespread. Project objectives are to provide an accurate estimate of the capability and rate of phytoremediation for removal of contaminants of concern from soils and groundwaters at Department of Energy (DOE) sites and to develop data suitable for engineering design and economic feasibility evaluations, including methods for destruction or final disposition of plants containing contaminants of concern. The bioremediation systems being evaluated could be less expensive than soil removal and treatment systems, given the areal extent and topography of sites under consideration and the investment of energy and money in soil-moving and -treating processes. In situ technology may receive regulatory acceptance more easily than ex situ treatments requiring excavation, processing, and replacement of surface soils. In addition, phytoremediation may be viable for cleanup of contaminated waters, either as the primary treatment or the final polishing stage, depending on the contaminant concentrations and process economics considerations.

449
(DOE/MC/30360–97/C0811)
Acoustically enhanced remediation, Phase 2: Technology scaling. Iovenitti, J.L. (Weiss Associates, Emeryville, CA (United States)); Hill, D.G.; Rynne, T.M.; Spadaro, J.F.; Hutchinson, W.; Illangasakere, T. Weiss Associates, Emeryville, CA (United States). [1996]. 18p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-94MC30360. (CONF-9610231–10: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052251. Source: OSTI; NTIS; INIS; GPO Dep.

Weiss Associates is conducting the following three phase program investigating the in-situ application of acoustically enhanced remediation (AER) of contaminated unconsolidated soil and ground water under both saturated and unsaturated conditions: Phase I– laboratory scale parametric investigation; Phase II–technology Scaling; and Phase III–large scale field tests. AER addresses the need for NAPL (either lighter or denser than water: LNAPL or DNAPL, respectively) in high and low permeability sediments, and the remediation of other types of subsurface contaminants (e.g., metals, radionuclides) in low permeability soils. This program has been placed in the U.S. Department of Energy's (DOE's) DNAPL product. Phase I indicated that AER could be used to effectively remediate NAPL in high permeability soil, and that removal of NAPL from low permeability soil could be increased since the water flux through these soils was significantly increased. Phase II, Technology Scaling, the subject of this paper, focused on (1) evaluating the characteristics of an AER field deployment system, (2) developing DNAPL flow and transport performance data under acoustic excitation, (3) predicting the effect of acoustic remediation in three-dimensional unconsolidated hydrogeologic conditions, (4) conducting an engineering analysis of acoustical sources, and (5) identifying candidate field site(s) for large-scale field testing of the technology.

450
(DOE/MC/32109–97/C0791)
Barometric pumping with a twist: VOC containment and remediation without boreholes. Lowry, W.; Dunn, S.D.; Neeper, D. Science and Engineering Associates, Inc., Santa Fe, NM (United States). [1996]. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-95MC32109. (CONF-9610231–31: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052233. Source: OSTI; NTIS; INIS; GPO Dep.

Objectives of Phase I (completed Nov. 1995) was to evaluate the feasibility of applying surface sealing and venting features to contain and remediate volatile organic compound (VOC) contaminated soils in the vadose zone. In Phase II, the remediation system will be installed at the Radioactive

Waste Management Complex of INEL. It will cover an area of the landfill known to be contaminated with chlorinated hydrocarbons, deposited in shallow trenches. Operation will be monitored for 12 to 18 months to evaluate the impact on soil gas displacement. The 4 key components are the surface seal, plenum, vent assembly, and soil vapor monitoring points.

451
(DOE/MC/32114–97/C0815)
Development of HUMASORB™, a lignite derived humic acid for removal of metals and organic contaminants from groundwater. Sanjay, H.G.; Tiedje, M.; Stashick, J.J.; Srivastava, K.C.; Johnson, H.R.; Walia, D.S. ARCTECH, Inc., Chantilly, VA (United States). [1996]. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-95MC32114. (CONF-9610231–13: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052255. Source: OSTI; NTIS; INIS; GPO Dep.

Heavy metal and organic contamination of surface and groundwater is a major environmental concern. The contamination is primarily due to improperly disposed industrial wastes. Decontamination of surface and groundwater can be achieved using a broad spectrum of treatment options such as precipitation, ion-exchange, microbial digestion, membrane separation, activated carbon adsorption, etc. The state-of-the-art technologies for treatment of contaminated water, however, can in one pass remediate only one class of contaminants, i.e., either VOCs (activated carbon) or heavy metals(ion-exchange). The groundwater contamination at different Department of Energy (DOE) sites (e.g. Hanford) is due to the presence of both VOCs and heavy metals. Therefore, two different stepwise processes are needed to remediate a site. The two-step approach increases the cost of remediation. A novel material having properties to remove both classes of contaminants in one step is being developed as part of this project. The objective of this project is to develop a lignite derived adsorbent, HUMASORB™, to remove heavy metal and organic contaminants from groundwater and surface water streams in one processing step. As part of this project, HUMASORB™ is being characterized and evaluated for its ion-exchange and adsorption capabilities.

452
(DOE/NV/11508–26)
Estimation of groundwater velocities from Yucca Flat to the Amargosa Desert using geochemistry and environmental isotopes. Hershey, R.L. (Nevada Univ., Reno, NV (United States). Water Resources Center); Acheampong, S.Y. Nevada Univ., Reno, NV (United States). Water Resources Center. Jun 1997. 60p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC08-95NV11508. Order Number DE97008166. Source: OSTI; NTIS; INIS; GPO Dep.

Geochemical and isotopic data from groundwater sampling locations can be used to estimate groundwater flow velocities for independent comparison to velocities calculated by other methods. The objective of this study was to calculate groundwater flow velocities using geochemistry and environmental isotopes from the southern end of Yucca Flat to the Amargosa Desert, considering mixing of different groundwater inputs from sources each and southeast of the Nevada Test Site (NTS). The approach used to accomplish the objective of this study consisted of five steps: (1) reviewing and selecting locations where carbon isotopic groundwater analyses, reliable ionic analysis, and well completion information are available; (2) calculating chemical speciation with the computer code WATEQ4F (Ball and Nordstrom, 1991) to determine the saturation state of mineral phases for each ground water location; (3) grouping wells into reasonable flowpaths and mixing scenarios from different groundwater sources; (4) using the computer code NETPATH (Plummer et al., 1991) to simulate mixing and the possible chemical reactions along the flowpath, and to calculate the changes in carbon-13/carbon-12 isotopic ratios ($\delta^{13}C$) as a result of these reactions; and (5) using carbon-14 (^{14}C) data to calculate velocity.

453
(DOE/NV/11718–060)
Nevada test site underground storage tank number 12-13-1: Nevada division of emergency management case number H931130E corrective action unit 450. Closure report. Bechtel Nevada Corp., Las Vegas, NV (United States). Jan 1997. 209p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC08-96NV11718. Order Number DE97003907. Source: OSTI; NTIS; GPO Dep.

The project site was identified as an abandoned Underground Storage Tank (UST) to be closed under the Department of Energy/Nevada Operations Office (DOE/NV) Environmental Restoration Division (ERD) Program during Fiscal Year 1993. The United States Environmental Protection Agency (EPA) requires that before permanent closure is completed an assessment of the site must take place. The Nevada Division of Environmental Protection (NDEP) requires assessment and corrective actions for a petroleum substance in the soil which exceeds 100 milligrams per kilogram (mg/kg). Subsequent to the tank removal, a hydrocarbon release was identified at the site. The release was reported to the NDEP by DOE/NV on November 30, 1993. Nevada Division of Environmental Management (NDEM) Case Number H931130E was assigned. This final closure report documents the assessment and corrective actions taken for the hydrocarbon release identified at the site. The Notification of Closure, EPA Form 7530-1 dated March 22, 1994, is provided in Appendix A. A 45-day report documenting the notification for a hydrocarbon release was submitted to NDEP on April 6, 1994.

454
(DOE/OR–01-1457&D2)
Remedial design report for operable unit 2, Chestnut Ridge Filled Coal Ash Pond, Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States); Foster-Wheeler Environmental Corp., Oak Ridge, TN (United States); MK-Ferguson of Oak Ridge Co., TN (United States). [1996]. 159p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Source: OSTI.

This document was prepared in accordance with requirements under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, which requires issuance of a remedial design. Publication of this document provides the Environmental Restoration Program with the design for the remediation project. The Remedial

Design Report consists of construction drawings and construction specifications for design improvements to Chestnut Ridge Filled Coal Ash Pond (FCAP). Associated with the project are several project plans which are being issued under separate cover.

455
(DOE/OR–01-1544&D1)
Removal action report on Waste Area Grouping 4 seeps 4 and 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Dec 1996. 33p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. (ORNL/M–5813). Order Number DE97051443. Source: OSTI; NTIS; INIS; GPO Dep.

This report documents removal action activities for a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) non-time-critical removal action as described in the Action Memorandum prepared in 1996. The technical objective of this removal action was to reduce the release of strontium 90 (^{90}Sr) into an ephemeral tributary to White Oak Creek from Waste Area Grouping 4 (WAG 4) seeps, as measured at Monitoring Station (MS) 1 at ORNL, Oak Ridge, TN. Design was initiated in early January 1996 and grouting activities were completed in late October 9996. Portions of four waste disposal trenches were injected using low-temperature permeation grouting technology with multiple formulations of grouts to reduce the in situ hydraulic conductivity of the waste materials and ultimately reduce the off-site transport of ^{90}Sr.

456
(DOE/OR–01-1546/V1&D1)
White Oak Creek Watershed: Melton Valley Area Remedial Investigation Report, Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 1 Main Text. Oak Ridge National Lab., TN (United States). Nov 1996. 241p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. (ORNL/M–5520/V1&D1). Order Number DE97051445. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this Remedial Investigation (RI) report is to present an analysis of the Melton Valley portion of the White Oak Creek (WOC) watershed, which will enable the US Department of Energy (DOE) to pursue a series of cost-effective remedial actions resulting in site cleanup and stabilization. In this RI existing levels of contamination and radiological exposure are compared to levels acceptable for future industrial and potential recreational use levels at the site. This comparison provides a perspective for the magnitude of remedial actions required to achieve a site condition compatible with relaxed access restrictions over existing conditions. Ecological risk will be assessed to evaluate measures required for ecological receptor protection. For each subbasin, this report will provide site-specific analyses of the physical setting including identification of contaminant source areas, description of contaminant transport pathways, identification of release mechanisms, analysis of contaminant source interactions with groundwater, identification of secondary contaminated media associated with the source and seepage pathways, assessment of potential human health and ecological risks from exposure to contaminants, ranking of each source area within the subwatershed, and outline the conditions that remedial technologies must address to stop present and future contaminant releases, prevent the spread of contamination and achieve the goal of limiting environmental contamination to be consistent with a potential recreational use of the site.

457
(DOE/OR–01-1546-V1&D2)
Remedial investigation report on the Melton Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Volume 1: Evaluation, interpretation, and data summary. CDM Federal Programs Corp., Oak Ridge, TN (United States); Science Applications International Corp., Oak Ridge, TN (United States). May 1997. 370p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97006024. Source: OSTI; NTIS; INIS; GPO Dep.

The Melton Valley watershed presents a multifaceted management and decision-making challenge because of the very heterogeneous conditions that exist with respect to contaminant type, disposal unit age, mode of disposal, release mechanism, and potential risk-producing pathways. The investigation presented here has assembled relevant site data in the geographic context with the intent of enabling program managers and decision-makers to understand site conditions and evaluate the necessity, relative priority, and scope of potential remedial actions.

458
(DOE/OR–01-1546/V2&D1)
White Oak Creek watershed: Melton Valley area Remedial Investigation report, at the Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 2, Appendixes A and B. Oak Ridge National Lab., TN (United States). Nov 1996. 467p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. (ORNL/M–5520/V2&D1). Order Number DE97051446. Source: OSTI; NTIS; INIS; GPO Dep.

This document contains Appendixes A "Source Inventory Information for the Subbasins Evaluated for the White Oak Creek Watershed" and B "Human Health Risk Assessment for White Oak Creek /Melton Valley Area" for the remedial investigation report for the White Oak Creek Watershed and Melton Valley Area. Appendix A identifies the waste types and contaminants for each subbasin in addition to the disposal methods. Appendix B identifies potential human health risks and hazards that may result from contaminants present in the different media within Oak Ridge National Laboratory sites.

459
(DOE/OR–01-1546/V3&D1)
White Oak Creek Watershed: Melton Valley Area Remedial Investigation Report, Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 3 Appendix C. Oak Ridge National Lab., TN (United States). Nov 1996. 285p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. (ORNL/M–5520/V3&D1). Order Number DE97051444. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides details on the baseline ecological risk assessment conducted in support of the Remedial Investigation (RI) Report for the Melton Valley areas of the White Oak Creek watershed (WOCW). The RI presents an analysis meant to enable the US Department of Energy (DOE) to pursue a series of remedial actions resulting in site cleanup and stabilization. The ecological risk assessment builds off of the WOCW screening ecological risk assessment. All information available for contaminated sites under the jurisdiction of the US Department of Energy's Comprehensive Environmental Response, Compensation, and Liability Act Federal Facilities Agreement within the White Oak Creek (WOC) RI area has been used to identify areas of potential concern with respect to the presence of contamination posing a potential risk to ecological receptors within the Melton Valley area of the White Oak Creek watershed. The risk assessment report evaluates the potential risks to receptors within each subbasin of the watershed as well as at a watershed-wide scale. The WOC system has been exposed to contaminant releases from Oak Ridge National Laboratory and associated operations since 1943 and continues to receive contaminants from adjacent waste area groupings.

460
(DOE/OR–02-1503-V1&D1)
Remedial investigation/feasibility study for the David Witherspoon, Inc., 901 Site, Knoxville, Tennessee: Volume 1. Jacobs Engineering Group, Inc., Oak Ridge, TN (United States). Oct 1996. 231p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002405. Source: OSTI; NTIS; INIS; GPO Dep.

This remedial investigation (RI)/feasibility study (FS) supports the selection of remedial actions for the David Witherspoon, Inc. 901 Maryville Pike Site in Knoxville, Tennessee. Operations at the site, used as a recycling center, have resulted in past, present, and potential future releases of hazardous substances in to the environment. This Site is a Tennessee Superfund site. A phased approach was planned to (1) gather existing data from previous investigations managed by the Tenn. Dept. of Environment and Conservation; (2) perform a preliminary RI, including risk assessments, and an FS with existing data to identify areas where remedial action may be necessary; (3) gather additional field data to adequately define the nature and extent of risk-based contaminants that present identifiable threats to human and/or ecological receptors; and (4) develop remedial action alternatives to reduce risks to acceptable levels.

461
(DOE/OR–02-1503-V2&D1)
Remedial investigation/feasibility study for the David Witherspoon, Inc., 901 Site, Knoxville, Tennessee: Volume 2, Appendixes. Jacobs Engineering Group, Inc., Oak Ridge, TN (United States). Oct 1996. 818p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002406. Source: OSTI; NTIS; INIS; GPO Dep.

This document contains the appendixes for the remedial investigation and feasibility study for the David Witherspoon, Inc., 901 site in Knoxville, Tennessee. The following topics are covered in the appendixes: (A) David Witherspoon, Inc., 901 Site Historical Data, (B) Fieldwork Plans for the David Witherspoon, Inc., 901 Site, (C) Risk Assessment, (D) Remediation Technology Discussion, (E) Engineering Support Documentation, (F) Applicable or Relevant and Appropriate Requirements, and (G) Cost Estimate Documentation.

462
(DOE/RL–95-100-Rev.1)
RCRA facility investigation report for the 200-PO-1 operable unit. Revision 1. Bechtel Hanford, Inc., Richland, WA (United States). May 1997. 220p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97053962. Source: OSTI; NTIS; INIS; GPO Dep.

This Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) report is prepared in support of the RFI/corrective measures study process for the 200-PO-1 Groundwater Operable Unit in the 200 East Area of the Hanford Site. This report summarizes existing information on this operable unit presented in the 200 East and PUREX Aggregate Area Management Study Reports, contaminant specific studies, available modeling data, and groundwater monitoring data summary reports. Existing contaminant data are screened against current regulatory limits to determine contaminants of potential concern (COPC). Each identified COPC is evaluated using well-specific and plume trend analyses.

463
(DOE/RL–96-90)
Interim action monitoring plan for the 100-HR-3 and 100-KR-4 Operable Units. Bechtel Hanford, Inc., Richland, WA (United States). Apr 1997. 67p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052826. Source: OSTI; NTIS; INIS; GPO Dep.

This plan addresses interim action monitoring in the 100-HR-3 and 100-KR-4 Operable Units (OU) located at the Hanford Site in Richland, Washington. Other ongoing monitoring programs for the groundwater within these OUs include Comprehensive Environmental Restoration, Compensation, and Liability Act remedial investigations for 100-HR-3 and 100-KR-4 OUs; Resource Conservation and Recovery Act (RCRA) 183-H Solar Evaporation Basin; RCRA 100-D Ponds; operational monitoring for the K-East and K-West Fuel Storage basins; and Hanford Site-wide environmental surveillance. This document describes the interim action monitoring, the quality assurance project plan, and a summary of the Data Quality Objectives process that was used to establish and resolve issues related to monitoring.

464
(DOE/RL–97-34)
N-Springs pump and treat system optimization study. Bechtel Hanford, Inc., Richland, WA (United States). Mar 1997. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052824. Source: OSTI; NTIS; INIS; GPO Dep.

This letter report describes and presents the results of a system optimization study conducted to evaluate the N-Springs pump and treat system. The N-Springs pump and treat is designed to remove strontium-90 (90Sr) found in the

groundwater in the 100-NR-2 Operable Unit near the Columbia River. The goal of the system optimization study was to assess and quantify what conditions and operating parameters could be employed to enhance the operating and cost effectiveness of the recently upgraded pump and treat system.This report provides the results of the system optimization study, reports the cost effectiveness of operating the pump and treat at various operating modes and 90Sr removal goals, and provides recommendations for operating the pump and treat.

465
(DOE/RL–97-36)
200-UP-1 groundwater remedial design/remedial action work plan. Bechtel Hanford, Inc., Richland, WA (United States). Mar 1997. 43p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052825. Source: OSTI; NTIS; INIS; GPO Dep.

The following 200-UP-1 remedial design work plan presents the objectives and rationale developed for designing and implementing the selected interim remedial measure for the 200-UP-1 Operable Unit, which is located in the 200 West Area of the Hanford Site.

466
(DOE/SR/18545–1)
Surfactant-enhanced extraction of hazardous wastes from soils. First report. Abotsi, G.; Davies, I.; Saha, G. Clark Atlanta Univ., GA (United States). Oct 1996. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG09-95SR18545. Order Number DE97002755. Source: OSTI; NTIS; INIS; GPO Dep.

Through combined efforts, researchers at Clark Atlanta University and Savannah River Site propose to develop improved soil washing techniques for decontaminating soils containing organic, inorganic and radioactive wastes. This project encompasses several tasks including (1) identification of organic, inorganic and radioactive pollutants in selected soils, (2) separation of soils into various fractions and the determination of wastes in each fraction, (3) soil decontamination by washing with surfactants and evaluation of the effectiveness of various types of surfactants in removing contaminants from soils, (4) determination of soil remediation and the effects of the surfactant concentration and wash solution-to-soil ratio on the desorption and removal of organic wastes from soils, (5) assessment of soil particle size distribution on waste efficiency, (6) evaluating the effects of temperature, mixing rates, and extraction times on waste solubilization and extraction, and (7) determination of the influence of surface charge properties and the pHs of the souls slurries on the decontamination efficiency.

467
(ES/ER/TM–217)
Remedial Action Contacts Directory - 1997. Oak Ridge National Lab., TN (United States); Information International Associates, Inc., Oak Ridge, TN (United States). May 1997. 315p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97008125. Source: OSTI; NTIS; GPO Dep.

This document, which was prepared for the US Department of Energy (DOE) Office of Environmental Restoration (ER), is a directory of 2628 individuals interested or involved in environmental restoration and/or remedial actions at radioactively contaminated sites. This directory contains a list of mailing addresses and phone numbers of DOE operations, area, site, project, and contractor offices; an index of DOE operations, area, site, project, and contractor office sorted by state; a list of individuals, presented by last name, facsimile number, and e-mail address; an index of affiliations presented alphabetically, with individual contacts appearing below each affiliation name; and an index of foreign contacta sorted by country and affiliation. This document was generated from the Remedial Action Contacts Database, which is maintained by the Remedial Action Program Information Center (RAPIC).

468
(INEL–95/00486)
The INEL approach: Environmental Restoration Program management and implementation methodology. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960212–31: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96007282. Source: OSTI; NTIS; INIS; GPO Dep.

The overall objectives of the INEL Environmental Restoration (ER) Program management approach are to facilitate meeting mission needs through the successful implementation of a sound, and effective project management philosophy. This paper outlines the steps taken to develop the ER program, and explains further the implementing tools and processes used to achieve what can be viewed as fundamental to a successful program. The various examples provided will demonstrate how the strategies for implementing these operating philosophies are actually present and at work throughout the program, in spite of budget drills and organizational changes within DOE and the implementing contractor. A few of the challenges and successes of the INEL Environmental Restoration Program have included: a) completion of all enforceable milestones to date, b) acceleration of enforceable milestones, c) managing funds to reduce uncosted obligations at year end by utilizing greater than 99% of FY-95 budget, d) an exemplary safety record, e) developing a strategy for partial Delisting of the INEL by the year 2000, f) actively dealing with Natural Resource Damages Assessment issues, g) the achievement of significant project cost reductions, h) and implementation of a partnering charter and application of front end quality principles.

469
(INEL–96/00231)
Consensus implementation of a groundwater remediation project at the Idaho National Engineering Laboratory. Hastings, K.R. (USDOE Idaho Operations Office, Idaho Falls, ID (United States)); Carlson, D.S. Lockheed Martin Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-9608181–1: Envirosig '96, Denver, CO (United

States), 26-30 Aug 1996). Order Number DE97050813. Source: OSTI; NTIS; INIS; GPO Dep.

Because of significant characterization uncertainties existing when the Record of Decision was signed and the unfavorable national reputation of groundwater pump and treat remediation projects, the Test Area North (TAN) groundwater ROD includes the evaluation of five emerging technologies that show potential for treating the organic contamination in situ or reducing the toxicity of contaminants above ground. Treatability studies will be conducted to ascertain whether any may be suitable for implementation at TAN to yield more timely or cost effective restoration of the aquifer. The implementation approach established for the TAN groundwater project is a consensus approach, maximizing a partnership relation with stakeholders in constant, iterative implementation decision making.

470
(INEL–96/00345)
***Field-scale* permeation testing of jet-grouted buried waste sites.** Loomis, G.G. (Lockheed Idaho Technologies Co., Idaho Falls, ID (United States)); Zdinak, A.P. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-970335–53: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97052142. Source: OSTI; NTIS; INIS; GPO Dep.

The Idaho National Engineering Laboratory (INEL) conducted field-scale hydraulic conductivity testing of simulated buried waste sites with improved confinement. The improved confinement was achieved by jet grouting the buried waste, thus creating solid monoliths. The hydraulic conductivity of the monoliths was determined using both the packer technique and the falling head method. The testing was performed on simulated buried waste sites utilizing a variety of encapsulating grouts, including high-sulfate-resistant Portland cement, TECT, (a proprietary iron oxide cement) and molten paraffin. By creating monoliths using in-situ jet grouting of encapsulating materials, the waste is simultaneously protected from subsidence and contained against further migration of contaminants. At the INEL alone there is 56,000 m^3 of buried transuranic waste commingled with 170,000–224,000 m^3 of soil in shallow land burial. One of the options for this buried waste is to improve the confinement and leave it in place for final disposal. Knowledge of the hydraulic conductivity for these monoliths is important for decision-makers. The packer tests involved coring the monolith, sealing off positions within the core with inflatable packers, applying pressurized water to the matrix behind the seal, and observing the water flow rate. The falling head tests were performed in full-scale 3-m-diameter, 3-m-high field-scale permeameters. In these permeameters, both water inflow and outflow were measured and equated to a hydraulic conductivity.

471
(INEL–96/0418)
Subsurface Contamination Focus Area technical requirements. Volume 1: Requirements summary. Nickelson, D.; Nonte, J.; Richardson, J. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Oct 1996. 60p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97050809. Source: OSTI; NTIS; INIS; GPO Dep.

This document summarizes functions and requirements for remediation of source term and plume sites identified by the Subsurface Contamination Focus Area. Included are detailed requirements and supporting information for source term and plume containment, stabilization, retrieval, and selective retrieval remedial activities. This information will be useful both to the decision-makers within the Subsurface Contamination Focus Area (SCFA) and to the technology providers who are developing and demonstrating technologies and systems. Requirements are often expressed as graphs or charts, which reflect the site-specific nature of the functions that must be performed. Many of the tradeoff studies associated with cost savings are identified in the text.

472
(LA–13325-MS)
Mortandad Canyon: Elemental concentrations in vegetation, streambank soils, and stream sediments - 1979. Ferenbaugh, R.W.; Gladney, E.S. Los Alamos National Lab., NM (United States). Jun 1997. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97006915. Source: OSTI; NTIS; INIS; GPO Dep.

In 1979, stream sediments, streambank soils, and streambank vegetation were sampled at 100 m intervals downstream of the outfall of the TA-50 radioactive liquid waste treatment facility in Mortandad Canyon. Sampling was discontinued at a distance of 3260 m at the location of the sediment traps in the canyon. The purpose of the sampling was to investigate the effect of the residual contaminants in the waste treatment facility effluent on elemental concentrations in various environmental media.

473
(LA–13330-MS)
Baseline geochemistry of soil and bedrock Tshirege Member of the Bandelier Tuff at MDA-P. Warren, R.G.; McDonald, E.V.; Ryti, R.T. Los Alamos National Lab., NM (United States). Aug 1997. 75p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE98001880. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides baseline geochemistry for soils (including fill), and for bedrock within three specific areas that are planned for use in the remediation of Material Disposal Area P (MDA-P) at Technical Area 16 (TA-16). The baseline chemistry includes leachable element concentrations for both soils and bedrock and total element concentrations for all soil samples and for two selected bedrock samples. MDA-P operated from the early 1950s to 1984 as a landfill for rubble and debris generated by the burning of high explosives (HE) at the TA-16 Burning Ground, HE-contaminated equipment and material, barium nitrate sand, building materials, and trash. The aim of this report is to establish causes for recognizable chemical differences between the background and baseline data sets. In many cases, the authors conclude that recognizable differences represent natural enrichments. In other cases, differences are best attributed to analytical problems. But most importantly, the comparison of background and baseline geochemistry demonstrates significant contamination for several elements not only at the two

remedial sites near the TA-16 Burning Ground, but also within the entire region of the background study. This contamination is highly localized very near to the surface in soil and fill, and probably also in bedrock; consequently, upper tolerance limits (UTLs) calculated as upper 95% confidence limits of the 95th percentile are of little value and thus are not provided. This report instead provides basic statistical summaries and graphical comparisons for background and baseline samples to guide strategies for remediation of the three sites to be used in the restoration of MDA-P.

474
(LA-UR–96-512)
Rectangular Schlumberger resistivity arrays for delineating vadose zone clay-lined fractures in shallow tuff. Miele, M. (ICF Kaiser, Rancho Cordova, CA (United States)); Laymon, D.; Gilkeson, R.; Michelotti, R. Los Alamos National Lab., NM (United States). 1996. 13p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960477–2: 9. annual symposium on the application of geophysics to engineering and environmental problems, Denver, CO (United States), 15 Apr - 1 May 1996). Order Number DE96008703. Source: OSTI; NTIS; INIS; GPO Dep.

Rectangular Schlumberger arrays can be used for 2-dimensional lateral profiling of apparent resistivity at a unique current electrode separation, hence single depth of penetration. Numerous apparent resistivity measurements are collected moving the potential electrodes (fixed MN spacing) within a rectangle of defined dimensions. The method provides a fast, cost-effective means for the collection of dense resistivity data to provide high-resolution information on subsurface hydrogeologic conditions. Several rectangular Schlumberger resistivity arrays were employed at Los Alamos National Laboratory (LANL) from 1989 through 1995 in an area adjacent to and downhill from an outfall pipe, septic tank, septic drainfield, and sump. Six rectangular arrays with 2 AB spacings were used to delineate lateral low resistivity anomalies that may be related to fractures that contain clay and/or vadose zone water. Duplicate arrays collected over a three year time period exhibited very good data repeatability. The properties of tritium make it an excellent groundwater tracer. Because tritium was present in discharged water from all of the anthropogenic sources in the vicinity it was used for this purpose. One major low resistivity anomaly correlates with relatively high tritium concentrations in the tuff. This was determined from borehole samples collected within and outside of the anomalous zone. The anomaly is interpreted to be due to fractures that contain clay from the soil profile. The clay was deposited in the fractures by aeolian processes and by surface water infiltration. The fractures likely served as a shallow vadose zone groundwater pathway.

475
(LA-UR–96-1322)
Characterization and immobilization of cesium-137 in soil at Los Alamos National Laboratory. Lu, Ningping; Mason, C.F.V.; Turney, W.R.J.R. Los Alamos National Lab., NM (United States). 1996. 16p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-9606219–1: 3. international conference on precision agriculture, St. Paul, MN (United States), 23-26 Jun 1996). Order Number DE96010480. Source: OSTI; NTIS; INIS; GPO Dep.

At Los Alamos National Laboratory, cesium-137 (^{137}Cs) is a major contaminant in soils of Technical Area 21 (TA-21) and is mainly associated with soil particles $\leq$2.00 mm. Cesium-137 was not leached by synthetic groundwater or acid rainwater. Soil erosion is a primary mechanism of ^{137}Cs transport in TA-21. The methodology that controls soil particle runoff can prevent the transport of ^{137}Cs.

476
(LA-UR–96-2301)
Applying modular concepts to process and authorization basis issues for plutonium residue stabilization. Hildner, R.A.; Zygmunt, S.J. Los Alamos National Lab., NM (United States). [1996]. 15p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-9607134–3: 10. American Glovebox Society annual conference, San Diego, CA (United States), 22-25 Jul 1996). Order Number DE96012827. Source: OSTI; NTIS; INIS; GPO Dep.

A recent study completed for the Rocky Flats Environmental Technology Site proved that it is feasible to use modular, skid-mounted processes for disposition of Category 1 quantities of nuclear materials. This would allow personnel to assemble, test, and authorize the processes outside of the nuclear material management area. Besides having cost and schedule advantages, this technology reduces the uncertainty and risk in applications involving disposition of materials and facilities. This paper explains the previous research into modular skid-mounted processes and suggests various future applications of the technology.

477
(LBNL–39498)
Sorption of cesium and strontium on Savannah River soils impregnated with colloidal silica. Hakem, N. (Lawrence Berkeley National Lab., CA (United States). Earth Sciences Div.); Al Mahamid, I.; Apps, J.; Moridis, G. Lawrence Berkeley National Lab., CA (United States). Jan 1997. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC03-76SF00098. (CONF-970208–12: International containment technology conference and exhibition, St. Petersburg, FL (United States), 9-12 Feb 1997). Order Number DE97004334. Source: OSTI; NTIS; INIS; GPO Dep.

Colloidal silica (CS) is being considered as an injectable low viscosity fluid for creation of impermeable barrier containment of low level radioactive waste at the Savannah River Site (SRS), South Carolina. The sorption behavior of cesium and strontium on Savannah River Site Soils impregnated with Colloidal Silica was studied using a batch experimental method. The samples were prepared by addition of CS and an aqueous solution of $CaCl_2$ to the soil materials. Sorption studies were conducted after the gelation of the CS samples had occurred. The variation of the sorption ratio, R, as a function of cesium or strontium concentration was examined. The Freundlich isotherm was used to fit the data and very good results were obtained.

478
(LBNL–39894)
High-frequency electric field measurement using a toroidal antenna. Lee, K.H. (Lawrence Berkeley National Lab., CA (United States). Earth Sciences Div.). Lawrence Berkeley National Lab., CA (United States). Jan 1997. 10p.

Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC03-76SF00098. Order Number DE97004240. Source: OSTI; NTIS; GPO Dep.

In this paper the author describes an innovative method of measuring high-frequency electric fields using a toroid. For typical geophysical applications the new sensor will detect electric fields for a wide range of spectrum starting from 1.0 MHz. This window, in particular the lower frequency range between 1.0 to 100 MHz, has not been used for existing electromagnetic or radar systems to detect small objects in the upper few meters of the ground. Ground penetrating radar (GPR) can be used successfully in this depth range if the ground is resistive but most soils are, in fact, conductive (0.01 to 1.0 S/m) rendering GPR inefficient. Other factors controlling the resolution of GPR system for small objects is the spatial averaging inherent in the electric dipole antenna and the scattering caused by soil inhomogeneities of dimensions comparable to the wavelength (and antenna size). For maximum resolution it is desirable to use the highest frequencies but the scattering is large and target identification is poor. Time-varying magnetic fields induce an emf (voltage) in a toroid. The electric field at the center of the toroid is shown to be linearly related to this induced voltage. By measuring the voltage across a toroid one can easily and accurately determine the electric field. The new sensor will greatly simplify the cumbersome procedure involved with GPR measurements with its center frequency less than 100 MHz. The overall size of the toroidal sensor can be as small as a few inches. It is this size advantage that will not only allow easy fabrication and deployment of multi-component devices either on the surface or in a borehole, but it will render greatly improved resolution over conventional systems.

479
(ORNL/ER–374/R1)
Technical Evaluation Summary of the In Situ Vitrification Melt Expulsion at the Oak Ridge National Laboratory on April 21, 1996, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Nov 1996. 73p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97050803. Source: OSTI; NTIS; INIS; GPO Dep.

This Technical Evaluation Summary of the In Situ Vitrification Melt Expulsion at the Oak Ridge National Laboratory on April 21, 1996, was prepared at the request of the Department of Energy as a supporting reference document for the Final Unusual Occurrence Report to fully explore the probable causes that lead to the subject incident. This document provides the Environmental Restoration Program with the technical information on the performance of the in situ vitrification treatability study operations at ORNL pit 1 up to and including the time of the melt expulsion incident. This document also attempts to diagnose the causes of the melt expulsion event the consequent damages to equipment the radiological impacts of the event, and the equipment design modifications and procedural changes necessary for future safe ISV operations.

480
(ORNL/ER–378)
Multi-point injection demonstration for solidification of shallow buried waste at Oak Ridge Reservation, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). Oct 1996. 84p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97050656. Source: OSTI; NTIS; INIS; GPO Dep.

The multi-point injection (MPI) technology is a precision, high-velocity jetting process for the in situ delivery of various agents to treat radiological and/or chemical wastes. A wide variety of waste forms can be treated, varying from heterogeneous waste dumped into shallow burial trenches to contaminated soils consisting of sands/gravels, silts/clays and soft rock. The robustness of the MPI system is linked to its broad range of applications which vary from in situ waste treatment to creation of both vertical and horizontal barriers. The only major constraint on the type of in situ treatment which can be delivered by the NTI system is that agents must be in a slurry form.

481
(ORNL/ER–385)
Quality assurance/quality control summary report on phase 2 of the Clinch River remedial investigation at the Oak Ridge Reservation, Oak Ridge, Tennessee. Holladay, S.K.; Anderson, H.M.; Benson, S.B.; Bevelhimer, M.S.; Brandt, C.C.; Chavannes, C.M.; Cook, R.B.; Evans, D.A.; Ford, C.J.; Harris, R.A., et al. Oak Ridge National Lab., TN (United States). Dec 1996. 454p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97051437. Source: OSTI; NTIS; INIS; GPO Dep.

Quality assurance (QA) objectives for Phase 2 were that (1) scientific data generated would withstand scientific and legal scrutiny; (2) data would be gathered using appropriate procedures for sample collection, sample handling and security, chain of custody, laboratory analyses, and data reporting; (3) data would be of known precision and accuracy; and (4) data would meet data quality objectives defined in the Phase 2 Sampling and Analysis Plan. A review of the QA systems and quality control (QC) data associated with the Phase 2 investigation is presented to evaluate whether the data were of sufficient quality to satisfy Phase 2 objectives. The data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity were evaluated to determine any limitations associated with the data. Data were flagged with qualifiers that were associated with appropriate reason codes and documentation relating the qualifiers to the reviewer of the data. These qualifiers were then consolidated into an overall final qualifier to represent the quality of the data to the end user. In summary, reproducible, precise, and accurate measurements consistent with CRRI objectives and the limitations of the sampling and analytical procedures used were obtained for the data collected in support of the Phase 2 Remedial Investigation.

482
(ORNL/ER–401-V1)
Field grouting summary report on the WAG seeps 4 and 6 removal action project, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Volume 1: Text. ECO Grouting Specialists Ltd., Cheltenham, ON (Canada). May 1997. 83p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC

(United States). DOE Contract AC05-96OR22464. Order Number DE97006026. Source: OSTI; NTIS; INIS; GPO Dep.

During the summer of 1996, a unique multi-phase, multi-stage, low-pressure permeation grouting pilot program was performed inside portions of four unlined waste disposal trenches at Waste Area Grouping (WAG) 4 at Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. The project was deemed a non-time-critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA); however, due to a history of heavy precipitation in the fall, the schedule was fast-tracked to meet an October 31, 1996 grouting completion date. The technical objective of the removal action was to reduce the off-site transport of Strontium 90 (^{90}Sr) by grouting portions of four waste disposal trenches believed to be responsible for over 70% of the ^{90}Sr leaving the site. A goal of the grouting operation was to reduce the average in situ hydraulic conductivity of the grouted waste materials to a value equal to or less than 1×10^{-6} cm/sec. This target hydraulic conductivity value was established to be at least two orders of magnitude lower than that of the surrounding natural ground.

483
(ORNL/ER–401-V2)
Field grouting summary report on the WAG 4 seeps 4 and 6 removal action project, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Volume 2: Appendixes A–D. ECO Grouting Specialists Ltd., Cheltenham, ON (Canada); Oak Ridge National Lab., TN (United States). May 1997. 143p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97006025. Source: OSTI; NTIS; INIS; GPO Dep.

During the summer of 1996, a unique multi-phase, multi-stage, low-pressure permeation grouting pilot program was performed inside portions of four unlined waste disposal trenches at Waste Area Grouping (WAG) 4 at Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. The project was deemed a non-time-critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA); however, due to a history of heavy precipitation in the fall, the schedule was fast-tracked to meet an October 31, 1996 grouting completion data. The technical objective of the removal action was to reduce the off-site transport of Strontium 90 (^{90}Sr) by grouting portions of four waste disposal trenches believed to be responsible for over 70% of the ^{90}Sr leaving the site. A goal of the grouting operation was to reduce the average in situ hydraulic conductivity of the grouted waste materials to a value equal to or less than 1×10^{-6} cm/sec. This target hydraulic conductivity value was established to be at least two orders of magnitude lower than that of the surrounding natural ground. The main report describes brief background to the project, describes and analyzes the grouting operations, draws conclusions from the work performed, and presents some of the lessons learned. Appendices contain: (A) pipe driving records; (B) casing grout injection records; (C) in-situ hydraulic conductivity testing records; and (D) grout quality control testing records.

484
(ORNL/ER–401-V3)
Field grouting summary report on the WAG 4 seeps 4 and 6 removal action project, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Volume 3. Appendixes E and F. Oak Ridge National Lab., TN (United States). May 1997. 665p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97006027. Source: OSTI; NTIS; INIS; GPO Dep.

During the summer of 1996, a unique multi-phase, multi-stage, low-pressure permeation grouting pilot program was performed inside portions of four unlined waste disposal trenches at Waste Area Grouping (WAG) 4 at Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. The project was deemed a non-time-critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA); however, due to a history of heavy precipitation in the fall, the schedule was fast-tracked to meet an October 31, 1996 grouting completion date. The technical objective of the removal action was to reduce the off-site transport of j Strontium 90 (^{90}Sr) by grouting portions of four waste disposal trenches believed to be responsible for over 70 percent of the ^{90}Sr leaving the site. A goal of the grouting operation was to reduce the average in situ hydraulic conductivity of the grouted waste materials to a value equal to or less than 1×10^{-6} cm/sec. This target hydraulic conductivity value was established to be at least two orders of magnitude lower than that of the surrounding natural ground.

485
(PNNL–11177)
The Multimedia Environmental Pollutant Assessment System (MEPAS®): Completely-Stirred Tank Reactor (CSTR) formulations for the wetland pathway. McDonald, J.P.; van der Aa, N.G.F.M.; Whelan, G. Pacific Northwest National Lab., Richland, WA (United States). ©Jun 1997. 32p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Source: Pacific Northwest National Laboratory, Richland, WA 99352 (United States).

The Multimedia Environmental Pollutant Assessment System (MEPAS) is a physics-based environmental analysis code integrating source-term, fate, and exposure models for concentration, dose, or risk endpoints. Developed by Pacific Northwest National Laboratory for the US Department of Energy, MEPAS is designed for site-specific assessments using readily available information. Endpoints are computed for chemical and radioactive pollutants. For human health impacts, risks are computed for radioactive and hazardous carcinogens, and hazard quotients for noncarcinogens. This system has wide applicability to environmental problems using air, groundwater, surface-water, overland, wetland, and exposure models. MEPAS enables users to simulate release of contaminants from a source; transport of contaminants through the air, groundwater, surface-water, overland, or wetland pathways; and transfer of contaminants through food chains and exposure pathways to the exposed individual or population. Whenever available and appropriate, guidance and/or models from the US Environmental Protection Agency, International Commission on Radiological Protection, and National Council on Radiation Protection and Measurements were used to facilitate compatibility and acceptance. Although based on relatively standard transport and exposure computation approaches, MEPAS uniquely integrated these approaches into a single system, providing a

consistent basis for evaluating health impacts for a large number of problems and sites. Implemented on a desktop computer, a user-friendly platform allows the user to define the problem, input the required data, and execute the appropriate models. This document describes the mathematical formulations for the Completely-Stirred Tank Reactor (CSTR) component of MEPAS as applied to the wetland pathway.

486
(PNNL–11216)
STOMP Subsurface Transport Over Multiple Phases: Application guide. Nichols, W.E.; Aimo, N.J.; Oostrom, M.; White, M.D. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 250p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States);Nuclear Regulatory Commission, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050086. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE), through the Office of Technology Development, has requested the demonstration of remediation technologies for the cleanup of volatile organic compounds and associated radionuclides within the soil and ground water at arid sites. This demonstration program, called the VOC-Arid Soils Integrated Demonstrated Program (Arid-ID), has been initially directed at a volume of unsaturated and saturated soil contaminated with carbon tetrachloride on the Hanford Site near Richland, Washington. A principal subtask of the Arid-ID program involves the development of an integrated engineering simulator for evaluating the effectiveness and efficiency of various remediation technologies. The engineering simulator's intended users include scientists and engineers who are investigating soil physics phenomena associated with remediation technologies. Principal design goals for the engineering simulator include broad applicability, verified algorithms, quality assurance controls, and validated simulations against laboratory and field-scale experiments. An important goal for the simulator development subtask involves the ability to scale laboratory and field-scale experiments to full-scale remediation technologies, and to transfer acquired technology to other arid sites. The STOMP (Subsurface Transport Over Multiple Phases) simulator has been developed by the Pacific Northwest Laboratory for modeling remediation technologies. Information on the use, application, and theoretical basis of the STOMP simulator are documented in three companion guide guides. This document, the Application Guide, provides a suite of example applications of the STOMP simulator.

487
(PNNL–11251-1)
Analysis of long-term impacts of TRU waste remaining at generator/storage sites for No Action Alternative 2. Buck, J.W. (and others); Bagaasen, L.M.; Bergeron, M.P.; Streile, G.P. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 121p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050090. Source: OSTI; NTIS; INIS; GPO Dep.

This report is a supplement to the Waste Isolation Pilot Plant Disposal-Phase Final Supplemental Environmental Impact Statement (SEIS-II). Described herein are the underlying information, data, and assumptions used to estimate the long-term human-health impacts from exposure to radionuclides and hazardous chemicals in transuranic (TRU) waste remaining at major generator/storage sites after loss of institutional control under No Action Alternative 2. Under No Action Alternative 2, TRU wastes would not be emplaced at the Waste Isolation Pilot Plant (WIPP) but would remain at generator/storage sites in surface or near-surface storage. Waste generated at smaller sites would be consolidated at the major generator/storage sites. Current TRU waste management practices would continue, but newly generated waste would be treated to meet the WIPP waste acceptance criteria. For this alternative, institutional control was assumed to be lost 100 years after the end of the waste generation period, with exposure to radionuclides and hazardous chemicals in the TRU waste possible from direct intrusion and release to the surrounding environment. The potential human-health impacts from exposure to radionuclides and hazardous chemicals in TRU waste were analyzed for two different types of scenarios. Both analyses estimated site-specific, human-health impacts at seven major generator/storage sites: the Hanford Site (Hanford), Idaho National Engineering and Environmental Laboratory (INEEL), Lawrence Livermore National Laboratory (LLNL), Los Alamos National Laboratory (LANL), Oak Ridge National Laboratory (ORNL), Rocky Flats Environmental Technology Site (RFETS), and Savannah River Site (SRS). The analysis focused on these seven sites because 99 % of the estimated TRU waste volume and inventory would remain there under the assumptions of No Action Alternative 2.

488
(PNNL–11348)
Numerical analysis of the in-well vapor-stripping system demonstration at Edwards Air Force Base. White, M.D.; Gilmore, T.J. Pacific Northwest National Lab., Richland, WA (United States). Oct 1996. 218p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051513. Source: OSTI; NTIS; INIS; GPO Dep.

Numerical simulations, with the Subsurface Transport Over Multiple Phases (STOMP) simulator, were applied to the field demonstration of an in-well vapor-stripping system at Edwards Air Force Base (AFB), near Mojave, California. The demonstration field site on the Edwards AFB was previously contaminated from traversing groundwater that was contained a varied composition of volatile organic compounds (VOCs), which primarily includes trichloroethylene (TCE). Contaminant TCE originated from surface basin that had been used to collect runoff during the cleaning of experimental rocket powered planes in the 1960s and 1970s. This report documents those simulations and associated numerical analyses. A companion report documents the in- well vapor-stripping demonstration from a field perspective.

489
(PNNL–11372)
In Situ Redox Manipulation Field Injection Test Report - Hanford 100-H Area. Fruchter, J.S. (and others); Amonette, J.E.; Cole, C.R. Pacific Northwest National Lab., Richland, WA (United States). Nov 1996. 336p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050892. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents results of an In Situ Redox Manipulation (ISRM) Field Injection Withdrawal Test performed at the 100-H Area of the US. Department of Energy's (DOE's) Hanford Site in Washington State in Fiscal Year 1996 by researchers at Pacific Northwest National Laboratory (PNNL). The test is part of the overall ISRM project, the purpose of which is to determine the potential for remediating contaminated groundwater with a technology based on in situ manipulation of subsurface reduction-oxidation (redox) conditions. The ISRM technology would be used to treat subsurface contaminants in groundwater zones at DOE sites.

490
(PNNL–11414)
Performance assessment of the In-Well Vapor-Stripping System. Gilmore, T.J. (and others); White, M.D.; Spane, F.A. Jr. Pacific Northwest Lab., Richland, WA (United States). Oct 1996. 78p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051568. Source: OSTI; NTIS; GPO Dep.

In-well vapor stripping is a remediation technology designed to preferentially extract volatile organic compounds dissolved in groundwater by converting them to a vapor phase and then treating the vapor. This vapor-stripping system is distinctly different from the more traditional in situ air-sparging concept. In situ sparging takes place in the aquifer formation; in-well vapor stripping takes place within the well casing. The system was field demonstrated at Edwards Air Force Base, California; the first-time demonstration of this technology in the United States. Installation and testing of the system were completed in late 1995, and the demonstration was operated nearly continuously for 6 months (191 days) between January 16 and July 25, 1996. Postdemonstration hydrochemical sampling continued until September 1996. The demonstration was conducted by collaborating researchers from Pacific Northwest National Laboratory (a) and Stanford University as part of an interim cleanup action at the base. Edwards Air Force Base and its environmental subcontractor, Earth Technology Corporation, as well as EG&G Environmental, holders of the commercial rights to the technology, were also significant contributors to the demonstration.

491
(PNNL–11463)
A comprehensive analysis of contaminant transport in the vadose zone beneath tank SX-109. Ward, A.L.; Gee, G.W.; White, M.D. Pacific Northwest Lab., Richland, WA (United States). Feb 1997. 72p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052271. Source: OSTI; NTIS; INIS; GPO Dep.

The Vadose Zone Characterization Project is currently investigating the subsurface distribution of gamma-emitting radionuclides in S and SX Waste Management Area (WMA-S-SX) located in the 200 West Area of the US Department of Energy's Hanford Site in southeastern Washington State. Spectral-gamma logging of boreholes has detected elevated ^{137}Cs concentrations as deep as 38 m, a depth considered excessive based on the assumed geochemistry of ^{137}Cs in Hanford sediments. Routine groundwater sampling under the Resource Conservation and Recovery Act (RCRA) have also detected elevated levels of site-specific contaminants downgradient of WMA-S-SX. The objective of this report is to explore the processes controlling the migration of ^{137}Cs, ^{99}Tc, and NO_3 through the vadose zone of WMA-S-SX, particularly beneath tank SX-109.

492
(PNNL–11565)
Colloid suspension stability and transport through unsaturated porous media. McGraw, M.A.; Kaplan, D.I. Pacific Northwest Lab., Richland, WA (United States). Apr 1997. 70p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053054. Source: OSTI; NTIS; INIS; GPO Dep.

Contaminant transport is traditionally modeled in a two-phase system: a mobile aqueous phase and an immobile solid phase. Over the last 15 years, there has been an increasing awareness of a third, mobile solid phase. This mobile solid phase, or mobile colloids, are organic or inorganic submicron-sized particles that move with groundwater flow. When colloids are present, the net effect on radionuclide transport is that radionuclides can move faster through the system. It is not known whether mobile colloids exist in the subsurface environment of the Hanford Site. Furthermore, it is not known if mobile colloids would likely exist in a plume emanating from a Low Level Waste (LLW) disposal site. No attempt was made in this study to ascertain whether colloids would form. Instead, experiments and calculations were conducted to evaluate the likelihood that colloids, if formed, would remain in suspension and move through saturated and unsaturated sediments. The objectives of this study were to evaluate three aspects of colloid-facilitated transport of radionuclides as they specifically relate to the LLW Performance Assessment. These objectives were: (1) determine if the chemical conditions likely to exist in the near and far field of the proposed disposal site are prone to induce flocculation (settling of colloids from suspension) or dispersion of naturally occurring Hanford colloids, (2) identify the important mechanisms likely involved in the removal of colloids from a Hanford sediment, and (3) determine if colloids can move through unsaturated porous media.

493
(PNNL–11568)
Treatment studies of plutonium-bearing INEEL waste surrogates in a bench-scale arc furnace. Freeman, C.J. Pacific Northwest National Lab., Richland, WA (United States). May 1997. 39p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053372. Source: OSTI; NTIS; INIS; GPO Dep.

Since 1989, the Subsurface Disposal Area (SDA) at the Idaho National Environmental and Engineering Laboratory (INEEL) has been included on the National Priority List for remediation. Arc- and plasma-heated furnaces are being considered for converting the radioactive mixed waste buried in the SDA to a stabilized-vitreous form. Nonradioactive, surrogate SDA wastes have been melted during tests in these types of furnaces, but data are needed on the behavior of transuranic (TRU) constituents, primarily plutonium, during thermal treatment. To begin collecting this data, plutonium-spiked SDA surrogates were processed in a bench-scale arc furnace to quantify the fate of the plutonium

and other hazardous and nonhazardous metals. Test conditions included elevating the organic, lead, chloride, and sodium contents of the surrogates. Blends having higher organic contents caused furnace power levels to fluctuate. An organic content corresponding to 50% INEEL soil in a soil-waste blend was the highest achievable before power fluctuations made operating conditions unacceptable. The glass, metal, and off-gas solids produced from each surrogate blend tested were analyzed for elemental (including plutonium) content and the partitioning of each element to the corresponding phase was calculated.

494
(PNNL–11573)
Groundwater monitoring plan for the 183-H Solar Evaporation Basins. Hartman, M.J. Pacific Northwest Lab., Richland, WA (United States). May 1997. 66p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053051. Source: OSTI; NTIS; INIS; GPO Dep.

Groundwater monitoring at the 183-H Solar Evaporation Basins is regulated under Washington Administrative Code 173-303-645. Proposed in this plan is the first phase of a final-status, corrective action monitoring program for the site. The monitoring network consists of four existing wells: 199-H4-3, 199-H4-7, 199-H4-12A, and 199-H4-12C. Well 199-H4-12C is completed at the base of the unconfined aquifer; the other wells are screened at the water table. Wells 199-H4-7 and 199-H4-12A are groundwater extraction wells used in a pump-and-treat system. Groundwater samples will be collected from each well annually. Samples will be analyzed for the following: (1) constituents of concern (i.e., chromium, nitrate, technetium-99, and uranium) and fluoride; (2) additional constituents to aid data interpretation (e.g., alkalinity, anions, and metals); and (3) field parameters routinely acquired at the wellhead (e.g., pH, specific conductance, temperature, and turbidity). The objective of monitoring during operation of the pump-and-treat system is to determine whether concentrations of the contaminants of concern are decreasing.

495
(PNNL–11574)
Results of RCRA groundwater quality assessment program at the 216-U-12 crib. Williams, B.A.; Chou, C.J. Pacific Northwest Lab., Richland, WA (United States). May 1997. 61p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053053. Source: OSTI; NTIS; INIS; GPO Dep.

The 216-U-12 crib has been in a Resource Conservation and Recovery Act of 1976 (RCRA) interim-status groundwater quality assessment program since the first quarter of 1993. Specific conductance measured in downgradient wells 299-W22-41 and 299-W22-42 exceeds its critical mean. This report presents the results and findings of Phases I and II of the assessment monitoring program, as required by 40 CFR 265.93. The elevated levels of specific conductance in the downgradient "triggering" wells are attributed to nitrate, the mobile anion released when nitric acid is diluted in water, and calcium which is released from the sediments as acid is neutralized. Technetium-99 levels have been elevated in these same downgradient wells since 1991. The source of these constituents is the 216-U-12 crib. Downward migration of nitrate and technetium-99 from the vadose zone (and continued elevated specific conductance in the two downgradient wells) is still occurring because the driving force is still present.

496
(PNNL–11620)
Liquid effluent retention facility final-status groundwater monitoring plan. Sweeney, M.D.; Chou, C.J.; Bjornstad, B.N. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 49p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050514. Source: OSTI; NTIS; INIS; GPO Dep.

The following sections describe the groundwater-monitoring program for the Liquid Effluent Retention Facility (LERF). The LERF is regulated under the Resource Conservation and Recovery Act of 1976 (RCRA). The LERF is included in the "Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste, Permit WA890008967", (referred to herein as the Permit) (Ecology 1994) and is subject to final-status requirements for groundwater monitoring (WAC 173-303-645). This document describes a RCRA/WAC groundwater detection-monitoring program for groundwater in the uppermost aquifer system at the LERF. This plan describes the LERF monitoring network, constituent list, sampling schedule, statistical methods, and sampling and analysis protocols that will be employed for the LERF. This plan will be used to meet the groundwater monitoring requirements from the time the LERF becomes part of the Permit and through the post-closure care period, until certification of final closure.

497
(PNNL–11633)
Origin of increased sulfate in groundwater at the ETF disposal site. Thornton, E.C. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 31p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054521. Source: OSTI; NTIS; INIS; GPO Dep.

Treated effluent being discharged to the vadose zone from the C-018H Effluent Treatment Facility (ETF) at the Hanford Site has infiltrated vertically to the unconfined aquifer, as indicated by increasing tritium activity levels in the groundwater. Well 699-48-77A, in particular, exhibits increased levels of tritium and also sulfate in the groundwater. The origin of increased sulfate levels in the groundwater is attributed to the dissolution of gypsum as the effluent flows through the vadose zone. This is supported by the observation that sulfate was found to be present in soils collected from the vadose zone at an average value of about 10.6 ppm. The maximum observed sulfate concentration of 190 mg/L from well 699-48-77A was observed on August 6, 1996, and is less than the maximum value of 879 mg/L that potentially could be achieved if water in the vadose zone was to attain saturation with respect to gypsum and calcite. It is suggested that infiltration rates were high enough that the effluent did not completely equilibrate with gypsum in the vadose zone, and thus, sulfate levels remained below gypsum saturation levels. Sulfate levels appear to be dropping, which may be attributed to the completion of the dissolution of the bulk of gypsum present along the vadose zone flow

path traversed by the effluent. Geochemical modeling was undertaken to evaluate the influence of effluent chemistry on sulfate concentration levels in the presence of excess calcite and gypsum. In general, the effect is fairly minor for dilute solutions, but becomes more significant for concentrated solutions.

498
(SAND–86-0917)
Analysis of solutes in groundwaters from the Rustler Formation at and near the Waste Isolation Pilot Plant site. Robinson, K.L. Sandia National Labs., Albuquerque, NM (United States). Sep 1997. 294p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE98000220. Source: OSTI; NTIS; INIS; GPO Dep.

Between 1976 and 1986, groundwater samples from more than 60 locations in the vicinity of the Waste Isolation Pilot Plant site were collected and analyzed for a variety of major, minor, and trace solutes. Most of the samples were from the Rustler Formation (the Culebra Dolomite, the Magenta Dolomite, or the zone at the contact between the Rustler and underlying Salado Formations) or the Dewey Lake Red Beds. The analytical data from the laboratories are presented here with accompanying discussions of sample collection methods, supporting field measurements, and laboratory analytical methods. A comparison of four data sets and a preliminary evaluation of the data for the major solutes (Cl^-, SO_4^{-2}, Na, K, Ca, and Mg) shows that the data for samples analyzed by UNC/Bendix for SNL seem to be the most reliable, but that at some locations, samples representative of the native, unperturbed groundwater have not been collected. At other locations, the water chemistry has apparently changed between sampling episodes.

499
(SAND–96-1652C)
Use of thermal desorption/gas chromatography as a performance-based screening method for petroleum hydrocarbons. Slavin, P.J. (GRAM, Inc., Albuquerque, NM (United States)); Crandall, K.; Dawson, L.; Kottenstette, R.; Wade, M. Sandia National Labs., Albuquerque, NM (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960804–51: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96012951. Source: OSTI; NTIS; GPO Dep.

Thermal desorption/gas chromatography (TD/GC) was used to screen soil samples on site for total petroleum hydrocarbon (TPH) content during a RCRA Facility Investigation (RFI). It proved to be a rapid, cost- effective tool for detecting non-aromatic mineral oil in soil. The on- site TD/GC results correlated well with those generated at an off-site laboratory for samples analyzed in accordance with EPA Method 418.1.

500
(SAND–96-2500)
Laboratory and field scale demonstration of reactive barrier systems. Dwyer, B.P. (Sandia National Labs., Albuquerque, NM (United States)); Marozas, D.C.; Cantrell, K.; Stewart, W. Sandia National Labs., Albuquerque, NM (United States). Oct 1996. 13p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97001355. Source: OSTI; NTIS; INIS; GPO Dep.

In an effort to devise a cost efficient technology for remediation of uranium contaminated groundwater, the Department of Energy's Uranium Mill Tailings Remedial Action (DOE-UMTRA) Program through Sandia National Laboratories (SNL) fabricated a pilot scale research project utilizing reactive subsurface barriers at an UMTRA site in Durango, Colorado. A reactive subsurface barrier is produced by placing a reactant material (in this experiment, metallic iron) in the flow path of the contaminated groundwater. The reactive media then removes and/or transforms the contaminant(s) to regulatory acceptable levels. Experimental design and results are discussed with regard to other potential applications of reactive barrier remediation strategies at other sites with contaminated groundwater problems.

501
(SAND–97-0844)
Development of a subsurface gas flow probe. Cutler, R.P.; Ballard, S.; Barker, G.T.; Keefe, R.G.; Chavez, M.P.; Stockman, H.W.; Romero, L. Sandia National Labs., Albuquerque, NM (United States). Apr 1997. 112p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97006288. Source: OSTI; NTIS; GPO Dep.

This report describes a project to develop a flow probe to monitor gas movement in the vadose zone due to passive venting or active remediation efforts such as soil vapor extraction. 3-D and 1-D probes were designed, fabricated, tested in known flow fields under laboratory conditions, and field tested. The 3-D pores were based on technology developed for ground water flow monitoring. The probes gave excellent agreement with measured air velocities in the laboratory tests. Data processing software developed for ground water flow probes was modified for use with air flow, and to accommodate various probe designs. Modifications were made to decrease the cost of the probes, including developing a downhole multiplexer. Modeling indicated problems with flow channeling due to the mode of deployment. Additional testing was conducted and modifications were made to the probe and to the deployment methods. The probes were deployed at three test sites: a large outdoor test tank, a brief vapor extraction test at the Chemical Waste landfill, and at an active remediation site at a local gas station. The data from the field tests varied markedly from the laboratory test data. All of the major events such as vapor extraction system turn on and turn off, as well as changes in the flow rate, could be seen in the data. However, there were long term trends in the data which were much larger than the velocity signals, which made it difficult to determine accurate air velocities. These long term trends may be due to changes in soil moisture content and seasonal ground temperature variations.

502
(SAND–97-1369)
Description and evaluation of a mechanistically based conceptual model for spall. Hansen, F.D. (and others); Knowles, M.K.; Thompson, T.W. Sandia National Labs.,

Albuquerque, NM (United States). Aug 1997. 315p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE98000055. Source: OSTI; NTIS; INIS; GPO Dep.

A mechanistically based model for a possible spall event at the WIPP site is developed and evaluated in this report. Release of waste material to the surface during an inadvertent borehole intrusion is possible if future states of the repository include high gas pressure and waste material consisting of fine particulates having low mechanical strength. The conceptual model incorporates the physics of wellbore hydraulics coupled to transient gas flow to the intrusion borehole, and mechanical response of the waste. Degraded waste properties using of the model. The evaluations include both numerical and analytical implementations of the conceptual model. A tensile failure criterion is assumed appropriate for calculation of volumes of waste experiencing fragmentation. Calculations show that for repository gas pressures less than 12 MPa, no tensile failure occurs. Minimal volumes of material experience failure below gas pressure of 14 MPa. Repository conditions dictate that the probability of gas pressures exceeding 14 MPa is approximately 1%. For these conditions, a maximum failed volume of 0.25 m^3 is calculated.

503
(SAND–97-2317)
TDR calibration for the alternative landfill cover demonstration (ALCD). Lopez, J. (Sandia National Labs., Albuquerque, NM (United States). Environmental Restoration Technologies Dept.); Dwyer, S.F.; Swanson, J.N. Sandia National Labs., Albuquerque, NM (United States). Sep 1997. 66p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE98000452. Source: OSTI; NTIS; GPO Dep.

The Alternative Landfill Cover Demonstration is a large scale field test that compares the performance of various landfill cover designs in dry environments. An important component of the comparison is the change in the moisture content of the soils throughout the different cover test plots. Time Domain Reflectometry (TDR) is the primary method for the measurement of the volumetric moisture content. Each of the covers is composed of layers of varying types and densities of soils. The probes are therefore calibrated to calculate the volumetric moisture content in each of the different soils in order to gain the optimum performance of the TDR system. The demonstration plots are constructed in two phases; a different probe is used in each phase. The probe that is used in Phase 1 is calibrated for the following soils: compacted native soil, uncompacted native soil, compacted native soil mixed with 6% sodium bentonite by weight, and sand. The probe that is used in Phase 2 is calibrated for the following soils: compacted native soil, uncompacted native soil, and sand. In addition, the probes are calibrated for the varying cable lengths of the TDR probes. The resulting empirically derived equations allow for the calculation of in-situ volumetric moisture content of all of the varying soils throughout the cover test plots in the demonstration.

504
(WSRC-MS–95-0303)
In situ bioremediation of chlorinated solvent with natural gas. Rabold, D.E. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. Order Number DE96002956. Source: OSTI; NTIS; INIS; GPO Dep.

A bioremediation system for the removal of chlorinated solvents from ground water and sediments is described. The system involves the the in-situ injection of natural gas (as a microbial nutrient) through an innovative configuration of horizontal wells.

505
(Y/ER–278)
Treatability study on the Bear Creek Valley characterization area at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Phase II work plan for S-3 site contaminated groundwater interception–in-field media evaluation and groundwater capture methods. Science Applications International Corp., Oak Ridge, TN (United States). *Dec 1996.* 27p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002412. Source: OSTI; NTIS; INIS; GPO Dep.

A treatability study is being conducted to support implementation:of early actions at the S-3 Site in the Bear Creek Valley (BCV) Characterization Area (CA). The objectives of the early actions Will be (1) to reduce concentrations of uranium and nitrate in Bear Creek and (2) to reduce contaminants of concern in North Tributary (NT)-1 and NT-2. The BCV CA is located within the US DOE's Oak Ridge Reservation in Tennessee. Hazardous and radioactive materials from the Y-12 Plant operations were, disposed of at various sites within BCV. Groundwater and surface water in the BCV CA have been contaminated. The remedial investigation (RI) for the BCV CA identified that the greatest mass flux of contaminants from the various sources migrates via groundwater at the source and discharges to surface water in Bear Creek and its tributaries. In the RI, the combined discharge from the S-3 Site and the Boneyard/Burnyard (BYBY) was identified as accounting for 75% of the cancer risk and more than 80% of the chemical toxicity to Potential downgradient human receptors. In addition, the S-3 Site has caused degradation of surface water quality in upper Bear Creek and two of its tributaries. The BCV CA treatability study focuses on capture and treatment of shallow groundwater before it discharges to tributary waters. The objectives Of treatment of this groundwater are (1) to reduce the concentrations of uranium and nitrate in NT-1 and Bear Creek such that the concentrations of these chemicals in surface water and groundwater are reduced to acceptable levels, (2) to reduce the concentrations of nitrate and metals, and reduce the overall concentration of total dissolved solids; and (3) to hydraulically contain the plume of contaminated, groundwater that is moving in bedrock in the Nolichucky Shale such that the rate of contaminant discharge will be reduced in the long term. The objective of Phase II is to produce conceptual designs for treatment system configurations.

506
(Y/ER–282)
Final report for the Central Mercury Treatment System in Building 9623 at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). Feb 1997. 20p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC

(United States). DOE Contract AC05-96OR22464. Order Number DE97004308. Source: OSTI; NTIS; INIS; GPO Dep.

This document discusses the construction of the Central Mercury Treatment System (CMTS) in Building 9623 at the Y-12 Plant, the remediation activities involved, waste generated from the project, and the monitoring schedule of the CMTS. As part of the Reduction of Mercury in Plant Effluent Program, the project treats groundwater contaminated with mercury from Buildings 9201-4, 9201-5, and 9204-4 at the Y-12 Plant to meet National Pollutant Discharge Elimination System (NPDES) Permit limits for discharge to East Fork Poplar Creek. The CMTS, located in Building 9623, will treat water from the sumps of buildings in which mercury was used in operations and which have been shown to be significant contributors to the overall levels of mercury in plant effluents. This project was anticipated when the NPDES Permit was issued, and the contamination limits and frequency of monitoring for the system discharge are detailed in the permit as Outfall 551. This project was performed as an Incentive Task Order and included the advance procurement of the carbon columns, removal of existing equipment in Building 9623, and system installation and checkout. Construction activities for installing the system started in January 1996 after the area in Building 9623 had been cleared of existing, obsolete equipment. The CMTS became operational on November 26, 1996, well ahead of the permit start date of January 1, 1998. The early completion date allows Hg concentrations in EFPC to be evaluated to determine whether further actions are required to meet NPDES permit limits for reduced Hg loading to the creek.

507
(Y/ER–285)
Phase 1 report on the Bear Creek Valley treatability study, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States); Science Applications International Corp., Oak Ridge, TN (United States). Apr 1997. 375p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97005102. Source: OSTI; NTIS; INIS; GPO Dep.

Bear Creek Valley (BCV) is located within the US Department of Energy (DOE) Oak Ridge Reservation and encompasses multiple waste units containing hazardous and radioactive wastes associated with past operations at the adjacent Oak Ridge Y-12 Plant. The BCV Remedial Investigation determined that disposal of wastes at the S-3 Site, Boneyard/Burnyard (BYBY), and Bear Creek Burial Grounds (BCBG) has caused contamination of both deep and shallow groundwater. The primary contaminants include uranium, nitrate, and VOCs, although other metals such as aluminum, magnesium, and cadmium persist. The BCV feasibility study will describe several remedial options for this area, including both in situ and ex situ treatment of groundwater. This Treatability Study Phase 1 Report describes the results of preliminary screening of treatment technologies that may be applied within BCV. Four activities were undertaken in Phase 1: field characterization, laboratory screening of potential sorbents, laboratory testing of zero valent iron products, and field screening of three biological treatment systems. Each of these activities is described fully in technical memos attached in Appendices A through G.

508
(Y/ER–287)
Health and safety plan for phase II of the Bear Creek Valley treatability study Oak Ridge Y-12 plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). May 1997. 39p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97006493. Source: OSTI; NTIS; INIS; GPO Dep.

This Health and Safety Plan (HASP) addresses the health and safety (H&S) concerns and requirements for the Bear Creek Valley (BCV) Treatability Study at the Oak Ridge Y-12 Plant. Samples will be collected from effluent following treatment tests of extraction columns, algal mats, and mature wetlands supplied by surface water locations and existing groundwater monitoring well locations. The project Sampling and Analysis Plan addresses the project description, technical objectives, procedures, and planned work activities in greater detail. It is the responsibility of the project managers, field manager, and site health and safety officer (SHSO) to determine that the requirements of this HASP are sufficiently protective. If it is determined that the requirements of this HASP are not sufficiently protective, a field change order(s) (FCO) will be prepared. FCOs will include a completed job hazard analysis or similar worksheet to ensure complete hazard assessment. FCOs must be approved by the Environmental Management and Enrichment Facilities (EMEF) project manager, EMEF H&S manager, subcontractor project or field manager, and subcontractor H&S representative. As a minimum, FCOs will be prepared if additional tasks will be performed or if contaminant exposure is anticipated.

509
(Y/ER–288)
Best management practices plan for Phase II of the Bear Creek Valley treatability study Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). May 1997. 28p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97007558. Source: OSTI; NTIS; INIS; GPO Dep.

The Oak Ridge Y-12 Plant site is currently under a Federal Facilities Agreement to define soil and groundwater contamination and develop remedies to protect human health and the environment. The western end of the site is known to have a former nitric acid disposal pit that has been remediated and capped. Remedial investigation data indicate this pit was a source of nitrate, uranium, technetium, and other metals contamination in groundwater. The downgradient receptor of this contamination includes Bear Creek and its tributaries. A feasibility study is underway to develop a remedy to prevent further contaminant migration to this receptor. To support the feasibility study, a treatability study is being completed to examine groundwater treatment at the S-3 site. This document serves as the top level command medium for Phase II and as such will be the primary resource for management and implementation of field activities. Many of the details and standard operating procedures referred within this document can be found in other Lockheed Martin Energy Systems (Energy Systems) documents. Several supporting documents specific to this project are also cited. These include the Sampling and Analysis Plan (SAP), the Health and Safety Plan (HASP), and the Waste Management Plan (WMP). Section 1 describes the results

of Phase I efforts. Section 2 describes the objectives of Phase II. Section 3 provides details of field testing. Section 4 addresses the HASP. Section 5 describes the SAP. Section 6 introduces the WMP. Environmental compliance issues are discussed in Section 7, and sediment and erosion control is addressed in Section 8. Information about the project team is provided in Section 9.

510
(Y/ER–288/R1)
Best management practices plan for Phase II of the Bear Creek Valley treatability study, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). Sep 1997. 39p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OS21400. Order Number DE97009168. Source: OSTI; NTIS; INIS; GPO Dep.

The Oak Ridge Y-12 Plant is currently under a Federal Agreement to define soil and groundwater contamination and develop remedies to protect human health and the environment. The western end of the site is known to have a former nitric acid disposal pit that has been remediated and capped. Remedial investigation data indicate this pit was a source of nitrate, uranium, technetium, and other metals contamination in groundwater. The downgradient receptor of this contamination includes Bear Creek and its tributaries. A feasibility study is under way to develop a remedy to prevent further contaminant migration to this receptor. To support the feasibility study, the treatability study is being completed to examine groundwater treatment at the S-3 site. This document serves as the top-level command medium for Phase II of the Bear Creek Valley (BCV) Treatability Study and, as such, will be the primary resource for management and implementation of field activities. Many of the details and standard operating procedures referred to herein can be found in other Lockheed Martin Energy Systems, Inc. (Energy Systems), documents. Several supporting documents specific to this project are also cited. These include the Sampling and Analysis Plan (SAP), the Health and Safety Plan (HASP), and the Waste Management Plan (WMP).

511
(Y/ER–289)
Waste management plan for Phase II of the Bear Creek Valley treatability study Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). May 1997. 20p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97005149. Source: OSTI; NTIS; INIS; GPO Dep.

This Waste Management Plant (WMP) for the Bear Creek Valley Treatability Study addresses waste management requirements for the Oak Ridge Y-12 Plant. The study is intended to produce treatment performance data required to design a treatment system for contaminated groundwater. The treatability study will consist of an evaluation of various treatment media including: continuous column tests, with up to six columns being employed to evaluate the performance of different media in the treatment of groundwater; an evaluation of the denitrifying capacity and metal uptake capacity of a wetland system; and the long-term denitrifying capacity and metal uptake capacity of algal mats. The Sampling and Analysis Plan (SAP) covers the project description, technical objectives, procedures, and planned work activities in greater detail. The Health and Safety Plan (HASP) addresses the health and safety concerns and requirements for the proposed sampling activities. This WMP identifies the types and estimates the volumes of various wastes that may be generated during the proposed treatability studies. The approach to managing waste outlined in this WMP emphasizes: (1) management of the waste generated in a manner that is protective of human health and the environment; (2) minimization of waste generation, thereby reducing unnecessary costs and usage of limited permitted storage and disposal capacities; and (3) compliance with federal, state, and site requirements. Prior sampling at the site has detected organic, radioactive, and metals contamination in groundwater and surface water. Proposed field operations are not expected to result in worker exposures greater than applicable exposure or action limits.

512
(Y/ER–289/R1)
Waste management plan for phase II of the Bear Creek Valley Treatability study Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). Sep 1997. 28p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OS21400. Order Number DE97009319. Source: OSTI; NTIS; INIS; GPO Dep.

This Waste Management Plan (WMP) for the Bear Creek Valley Treatability Study addresses waste management requirements for the Oak Ridge Y-12 Plant. The study is intended to produce treatment performance data required to design a treatment system for contaminated groundwater. The treatability study will consist of an evaluation of various treatment media including continuous column tests, with up to six columns being employed to evaluate the performance of different media in the treatment of groundwater; an evaluation of the dentrifying capacity and metal uptake capacity of a wetland system; and the long-term dentrifying capacity and metal uptake capacity of algal mats. Additionally, the treatability study involves installation of a trench and incline well to evaluate and assess hydraulic impacts of pumping groundwater. The Sampling and Analysis Plan (SAP) covers the project description, technical objectives, procedures, and planned work activities in greater detail. The Health and Safety Plan (HASP) addresses the health and safety concerns and requirements for the proposed sampling activities. This WMP identifies the types and estimates the volumes of various wastes that may be generated during the proposed treatability studies. The approach to managing waste outlined in this WMP emphasizes the following points: (1) management of the waste generated in a manner that is protective of human health and the environment; (2) minimization of waste generation, thereby reducing unnecessary costs and usage of limited permitted storage and disposal capacities; and (3) compliance with federal, state, and site requirements. Prior sampling at the site has detected organic, radioactive, and metals contamination in groundwater and surface water. Proposed field operations are not expected to result in worker exposures greater than applicable exposure or action limits.

513
(Y/ER–291)
Review of passive groundwater remediation systems:

Lessons learned Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). Aug 1997. 22p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OS21400. Order Number DE97007268. Source: OSTI; NTIS; INIS; GPO Dep.

One of the proposed solutions for treatment of the contaminated groundwater in the Bear Creek Valley is the installation of a passive treatment system. Such a system would use a reactive media installed in a continuous trench or in a gate as part of a barrier wall and gate system. This report evaluates information on five similar systems [no information was available on two additional systems] and evaluates the shortcomings and the advantages of each. Section 5 provides a short summary of the findings and presents some recommendations on how to avoid some of the common problems encountered with the existing systems.

MIXED WASTE CHARACTERIZATION, TREATMENT, AND DISPOSAL

514
(ANL/CMT/CP–87864)
A review of chemical decontamination systems for nuclear facilities. Chen, L.; Chamberlain, D.B.; Conner, C.; Vandegrift, G.F. Argonne National Lab., IL (United States). Chemical Technology Div. [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960443–6: American Nuclear Society (ANS) topical meeting on decontamination and decommissioning, Chicago, IL (United States), 14-17 Apr 1996). Order Number DE96008403. Source: OSTI; NTIS; INIS; GPO Dep.

With the downsizing of the Department of Energy (DOE) complex, many of its buildings and facilities will be decommissioned and dismantled. As part of this decommissioning, some form of decontamination will be required. To develop an appropriate technology for in situ chemical decontamination of equipment interiors in the decommissioning of DOE nuclear facilities, knowledge of the existing chemical decontamination methods is needed. This paper attempts to give an up-to-date review of chemical decontamination methods. This survey revealed that aqueous systems are the most widely used for the decontamination and cleaning of metal surfaces. We have subdivided the aqueous systems by types of chemical solvent: acid, alkaline permanganate, highly oxidizing, peroxide, and proprietary. Two other systems, electropolishing and foams and gels, are also described in this paper.

515
(ANL/CMT/CP–87865)
Decontamination of actinides and fission products from stainless steel surfaces. Mertz, C. (Argonne National Lab., IL (United States)); Chamberlain, D.B.; Chen, L.; Conner, C.; Vandegrift, G.F.; Drockelman, D.; Kaminski, M.; Landsberger, S.; Stubbins, J. Argonne National Lab., IL (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960443–5: American Nuclear Society (ANS) topical meeting on decontamination and decommissioning, Chicago, IL (United States), 14-17 Apr 1996). Order Number DE96008402. Source: OSTI; NTIS; INIS; GPO Dep.

Seven in situ decontamination processes were evaluated as possible candidates to reduce radioactivity levels in nuclear facilities throughout the DOE complex. These processes were tested using stainless steel coupons (Type 304) contaminated with actinides (Pu and Am) or fission products (a mixture of Cs, Sr, and Gd). The seven processes were decontamination with nitric acid, nitric acid plus hydrofluoric acid, fluoboric acid, silver(II) persulfate, hydrogen peroxide plus oxalic acid plus hydrofluoric acid, alkaline persulfate followed by citric acid plus oxalic acid, and electropolishing using nitric acid electrolyte. Of the seven processes, the nitric acid plus hydrofluoric acid and fluoboric acid solutions gave the best results; the decontamination factors for 3- to 6-h contacts at 80°C were as high as 600 for plutonium, 5500 for americium, 700 for cesium, 15000 for strontium, and 1100 for gadolinium.

516
(ANL/CMT/CP–90404)
Dissolution rates of DWPF glasses from long-term PCT. Ebert, W.L.; Tam, S.W. Argonne National Lab., IL (United States). [1996]. 8p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-961202–84: 1996 Fall meeting of the Materials Research Society (MRS), Boston, MA (United States), 2-6 Dec 1996). Order Number DE97003180. Source: OSTI; NTIS; INIS; GPO Dep.

We have characterized the corrosion behavior of several Defense Waste Processing Facility (DWPF) reference waste glasses by conducting static dissolution tests with crushed glasses. Glass dissolution rates were calculated from measured B concentrations in tests conducted for up to five years. The dissolution rates of all glasses increased significantly after certain alteration phases precipitated. Calculation of the dissolution rates was complicated by the decrease in the available surface area as the glass dissolves. We took the loss of surface area into account by modeling the particles to be spheres, then extracting from the short-term test results the dissolution rate corresponding to a linear decrease in the radius of spherical particles. The measured extent of dissolution in tests conducted for longer times was less than predicted with this linear dissolution model. This indicates that advanced stages of corrosion are affected by another process besides dissolution, which we believe to be associated with a decrease in the precipitation rate of the alteration phases. These results show that the dissolution rate measured soon after the formation of certain alteration phases provides an upper limit for the long-term dissolution rate, and can be used to determine a bounding value for the source term for radionuclide release from waste glasses. The long-term dissolution rates measured in tests at 20,000 per m at 90 °C in tuff groundwater at pH values near 12 for the Environmental Assessment glass and glasses made with SRL 131 and SRL 202 frits, respectively.

517
(ANL/CMT/CP–90405)
Comparison of the corrosion behavior of tank 51 sludge-based glass and a nonradioactive homologue glass. Nunez, L.; Ebert, W.L.; Wolf, S.F.; Bates, J.K. Argonne National Lab., IL (United States). [1996]. 8p. Sponsored by USDOE Office of Environmental Restoration and

Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-961202–74: 1996 Fall meeting of the Materials Research Society (MRS), Boston, MA (United States), 2-6 Dec 1996). Order Number DE97003239. Source: OSTI; NTIS; INIS; GPO Dep.

We are conducting static dissolution tests with a glass made at the Savannah River Technology Center (SRTC) during a demonstration of the Defense Waste Processing Facility (DWPF) process control for remote vitrification [1]. The glass was made with sludge from Tank 5 1, SRL 202 frit, and added soda. This glass is similar to waste glasses being made in the current DWPF campaign. Parallel tests are being conducted with a nonradioactive glass made at ANL having the same composition as the radioactive glass, except without the radionuclides. The radioactive and nonradioactive glasses are referred to as 5IR and 5IS, respectively. The results of these tests provide information pertinent to assessing the long-term corrosion behavior of DWPF glasses, comparing the corrosion behaviors of radioactive and nonradioactive glasses, and characterizing the disposition of radionuclides as the glass corrodes.

518
(ANL/DIS/CP–87708)
Accident analysis for the low-level mixed waste "No-Flame" option in the U.S. Department of Energy Waste Management Programmatic Environmental Impact Statement. Folga, S. (Argonne National Lab., Argonne, IL (United States)); Kohout, E.; Mueller, C.J.; Nabelssi, B.; Wilkins, B.; Mishima, J. Argonne National Lab., IL (United States). 1996. 12p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31-109-ENG-38. (CONF-960212–17: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006903. Source: OSTI; NTIS; INIS; GPO Dep.

This paper outlines the various steps pursued in performing a generic safety assessment of the various technologies considered for the low-level mixed waste (LLMW) "No-Flame" option in the US Department of Energy (DOE) Waste Management Programmatic Environmental Impact Statement (WM PEIS). The treatment technologies for the "No-Flame" option differ from previous LLMW technologies analyzed in the WM PEIS in that the incineration and thermal desorption technologies are replaced by sludge washing, soil washing, debris washing, and organic destruction. A set of dominant waste treatment processes and accident scenarios were selected for analysis by means of a screening process. A subset of results (release source terms) from this analysis is presented.

519
(ANL/EA/CP–88903)
Waste-clearance strategy for DOE waste processed at commercial facilities. Chen, S.Y.; Pfingston, M.; LePoire, D. Argonne National Lab., IL (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9606116–26: Annual meeting of the American Nuclear Society (ANS), Reno, NV (United States), 16-20 Jun 1996). Order Number DE96010769. Source: OSTI; NTIS; INIS; GPO Dep.

In May 1991, a moratorium was issued on shipping potentially mixed waste from DCE facilities nationwide to commercial treatment, storage, and disposal facilities. A potential waste-clearance strategy was developed to address the DOE mixed-waste moratorium issues, which had resulted from a lack of exisitng volume contamination regulations. This strategy also has important potential applications for establishing site clearance limits that ensure worker and public risks remain well below regulatory limits.

520
(ANL/EA/CP–89045)
Projected transuranic waste loads requiring treatment, storage, and disposal. Hong, K.; Kotek, T. Argonne National Lab., IL (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31-109-ENG-38. (CONF-960212–38: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006902. Source: OSTI; NTIS; INIS; GPO Dep.

This paper provides information on the volume of TRU waste loads requiring treatment, storage, and disposal at DOE facilities for three siting configurations. Input consisted of updated inventory and generation data from. Waste Isolation Pilot plant Transuranic Waste Baseline Inventory report. Results indicate that WIPP's design capacity is sufficient for the CH TRU waste found throughout the DOE Complex.

521
(ANL/EAD/TM–20)
Low-level waste inventory, characteristics, generation, and facility assessment for treatment, storage, and disposal alternatives considered in the US Department of Energy waste management programmatic environmental impact statement. Goyette, M.L.; Dolak, D.A. Argonne National Lab., IL (United States). Dec 1996. 412p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000959. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides technical support information for use in analyzing environmental impacts associated with U.S. Department of Energy (DOE) low-level radioactive waste (LLW) management alternatives in the Waste-Management (WM) Programmatic Environmental Impact Statement (PEIS). Waste loads treated and disposed of for each of the LLW alternatives considered in the DOE WM PEIS are presented. Waste loads are presented for DOE Waste Management (WM) wastes, which are generated from routine operations. Radioactivity concentrations and waste quantities for treatment and disposal under the different LLW alternatives are described for WM waste. 76 refs., 14 figs., 42 tabs.

522
(ANL/EAD/TM–23)
Supplemental information related to risk assessment for the off-site transportation of low-level waste for the U.S. Department of Energy waste management programmatic environmental impact statement. Monette, F.A. (Argonne National Lab., IL (United States). Environmental Assessment Div.); Biwer, B.M.; LePoire, D.J.; Chen, S.Y. Argonne National Lab., IL (United States). Dec 1996. 491p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98001951. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents supplemental information to support the human health risk assessment conducted for the transportation of low-level waste (LLW) in support of the US Department of Energy Waste Management Programmatic Environmental Impact Statement (WM PEIS). Detailed descriptions of the transportation health risk assessment method and results of the assessment are presented in Appendix E of the WM PEIS and are not repeated in this report. This report presents additional information that is not presented in Appendix E but that was needed to conduct the transportation risk assessment for Waste Management (WM) LLW. Included are definition of the LLW alternatives considered in the WM PEIS, data related to the inventory and to the physical and radiological characteristics of WM LLW, an overview of the risk assessment method, and detailed results of the assessment for each WM LLW alternative considered.

523
(ANL/EAD/TM–25)
Hazardous waste inventory, characteristics, generation, and facility assessment for treatment, storage, and disposal alternatives considered in the U.S. Department of Energy Waste Management Programmatic Environmental Impact Statement. Lazaro, M.A. (Argonne National Lab., IL (United States). Environmental Assessment Div.); Antonopoulos, A.A.; Esposito, M.P.; Policastro, A.J. Argonne National Lab., IL (United States). Dec 1996. 87p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000741. Source: OSTI; NTIS; INIS; GPO Dep.

This report focuses on the generation of hazardous waste (HW) and the treatment of HW being generated by routine US Department of Energy (DOE) facility operations. The wastes to be considered are managed by the DOE Waste Management (WM) Division (WM HW). The waste streams are to be sent to WM operations throughout the DOE complex under four management alternatives: No Action, Decentralization, Regionalized 1, and Regionalized 2. On-site and off-site capabilities for treatment are examined for each alternative. This report (1) summarizes the HW inventories and generated amounts resulting from WM activities, focusing on the largest DOE HW generators; (2) presents estimates of the annual amounts shipped off-site, as well as the amounts treated by various treatment technology groups; (3) describes the existing and planned treatment and storage capabilities of the largest HW-generating DOE installations, as well as the use of commercial treatment facilities by DOE sites; (4) presents applicable technologies (destruction of organics, deactivation/neutralization of waste, removal/recovery of organics, and aqueous liquid treatment); and (5) describes the four alternatives for consideration for future HW management, and for each alternative provides the HW loads and the approach used to estimate the source term for routine treatment operations. In addition, potential air emissions, liquid effluents, and solid residuals associated with each alternative are presented. This report is supplemented with an addendum that includes detailed information related to HW inventory, characteristics, generation, and facility assessment for the treatment alternatives. The addendum also presents source terms, emission rates, and throughput totals by alternative and treatment installation.

524
(ANL/EAD/TM–28)
Risk assessment for the transportation of hazardous waste and hazardous waste components of low-level mixed waste and transuranic waste for the US Department of Energy waste management programmatic environmental impact statement. Lazaro, M.A. (and others); Policastro, A.J.; Hartmann, H.M.; Chang, Y.S. Argonne National Lab., IL (United States). Dec 1996. 92p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000960. Source: OSTI; NTIS; INIS; GPO Dep.

This report, a supplement to Appendix E (Transportation Risk) of the U.S. Department of Energy Waste Management Programmatic Environmental Impact Statement (WM PEIS), provides additional information supporting the accident data for chemical risk assessment and health risk methodology described in that appendix (Part II) and presents the uncertainty analysis and on-site risk calculations. This report focuses on hazardous material truck accident rates, release probabilities, and release quantities; provides the toxicological values derived for each hazardous chemical assessed in the WM PEIS and further details on the derivation of health criteria; describes the method used in the transportation risk assessments to address potential additivity of health effects from simultaneous exposure to several chemicals and the method used to address transportation risks for maximally exposed individuals; presents an expanded discussion of the uncertainty associated with transportation risk calculations; and includes the results of the on-site transportation risk analysis. In addition, two addenda are provided to detail the risk assessments conducted for the hazardous components of low-level mixed waste (Addendum I) and transuranic waste (Addendum II).

525
(ANL/EAD/TM–29)
Analysis of accident sequences and source terms at treatment and storage facilities for waste generated by US Department of Energy waste management operations. Mueller, C.; Nabelssi, B.; Roglans-Ribas, J.; Folga, S.; Policastro, A.; Freeman, W.; Jackson, R.; Mishima, J.; Turner, S. Argonne National Lab., IL (United States). Dec 1996. [1000p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98003255. Source: OSTI; NTIS; INIS; GPO Dep.

This report documents the methodology, computational framework, and results of facility accident analyses performed for the US Department of Energy (DOE) Waste Management Programmatic Environmental Impact Statement (WM PEIS). The accident sequences potentially important to human health risk are specified, their frequencies assessed, and the resultant radiological and chemical source terms evaluated. A personal-computer-based computational framework and database have been developed that provide these results as input to the WM PEIS for the calculation of human health risk impacts. The WM PEIS addresses management of five waste streams in the DOE complex: low-level waste (LLW), hazardous waste (HW), high-level waste (HLW), low-level mixed waste (LLMW), and transuranic waste (TRUW). Currently projected waste generation rates, storage inventories, and treatment process throughputs have been calculated for each of the waste

streams. This report summarizes the accident analyses and aggregates the key results for each of the waste streams. Source terms are estimated, and results are presented for each of the major DOE sites and facilities by WM PEIS alternative for each waste stream. Key assumptions in the development of the source terms are identified. The appendices identify the potential atmospheric release of each toxic chemical or radionuclide for each accident scenario studied. They also discuss specific accident analysis data and guidance used or consulted in this report.

526
(ANL/EAD/TM–32)
Information related to low-level mixed waste inventory, characteristics, generation, and facility assessment for treatment, storage, and disposal alternatives considered in the U.S. Department of Energy Waste Management Programmatic Environmental Impact Statement. Wilkins, B.D.; Dolak, D.A.; Wang, Y.Y.; Meshkov, N.K. Argonne National Lab., IL (United States). Dec 1996. 261p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97052983. Source: OSTI; NTIS; INIS; GPO Dep.

This report was prepared to support the analysis of risks and costs associated with the proposed treatment of low-level mixed waste (LLMW) under management of the US Department of Energy (DOE). The various waste management alternatives for treatment of LLMW have been defined in the DOE's Office of Waste Management Programmatic Environmental Impact Statement. This technical memorandum estimates the waste material throughput expected at each proposed LLMW treatment facility and analyzes potential radiological and chemical releases at each DOE site resulting from treatment of these wastes. Models have been developed to generate site-dependent radiological profiles and waste-stream-dependent chemical profiles for these wastes. Current site-dependent inventories and estimates for future generation of LLMW have been obtained from DOE's 1994 Mixed Waste Inventory Report (MWIR-2). Using treatment procedures developed by the Mixed Waste Treatment Project, the MWIR-2 database was analyzed to provide waste throughput and emission estimates for each of the different waste types assessed in this report. Uncertainties in the estimates at each site are discussed for waste material throughputs and radiological and chemical releases.

527
(ANL/EAD/TM–35)
Supplemental information related to risk assessment for the off-site transportation of low-level mixed waste for the U.S. Department of Energy waste management programmatic environmental impact statement. Monette, F.A. (Argonne National Lab., IL (United States). Environmental Assessment Div.); Biwer, B.M.; LePoire, D.J.; Lazaro, M.A.; Antonopoulos, A.A.; Hartmann, H.M.; Policastro, A.J.; Chen, S.Y. Argonne National Lab., IL (United States). Dec 1996. 380p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98001959. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides supplemental information to support the human health risk assessment conducted for the transportation of low-level mixed waste (LLMW) in support of the US Department of Energy Waste Management Programmatic Environmental Impact Statement (WM PEIS). The assessment considers both the radioactive and chemical hazards associated with LLMW transportation. Detailed descriptions of the transportation health risk assessment methods and results of the assessment are presented in Appendix E of the WM PEIS. This report presents additional information that is not included in Appendix E but that was needed to conduct the transportation risk assessment for Waste Management (WM) LLMW. Included are definitions of the LLMW alternatives considered in the WM PEIS; data related to the inventory and to the physical, chemical, and radiological characteristics of WM LLMW; an overview of the risk assessment methods; and detailed results of the assessment for each WM LLMW case considered.

528
(ANL/EAD/TM–67)
Radiological dose assessment for the decontaminated concrete removed from 183-H solar evaporation basins at the Hanford site, Richland, Washington. Kamboj, S. (Argonne National Lab., IL (United States). Environmental Assessment Div.); Faillace, E.; Yu, C. Argonne National Lab., IL (United States). Jan 1997. 26p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97004178. Source: OSTI; NTIS; INIS; GPO Dep.

Potential maximum radiation dose rates over a 1,000-year time horizon were calculated for exposure to the decontaminated concrete removed from the 183-H Solar Evaporation Basins at the Hanford Site, Richland, Washington. The RESRAD computer code, Version 5.62, which implements the methodology described in the US Department of Energy's manual for developing residual radioactive material guidelines, was used in this evaluation. Currently, the concrete is not being used. Four potential exposure scenarios were developed for the land area where the decontaminated concrete will be stored. In Scenario A industrial use of the land is assumed; in Scenario B recreational use of the land is assumed; in Scenario C residential use of the land is assumed; and in Scenario D (a plausible but unlikely land-use scenario), the presence of a subsistence farmer in the immediate vicinity of the land is assumed. For Scenarios A and B, water used for drinking is assumed to be surface water from the Columbia River; for Scenarios C and D, groundwater drawn from a well located at the downgradient edge of the storage area is the only source of water for drinking, irrigation, and raising livestock. Conservative parameters values were used to estimate the radiation doses. The results of the evaluation indicate that the US Department of Energy's dose limit of 100 mrem/yr would not be exceeded for any of the scenarios analyzed. The potential maximum dose rates for Scenarios A, B, C, and D are 0.75, 0.022, 29, 29 mrem/yr, respectively. An uncertainty analysis was performed to determine which parameters have the greatest impact on the estimated doses. The doses in Scenarios C and D were found to be very sensitive to the magnitude of the irrigation rate.

529
(ANL/EAD/TM–73)
Authorized limits for Fernald copper ingots. Frink, N.; Kamboj, S.; Hensley, J.; Chen, S.Y. Argonne National Lab., IL (United States). Sep 1997. 66p. Sponsored by USDOE

Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000206. Source: OSTI; NTIS; INIS; GPO Dep.

This development document contains data and analysis to support the approval of authorized limits for the unrestricted release of 59 t of copper ingots containing residual radioactive material from the U.S. Department of Energy (DOE) Fernald Environmental Management Project (FEMP). The analysis presented in this document comply with the requirements of DOE Order 5400.5, "Radiation Protection of the Public and the Environment," as well as the requirements of the proposed promulgation of this order as 10 CFR Part 834. The document was developed following the step-by-step process described in the Draft Handbook for Controlling Release for Reuse or Recycle Property Containing Residual Radioactive Material.

530
(ANL/EA/RP–91539)
Environmental review of options for managing radioactively contaminated carbon steel. Argonne National Lab., IL (United States). Oct 1996. 44p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97002604. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE) is proposing to develop a strategy for the management of radioactively contaminated carbon steel (RCCS). Currently, most of this material either is placed in special containers and disposed of by shallow land burial in facilities designed for low-level radioactive waste (LLW) or is stored indefinitely pending sufficient funding to support alternative disposition. The growing amount of RCCS with which DOE will have to deal in the foreseeable future, coupled with the continued need to protect the human and natural environment, has led the Department to evaluate other approaches for managing this material. This environmental review (ER) describes the options that could be used for RCCS management and examines the potential environmental consequences of implementing each. Because much of the analysis underlying this document is available from previous studies, wherever possible the ER relies on incorporating the conclusions of those studies as summaries or by reference.

531
(ANL/EMO/CP–89921)
Mixed waste disposal at Argonne National Laboratory-East. Wescott, J. Argonne National Lab., IL (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960648–6: 21. annual conference of the National Association of Environmental Professionals: practical environmental directions - a changing agenda, Houston, TX (United States), 2-6 Jun 1996). Order Number DE96010800. Source: OSTI; NTIS; INIS; GPO Dep.

Off-site disposal of mixed waste was severely curtailed at the beginning of FY 96. During FY 95 Argonne National Laboratory-East (ANL-E) conducted a comprehensive characterization and packaging project to remove mixed waste from the ANL-E inventory. The mixed wastes were primarily historic material which had been stored on-site since 1987. The waste consisted of solid debris, sludges, ignitable and corrosive liquids, and water-reactive metal. All of the waste was contaminated with varying degrees of radioactivity. The first step in the characterization process was to review available documentation on the waste. Because of the historic nature of the material, most records were incomplete. Using the records as a guide, the waste was divided into groups that could each be sampled according to the physical nature of the material. Worker safety was an important consideration during the sampling phase, therefore, several precautions were taken to prevent spills or cause unnecessary chemical reactions in the material. Characterization activities were either completed entirely by ANL-E technicians or with assistance from specialized contractors. Once characterization of the waste was complete it was packaged for shipment to other DOE facilities for storage and eventual treatment. Because most of the mixed waste treatment systems were not yet operational, waste was packaged to ensure integrity for a long period of time. Fifty-five cubic meters of mixed waste was characterized and packaged during FY 95. Most of this material was sent off-site. However, the remainder was stored in a configuration that will provide better health and safety protection than previously afforded.

532
(ANL/ES/CP–90891)
Treatment of plutonium contaminated soil/sediment from the Mound site using the ACT*DE*CON^{SM} process. Negri, M.C. (Argonne National Lab., IL (United States)); Swift, N.A.; North, J.P. Argonne National Lab., IL (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960804–55: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96013955. Source: OSTI; NTIS; INIS; GPO Dep.

The removal and/or treatment of contaminated soil is a major problem facing the US DOE. The EG&G Mound Applied Technologies site in Miamisburg, Ohio, has an estimated 1.5 million cubic feet of soils from past disposal and waste burial practices awaiting remediation from plutonium contamination. This amount includes sediment from the Miami-Erie Canal that was contaminated in 1969 following a pipe- rupture accident. Conventional soil washing techniques that use particle separation would generate too large a waste volume to be economically feasible. Therefore, innovative technologies are needed for the cleanup. The ACT*DE*CON process was developed by SELENTEC for washing soils to selectively dissolve and remove heavy metals and radionuclides. ACT*DE*CON chemically dissolves and removes heavy metals and radionuclides from soils and sediments into an aqueous medium. The ACT*DE*CON process uses oxidative carbonate/chelant chemistry to dissolve the contaminant from the sediment and hold the contaminant in solution. The objective of recent work was to document the proves conditions necessary to achieve the Mound-site and regulatory-cleanup goals using the ACT*DE*CON technology.

533
(ANL/ESH-HP–97/01)
Building 579 waste ion exchange facility characterization report. Sholeen, C.M.; Geraghty, D.C. Argonne National Lab., IL (United States). Mar 1997. 116p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE

Contract W-31109-ENG-38. Order Number DE97005958. Source: OSTI; NTIS; INIS; GPO Dep.

External direct surveys were performed for elevated γ levels with a PG2 portable detector connected to a PRM 5-3 meter and for elevated α and β levels with an NE portable detector. No γ activity above background was detected. Several locations, the floor and west wall of building 579 and the manhole, had low levels of β activity, up to 87 $\pm$ 49 dis/min. These values are below the allowable residual surface contamination limits for removable beta activity. There is water in the Mixed Bed Exchange Vessel, the Cation Exchange Vessel, the Closed Drain Tank, the manhole and some of the pipes. The accessible internal surfaces of the pipes, tanks and columns had higher levels of β activity up to 172 $\pm$ 52 dis/min and some α activity up to 106 $\pm$ 29 dis/min. After the water is removed from the vessels, tanks, and lines, they should be surveyed to determine whether the areas accessible for smear surveys are representative of the general inside contamination levels. There are elevated levels of radionuclides in the resin from the Cation Exchange Vessel and in the water from the manhole. Since the radionuclide concentrations in the manhole water are less than ten times the site release criteria, it does not need any processing before it is released to the onsite drains. Although there are RCRA metals on the resin in the Cation Exchange Vessel, the amount that is removed during a leaching analysis is below the toxicity Characteristic level. Therefore, the resin is a radioactive waste not a mixed waste.

534
(ANL/ET/CP–87963)
Effects of aqueous environment on long-term durability of phosphate-bonded ceramic waste forms. Singh, D.; Wagh, A.S.; Jeong, S.Y. Argonne National Lab., IL (United States). [1996]. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31-109-ENG-38. (CONF-960212–33: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006736. Source: OSTI; NTIS; INIS; GPO Dep.

Over the last few years, Argonne National Laboratory has been developing room-temperature-setting chemically-bonded phosphate ceramics for solidifying and stabilizing low-level mixed wastes. This technology is crucial for stabilizing waste streams that contain volatile species and off-gas secondary waste streams generated by high-temperature treatment of such wastes. Magnesium phosphate ceramic has been developed to treat mixed wastes such as ash, salts, and cement sludges. Waste forms of surrogate waste streams were fabricated by acid-base reactions between the mixtures of magnesium oxide powders and the wastes, and phosphoric acid or acid phosphate solutions. Dense and hard ceramic waste forms are produced in this process. The principal advantage of this technology is that the contaminants are immobilized by both chemical stabilization and subsequent microencapsulation of the reaction products. This paper reports the results of durability studies conducted on waste forms made with ash waste streams spiked with hazardous and radioactive surrogates. Standard leaching tests such as ANS 16.1 and TCLP were conducted on the final waste forms. Fates of the contaminants in the final waste forms were established by electron microscopy. In addition, stability of the waste forms in aqueous environments was evaluated with long-term water-immersion tests.

535
(ANL/ET/CP–90989)
Immobilization of fission products in low-temperature ceramic waste forms. Singh, D.; Wagh, A.S.; Tlustochowicz, M.; Mandalika, V. Argonne National Lab., IL (United States). Jan 1997. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970335–42: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97004697. Source: OSTI; NTIS; INIS; GPO Dep.

Over the last few years, Argonne National Laboratory has been developing room-temperature-setting chemically bonded phosphate ceramics (CBPCs) for use in solidifying and stabilizing low-level mixed wastes. The focus of this work is development of CBPCs for use with fission-product wastes generated from high-level waste (HLW) tank cleaning or other decontamination and decommissioning activities. The volatile fission products such as Tc, Cs, and Sr removed from HLW need to be disposed of in a low-temperature immobilization system. Specifically, this paper reports on the solidification and stabilization of separated ^{99}Tc from Los Alamos National Laboratory's complexation-elution process. Using rhenium as a surrogate form technetium, we fabricated CBPC waste forms by acid-base reactions. Dense and hard ceramic waste forms are produced in this process. The principal advantage of this technology is that the contaminants are immobilized by both chemical stabilization and subsequent microencapsulation of the reaction products. This paper reports the results of durability studies conducted on waste forms made with 35 wt.% waste loading. Standard leaching tests such as ANS 16.1 and PCT were conducted on the final waste forms. In addition, stability of the waste forms in aqueous environments was evaluated by long-term water-immersion tests.

536
(ANL/ET/CP–91063)
Stabilization of contaminated soil and wastewater with chemically bonded phosphate ceramics. Wagh, A.S. (and others); Jeong, S.Y.; Singh, D. Argonne National Lab., IL (United States). Jan 1997. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970335–36: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97004093. Source: OSTI; NTIS; INIS; GPO Dep.

At Argonne National Laboratory, we have developed chemically Bonded phosphate ceramic (CBPC) technology to stabilize the U.S. Department of Energy's problem mixed waste streams, for which no other stabilization technology is suitable. In this technology, solid waste is mixed with MgO and reacted with aqueous solutions of phosphoric acid or acid phosphates at room temperature to form a slurry that sets in $\approx$2 h into a hard and dense ceramic waste form. Initial studies involved stabilizing the surrogate waste streams and then testing the waste forms for leaching of contaminants. After achieving satisfactory performance of the waste forms, we next incorporated actual waste streams at bench scale and produced waste forms that were then tested with the Toxicity Characteristic Leaching Procedure (TCLP). This presentation deals with stabilization of soil contaminated with Cd, Cr, Pb, Ag, Ba, and Hg, and of low-level radioactive wastewater. To enhance the contaminant levels in the soil, we further spiked the soil with additional amounts of

Cd, Cr, Pb, and Hg. Both the soil and the wastewater were incorporated in the same waste form by stabilizing them with the CBPC process. The waste forms had a total waste loading of ≈77 wt.% and were dense with an open porosity of 2.7 vol.% and a density of 2.17 g/cm^3. Compression strength was 4910 psi. The TCLP results showed excellent immobilization of all the RCRA metals, and radioactive contaminant levels were below the detection limit of 0.2 pCi/mL. Long-term leaching studies using the ANS 16.1 procedure showed that the retention of contaminants is excellent and comparable to or better than most of other stabilization processes. These results demonstrate that the CBPC process is a very superior process for treatment of low level mixed wastes; we therefore conclude that the CBPC process is well suited to the treatment of low-level mixed waste streams with high waste loading.

537
(ANL/ET/CP–91088)
Iron-phosphate-based chemically bonded phosphate ceramics for mixed waste stabilization. Wagh, A.S. (and others); Jeong, S.Y.; Singh, D. Argonne National Lab., IL (United States). Jan 1997. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970335–35: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97004094. Source: OSTI; NTIS; INIS; GPO Dep.

In an effort to develop chemically bonded phosphate ceramics for mixed waste stabilization, a collaborative project to develop iron-phosphate based ceramics has been initiated between Argonne National Laboratory and the V. G. Khlopin Radium Institute in St. Petersburg, Russia. The starter powders are oxides of iron that are generated as inexpensive byproduct materials in the iron and steel industry. They contain iron oxides as a mixture of magnetite (Fe_3O_4) and haematite (Fe_2O_3). In this initial phase of this project, both of these compounds were investigated independently. Each was reacted with phosphoric acid solution to form iron phosphate ceramics. In the case of magnetite, the reaction was rapid. Adding ash as the waste component containing hazardous contaminants resulted in a dense and hard ceramic rich in glassy phase. On the other hand, the reaction of phosphoric acid solution with a mixture of haematite and ash waste contaminated with cesium and americium was too slow. Samples had to be molded under pressure. They were cured for 2-3 weeks and then hardened by heating at 350°C for 3 h. The resulting ceramics in both cases were subjected to physical tests for measurement of density, open porosity, compression strength, phase analyses using X-ray diffraction and differential thermal analysis, and leaching tests using toxicity characteristic leaching procedure (TCLP) and ANS 16.1 with 7 days of leaching. Using the preliminary information obtained from these tests, we evaluated these materials for stabilization of Department of Energy's mixed waste streams.

538
(ANL/ET/CP–92758)
Macroencapsulation of low-level debris waste with the phosphate ceramic process. Singh, D.; Wagh, A.S.; Tlustochowicz, M.; Jeong, S.Y. Argonne National Lab., IL (United States). Mar 1997. 7p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970537–6: 18. annual DOE low-level radioactive waste management conference, Salt Lake City, UT (United States), 20-22 May 1997). Order Number DE97007083. Source: OSTI; NTIS; INIS; GPO Dep.

Across the DOE complex, large quantities of contaminated debris and irradiated lead bricks require disposal. The preferred method for disposing of these wastes is macroencapsulation under U.S. Environmental Protection Agency Alternative Treatment Standards. Chemically bonded phosphate ceramics serve as a novel binder, developed at Argonne National Laboratory, for stabilizing and solidifying various low-level mixed wastes. Extremely strong, dense, and impervious to water intrusion, this material was developed with support from the U.S. Department of Energy's Office of Science and Technology (DOE OST). In this investigation, CBPCs have been used to demonstrate macroencapsulation of various contaminated debris wastes, including cryofractured debris, lead bricks, and lead-lined plastic gloves. This paper describes the processing steps for fabricating the waste forms and the results of various characterizations performed on the waste forms. The conclusion is that simple and low-cost CBPCs are excellent material systems for macroencapsulating debris wastes.

539
(ANL/ET/CP–92843)
Ceramicrete stabilization of low-level mixed wastes - a complete story. Wagh, A.S.; Singh, D.; Jeong, S.Y.; Strain, R.V. Argonne National Lab., IL (United States). Mar 1997. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970537–7: 18. annual DOE low-level radioactive waste management conference, Salt Lake City, UT (United States), 20-22 May 1997). Order Number DE97007073. Source: OSTI; NTIS; INIS; GPO Dep.

During the last three years, Ceramicrete (chemically bonded phosphate ceramics) have been investigated at Argonne-East for low-temperature stabilization and solidification of U.S. Department of Energy (DOE's) mixed wastes, for which conventional high-temperature treatments cannot be used because of volatiles and pyrophorics present in these wastes. This paper summarizes the development of Ceramicrete and provides the current technology status. We discuss our early investigations with surrogates that are typical of DOE mixed wastes, subsequent testing with actual waste streams, and scale-up of the process to an operational level. Current efforts include testing the process at an operational level for an ash waste stream from the Idaho National Engineering Laboratory and obtaining sufficient information to prepare a technology performance report.

540
(ANL/ET/CP–93971)
Mercury stabilization in chemically bonded phosphate ceramics. Wagh, Arun S.; Jeong, Seung-Young; Singh, Dileep. Argonne National Lab., IL (United States). Jul 1997. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31-109-ENG-38. (CONF-9610115–: Fall meeting of the American Ceramic Society, San Antonio, TX (United States), 30 Oct - 2 Nov 1996). Order Number DE97053851. Source: OSTI; NTIS; INIS; GPO Dep.

We have investigated mercury stabilization in chemically bonded phosphate ceramic (CBPC) using four surrogate waste streams that represent U.S. Department of Energy (DOE) ash, soil, and two secondary waste streams resulting from the destruction of DOE's high-organic wastes by the DETOX[SM] Wet Oxidation Process. Hg content in the waste streams was 0.1 to 0.5 wt.% (added as soluble salts). Sulfidation of Hg and its concurrent stabilization in the CBPC matrix yielded highly nonleachable waste forms. The Toxicity Characteristic Leaching Procedure showed that leaching levels were well below the U.S. Environmental Protection Agency's regulatory limits. The American Nuclear Society's ANS 16.1 immersion test also gave very high leaching indices, indicating excellent retention of the contaminants. In particular, leaching levels of Hg in the ash waste form were below the measurement detection limit in neutral and alkaline water, negligibly low but measureable in the first 72 h of leaching in acid water, and below the detection limit after that. These studies indicate that the waste forms are stable in a wide range of chemical environments during storage. 9 refs., 5 tabs.

541
(ANL/TD/CP–92607)
Update on intrusive characterization of mixed contact-handled transuranic waste at Argonne-West. Dwight, C.C.; Jensen, B.A.; Bryngelson, C.D.; Duncan, D.S. Argonne National Lab., IL (United States). 3 Feb 1997. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970335–34: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97004097. Source: OSTI; NTIS; INIS; GPO Dep.

Argonne National Laboratory and Lockheed Martin Idaho Technologies Company have jointly participated in the Department of Energy's (DOE) Waste Isolation Pilot Plant (WIPP) Transuranic Waste Characterization Program since 1990. Intrusive examinations have been conducted in the Waste Characterization Area, located at Argonne-West in Idaho Falls, Idaho, on over 200 drums of mixed contact-handled transuranic waste. This is double the number of drums characterized since the last update at the 1995 Waste Management Conference. These examinations have provided waste characterization information that supports performance assessment of WIPP and that supports Lockheed's compliance with the Resource Conservation and Recovery Act. Operating philosophies and corresponding regulatory permits have been broadened to provide greater flexibility and capability for waste characterization, such as the provision for minor treatments like absorption, neutralization, stabilization, and amalgamation. This paper provides an update on Argonne's intrusive characterization permits, procedures, results, and lessons learned. Other DOE sites that must deal with mixed contact-handled transuranic waste have initiated detailed planning for characterization of their own waste. The information presented herein could aid these other storage and generator sites in further development of their characterization efforts.

542
(BHI–00139-Rev.1)
Environmental Restoration Disposal Facility waste acceptance criteria. Revision 1. Corriveau, C.E. Bechtel Hanford, Inc., Richland, WA (United States). [1996]. 41p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE96005936. Source: OSTI; NTIS; INIS; GPO Dep.

The Environmental Restoration Disposal Facility (ERDF) is designed to be an isolation structure for low-level radioactive remediation waste, chemically contaminated remediation waste, and remediation waste that contains both chemical and radioactive constituents (i.e., mixed remediation waste) produced during environmental remediation of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) past-practice units at the Hanford Site. Remedial action wastes, which will become a structural component of the ERDF, include bulk soil, demolition debris, and miscellaneous wastes from burial grounds. These wastes may originate from CERCLA past-practice sites (i.e., operable units) in the 100 Areas, the 200 Areas, and the 300 Area of the Hanford Site.

543
(BNL–64958)
In-situ stabilization of TRU/mixed waste project at the INEEL. Milian, L.W.; Heiser, J.H.; Adams, J.W.; Rutenkroeger, S.P. Brookhaven National Lab., Upton, NY (United States). Aug 1997. 82p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC02-76CH00016. Order Number DE98001660. Source: OSTI; NTIS; INIS; GPO Dep.

Throughout the DOE complex, buried waste poses a threat to the environment by means of contaminant transport. Many of the sites contain buried waste that is untreated, prior to disposal, or insufficiently treated, by today's standards. One option to remedy these disposal problems is to stabilize the waste in situ. This project was in support of the Transuranic/Mixed Buried Waste - Arid Soils product line of the Landfill Focus Area, which is managed currently by the Idaho National Engineering Laboratory (BNL) provided the analytical laboratory and technical support for the various stabilization activities that will be performed as part of the In Situ Stabilization of TRU/Mixed Waste project at the INEL. More specifically, BNL was involved in laboratory testing that included the evaluation of several grouting materials and their compatibility, interaction, and long-term durability/performance, following the encapsulation of various waste materials. The four grouting materials chosen by INEL were: TECT 1, a two component, high density cementious grout, WAXFIX, a two component, molten wax product, Carbray 100, a two component elastomeric epoxy, and phosphate cement, a two component ceramic. A simulated waste stream comprised of sodium nitrate, Canola oil, and INEL soil was used in this study. Seven performance and durability tests were conducted on grout/waste specimens: compressive strength, wet-dry cycling, thermal analysis, base immersion, solvent immersion, hydraulic conductivity, and accelerated leach testing.

544
(CONF-9603228–Summ.)
The 1996 meeting of the national technical workgroup on mixed waste thermal treatment. Environmental Protection Agency, Athens, GA (United States). Environmental Research Lab. 1996. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AI34-93RF00643. From National technical workgroup on mixed waste thermal

treatment; Atlanta, GA (United States); 12-14 Mar 1996. Order Number DE97003405. Source: OSTI; NTIS; INIS; GPO Dep.

The National Technical Workgroup on Mixed Waste Thermal Treatment held its annual meeting in Atlanta Georgia on March 12-14, 1996. The National Technical Workgroup (NTW) and this meeting were sponsored under an interagency agreement between EPA and DOE. The 1996 Annual Meeting was hosted by US DOE Oak Ridge Operations in conjunction with Lockheed Martin Energy Systems - Center for Waste Management. A new feature of the annual meeting was the Permit Writer Panel Session which provided an opportunity for the state and federal permit writers to discuss issues and potential solutions to permitting mixed waste treatment systems. In addition, there was substantial discussion on the impacts of the Waste Combustion Performance Standards on mixed waste thermal treatment which are expected to proposed very soon. The 1996 meeting also focussed on two draft technical resource documents produced by NTW on Waste Analysis Plans and Compliance Test Procedures. Issues discussed included public involvement, waste characterization, and emission issues.

545
(CONF-9606125–4)
An exposure assessment of radionuclide emissions associated with potential mixed-low level waste disposal facilities at fifteen DOE sites. Lombardi, D.A.; Socolof, M.L. Oak Ridge National Lab., TN (United States). [1996]. 17p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From Air and Waste Management (AWM) annual meeting; Nashville, TN (United States); 23-28 Jun 1996. Order Number DE96008619. Source: OSTI; NTIS; INIS; GPO Dep.

A screening method was developed to compare the doses received via the atmospheric pathway at 15 potential DOE MLLW (mixed low-level waste) sites. Permissible waste concentrations were back calculated using the radioactivity NESHAP (National Emissions Standards for Hazardous Air Pollutants) in 40 FR 61 (DOE Order 5820.2A performance objective). Site-specific soil and meteorological data were used to determine permissible waste concentrations (PORK). For a particular radionuclide, perks for each site do not vary by more than one order of magnitude. perks of ^{14}C are about six orders of magnitude more restrictive than perks of ^{3}H because of differences in liquid/vapor partitioning, decay, and exposure dose. When comparing results from the atmospheric pathway to the water and intruder pathways, ^{14}C disposal concentrations were limited by the atmospheric pathway for most arid sites; for ^{3}H, the atmospheric pathway was not limiting at any of the sites. Results of this performance evaluation process are to be used for planning for siting of disposal facilities.

546
(CONF-960804–10)
Fernald's dilemma: Do we recycle the radioactively contaminated metals, or do we bury them?. Yuracko, K.L. (and others); Hadley, S.W.; Perlack, R.D. Oak Ridge National Lab., TN (United States). 1996. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From SPECTRUM '96: international conference on nuclear and hazardous waste management; Seattle, WA (United States); 18-23 Aug 1996. Order Number DE96009396. Source: OSTI; NTIS; INIS; GPO Dep.

During the past five years, a number of U.S. Department of Energy (DOE) funded efforts have demonstrated the technical efficacy of converting various forms of radioactive scrap metal (RSM) into useable products. From the development of large accelerator shielding blocks, to the construction of low level waste containers, technology has been applied to this fabrication process in a safe and stakeholder supported manner. The potential health and safety risks to both workers and the public have been addressed. The question remains; can products be fabricated from RSM in a cost efficient and market competitive manner? This paper presents a methodology for use within DOE to evaluate the costs and benefits of recycling and reusing some RSM, rather than disposing of this RSM in an approved burial site. This life cycle decision methodology, developed by both the Oak Ridge National Laboratory (ORNL) and DOE Fernald is the focus of the following analysis.

547
(DOE/EM–0322)
Summary of comparative results integrated nonthermal treatment and integrated thermal treatment systems studies. USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Dec 1996. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97003564. Source: OSTI; NTIS; INIS; GPO Dep.

In July 1994, the Idaho National Engineering Laboratory (INEL), under a contract from U.S. Department of Energy's (DOE) Environment Management Office of Science and Technology (OST, EM-50) published a report entitled "Integrated Thermal Treatment System Study - Phase 1 Results" (EGG-MS-11211). This report was the culmination of over a year of analysis involving scientists and engineers within the DOE complex and from private industry. The purpose of that study was "to conduct a systematic engineering evaluation of a variety of mixed low level waste (MLLW) treatment system alternatives." The study also "identified the research and development, demonstrations, and testing and evaluation needed to assure unit operability in the most promising alternative system." This study evaluated ten primary thermal treatment technologies, organized into complete "cradle-to-grave" systems (including complete engineering flow sheets), to treat DOE MLLW and calculated mass balances and 20-year total life cycle costs (TLCC) for all systems. The waste input used was a representative heterogenous mixture of typical DOE MLLW. An additional study was conducted, and then, based on response to these studies, additional work was started to investigate and evaluate non-thermal treatment options on a footing comparable to the effort devoted to thermal options. This report attempts to present a summary overview of the thermal and non-thermal treatment technologies which were examined in detail in the process of the above mentioned reviews.

548
(DOE/EM–0323)
Annual report of waste generation and pollution prevention progress 1995. USDOE Assistant Secretary for Environmental Management, Washington, DC (United States). Feb 1997. 179p. Sponsored by USDOE Office of

Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97004669. Source: OSTI; NTIS; INIS; GPO Dep.

This fourth Annual Report presents and analyzes 1995 DOE complex-wide waste generation and pollution prevention activities at 40 reporting sites in 25 States, and trends DOE waste generation from 1991 through 1995. DOE has established a 50% reduction goal (relative to the 1993 baseline) for routine operations radioactive and hazardous waste generation, due by December 31, 1999. Routine operations waste generation decreased 37% from 1994 to 1995, and 43% overall from 1993–1995.

549
(DOE/ID–10524-Vol.1-Rev.1)
Mixed waste focus area technical baseline report. Volume 1. Idaho National Engineering Lab., Idaho Falls, ID (United States). Apr 1997. 45p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052940. Source: OSTI; NTIS; INIS; GPO Dep.

The Department of Energy (DOE) established the Mixed Waste Characterization, Treatment, and Disposal Focus Area (MWFA) to develop and facilitate implementation of technologies required to meet the Department's commitments for treatment of mixed low-level and transuranic wastes. The mission of the MWFA is to provide acceptable technologies, developed in partnership with end-users, stakeholders, tribal governments, and regulators, that enable implementation of mixed waste treatment systems. To accomplish this mission, a technical baseline was established in 1996 that forms the basis for determining which technology development activities will be supported by the MWFA. This technical baseline is revised on an annual basis to reflect changes in the DOE Mixed Waste Management strategies, changes in the MWFA technical baseline development process, and MWFA accomplishments. This report presents the first revision to the technical baseline and the resulting prioritized list of deficiencies that the MWFA will address. This report also reflects a higher level of stakeholder involvement in the prioritization of the deficiencies. This document summarizes the data and the assumptions upon which this work was based, as well as information concerning the DOE Office of Environmental Management (EM) mixed waste technology development needs.

550
(DOE/ID–10524-Vol.2-Rev.1)
Mixed waste focus area technical baseline report. Volume 2. Idaho National Engineering Lab., Idaho Falls, ID (United States). Apr 1997. 328p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97007619. Source: OSTI; NTIS; INIS; GPO Dep.

As part of its overall program, the MWFA uses a national mixed waste data set to develop approaches for treating mixed waste that cannot be treated using existing capabilities at DOE or commercial facilities. The current data set was originally compiled under the auspices of the 1995 Mixed Waste Inventory Report. The data set has been updated over the past two years based on Site Treatment Plan revisions and clarifications provided by individual sites. The current data set is maintained by the MWFA staff and is known as MWFA97. In 1996, the MWFA developed waste groupings, process flow diagrams, and treatment train diagrams to systematically model the treatment of all mixed waste in the DOE complex. The purpose of the modeling process was to identify treatment gaps and corresponding technology development needs for the DOE complex. Each diagram provides the general steps needed to treat a specific type of waste. The NWFA categorized each MWFA97 waste stream by waste group, treatment train, and process flow. Appendices B through F provide the complete listing of waste streams by waste group, treatment train, and process flow. The MWFA97 waste strewn information provided in the appendices is defined in Table A-1.

551
(DOE/ID–10551)
Mixed Waste Focus Area program management plan. Beitel, G.A. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Oct 1996. 48p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97050846. Source: OSTI; NTIS; INIS; GPO Dep.

This plan describes the program management principles and functions to be implemented in the Mixed Waste Focus Area (MWFA). The mission of the MWFA is to provide acceptable technologies that enable implementation of mixed waste treatment systems developed in partnership with end-users, stakeholders, tribal governments and regulators. The MWFA will develop, demonstrate and deliver implementable technologies for treatment of mixed waste within the DOE Complex. Treatment refers to all post waste-generation activities including sampling and analysis, characterization, storage, processing, packaging, transportation and disposal.

552
(DOE/ID/13266–T1)
Final PHP bench-scale report for the DOE-ID/SAIC sole source contract. Science Applications International Corp., Idaho Falls, ID (United States). Apr 1997. 20p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13266. (PHP–97/002). Order Number DE97004869. Source: OSTI; NTIS; INIS; GPO Dep.

The Plasma Hearth Process (PHP) Technology Development Project was established to develop, test, and evaluate a new concept for treating mixed waste. The new concept uses direct current (dc) transferred-arc plasma torch technology to process mixed waste into a glass-like end-product. Under the cognizance of the US Department of Energy (DOE) Office of Technology Development (OTD) Mixed Waste Focus Area (MWFA), the technology is being explored for its potential to treat mixed waste. Because it is a mature technology, well-understood and commercially available, it is expected to develop rapidly in this new application. This report summarizes the radioactive bench-scale system activities funded under PHP Sole Source Contract DE-AC07-94ID13266 through the end of the contract.

553
(DOE/ID/13303–T1-Vol.1)
Supercritical water oxidation data acquisition testing. Final report, Volume I. Stone and Webster Engineering Corp., Boston, MA (United States). Nov 1996. 65p. Sponsored by USDOE Office of Environmental Restoration and

Waste Management, Washington, DC (United States). DOE Contract FC07-94ID13303. Order Number DE97005064. Source: OSTI; NTIS; INIS; GPO Dep.

This report discusses the phase one testing of a data acquisition system for a supercritical water waste oxidation system. The system is designed to destroy a wide range of organic materials in mixed wastes. The design and testing of the MODAR Oxidizer is discussed. An analysis of the optimized runs is included.

554
(DOE/ID/13303–T1-Vol.2)
Supercritical water oxidation data acquisition testing. Final report, Volume II. Stone and Webster Engineering Corp., Boston, MA (United States). Nov 1996. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FC07-94ID13303. Order Number DE97005065. Source: OSTI; NTIS; INIS; GPO Dep.

Supercritical Water Oxidation (SCWO) technology holds great promise for treating mixed wastes, in an environmentally safe and efficient manner. In the spring of 1994 the US Department of Energy (DOE), Idaho Operations Office awarded Stone & Webster Engineering Corporation, of Boston Massachusetts and its sub-contractor MODAR, Inc. of Natick Massachusetts a Supercritical Water Oxidation Data Acquisition Testing (SCWODAT) program. The SCWODAT program was contracted through a Cooperative Agreement that was co-funded by the US Department of Energy and the Strategic Environmental Research and Development Program. The SCWODAT testing scope outlined by the DOE in the original Cooperative Agreement and amendments thereto was initiated in June 1994 and successfully completed in December 1995. The SCWODAT program provided further information and operational data on the effectiveness of treating both simulated mixed waste and typical Navy hazardous waste using the MODAR SCWO technology.

555
(DOE/MC/28245–97/C0790)
An intelligent inspection and survey robot. Byrd, J.S. (South Carolina Univ., Columbia, SC (United States). Dept. of Electrical and Computer Engineering). South Carolina Universities Research and Education Foundation, Clemson, SC (United States). Strom Thurman Inst. [1996]. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FC21-92MC28245. (CONF-9610231–30: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052232. Source: OSTI; NTIS; INIS; GPO Dep.

Large quantities of mixed/low-level radioactive waste contained in 55-, 85-, and 110-gallon steel drums are stored at DOE warehouses throughout US. The steel drums are placed on pallets and stacked on top of one another, forming a column of drums ranging in heights of one to five drums and up to 16 feet. The columns of drums are aligned in rows forming aisles about 3 feet wide between the rows of drums. Many tens of thousands of drums are stored in these warehouses. ARIES (Autonomous Robotic Inspection Experimental System) is under development for DOE to survey and inspect these drums. The mobile robot will autonomously navigate through the warehouse and the aisles and perform an inspection operation, typically performed by a human operator, making decisions about the condition of the drums and maintaining a database of pertinent information about each drum.

556
(DOE/MC/29249–97/C0817)
Electromagnetic mixed waste processing system for asbestos decontamination. Kasevich, R.S. (KAI Technologies, Inc., Portsmouth, NH (United States)); Vaux, W.; Ulerich, N.; Nocito, T. KAI Technologies, Inc., Portsmouth, NH (United States). [1996]. 15p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-94MC29249. (CONF-9610231–15: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052257. Source: OSTI; NTIS; INIS; GPO Dep.

The overall objective of this three-phase program is to develop an integrated process for treating asbestos-containing material that is contaminated with radioactive and hazardous constituents. The integrated process will attempt to minimize processing and disposal costs. The objectives of Phase 1 were to establish the technical feasibility of asbestos decomposition, inorganic radionuclide nd heavy metal removal, and organic volatilization. Phase 1 resulted in the successful bench-scale demonstration of the elements required to develop a mixed waste treatment process for asbestos-containing material (ACM) contaminated with radioactive metals, heavy metals, and organics. Using the Phase 1 data, a conceptual process was developed. The Phase 2 program, currently in progress, is developing an integrated system design for ACM waste processing. The Phase 3 program will target demonstration of the mixed waste processing system at a DOE facility. The electromagnetic mixed waste processing system employs patented technologies to convert DOE asbestos to a non-hazardous, radionuclide-free, stable waste. The dry, contaminated asbestos is initially heated with radiofrequency energy to remove organic volatiles. Second,the radionuclides are removed by solvent extraction coupled with ion exchange solution treatment. Third, the ABCOV method converts the asbestos to an amorphous silica suspension at low temperature (100°C). Finally the amorphous silica is solidified for disposal.

557
(DOE/MC/29467–97/C0800)
WVU cooperative agreement, decontamination systems information and research program, deployment support leading to implementation. Cook, E.E. West Virginia Univ., Morgantown, WV (United States). [1996]. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FC21-92MC29467. (CONF-9610231–2: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052241. Source: OSTI; NTIS; INIS; GPO Dep.

This program at West Virginia University is a Cooperative Agreement that focuses on R&D associated with hazardous waste remediation problems existing at DOE, Corps of Engineers, and private sector sites. The Agreement builds on a unique combination of resources coupling university researchers with DOE sponsored small businesses, leading toward field tests and large scale technology demonstrations

of environmental technologies. Most of the Agreement's projects are categorized in the Technology Maturity Levels under Gates 3-Advanced Development, Gate 4-Engineering Development, and Gate 5-Demonstration. The program includes a diversity of projects: subsurface contaminants; mixed wastes; mixed wastes/efficient separations; mixed wastes/characterization, monitoring, and sensor technologies; and decontamination and decommissioning/efficient separations.

558
(DOE/MC/31388–5657)
Review of the integrated thermal and nonthermal treatment system studies. Final report. North Dakota Univ., Grand Forks, ND (United States). Energy and Environmental Research Center. Oct 1996. 147p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FC21-94MC31388. Order Number DE97052828. Source: OSTI; NTIS; INIS; GPO Dep.

This report contains a review and evaluation of three systems analysis studies performed by LITCO on integrated thermal treatment systems and integrated nonthermal treatment systems for the remediation of mixed low-level waste stored throughout the US Department of Energy weapons complex. The review was performed by an independent team of nine researchers from the Energy and Environmental Research Center, Science Applications International Corporation, the Waste Policy Institute, and Virginia Tech. The three studies reviewed were as follows: Integrated Thermal Treatment System Study, Phase 1 – issued July 1994; Integrated Thermal Treatment System Study, Phase 2 – issued February 1996; and Integrated Nonthermal Treatment System Study – drafted March 1996. The purpose of this review was to (1) determine whether the assumptions of the studies were adequate to produce an unbiased review of both thermal and nonthermal systems, (2) to identify the critical areas of the studies that would benefit from further investigation, and (3) to develop a standard template that could be used in future studies to assure a sound application of systems engineering.

559
(DOE/MC/32091–97/C0789)
Steam reforming of low-level mixed waste. Voelker, G.E. (Thermochem, Inc., Columbia, MD (United States)); Steedman, W.G.; Chandran, R.R. Thermochem, Inc., Columbia, MD (United States). [1996]. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-95MC32091. (CONF-9610231–39: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052231. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. department of Energy (DOE) is responsible for the treatment and disposal of an inventory of approximately 160,000 tons of Low-Level Mixed Waste (LLMW). Most of this LLMW is stored in drums, barrels and steel boxes at 20 different sites throughout the DOE complex. The basic objective of low-level mixed waste treatment systems is to completely destroy the hazardous constituents and to simultaneously isolate and capture the radionuclides in a superior final waste form such as glass. The DOE is sponsoring the development of advanced technologies that meet this objective while achieving maximum volume reduction, low-life cycle costs and maximum operational safety. ThermoChem, Inc. is in the final stages of development of a steam-reforming system capable of treating a wide variety of DOE low-level mixed waste that meets these objectives. The design, construction, and testing of a nominal 1 ton/day Process Development Unit is described.

560
(DOE/NE/44139–79)
Vitrification Facility integrated system performance testing report. Elliott, D. West Valley Nuclear Services Co., Inc., West Valley, NY (United States). 1 May 1997. 64p. Sponsored by USDOE Assistant Secretary for Nuclear Energy, Washington, DC (United States). DOE Contract AC24-81NE44139. Order Number DE97006910. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides a summary of component and system performance testing associated with the Vitrification Facility (VF) following construction turnover. The VF at the West Valley Demonstration Project (WVDP) was designed to convert stored radioactive waste into a stable glass form for eventual disposal in a federal repository. Following an initial Functional and Checkout Testing of Systems (FACTS) Program and subsequent conversion of test stand equipment into the final VF, a testing program was executed to demonstrate successful performance of the components, subsystems, and systems that make up the vitrification process. Systems were started up and brought on line as construction was completed, until integrated system operation could be demonstrated to produce borosilicate glass using nonradioactive waste simulant. Integrated system testing and operation culminated with a successful Operational Readiness Review (ORR) and Department of Energy (DOE) approval to initiate vitrification of high-level waste (HLW) on June 19, 1996. Performance and integrated operational test runs conducted during the test program provided a means for critical examination, observation, and evaluation of the vitrification system. Test data taken for each Test Instruction Procedure (TIP) was used to evaluate component performance against system design and acceptance criteria, while test observations were used to correct, modify, or improve system operation. This process was critical in establishing operating conditions for the entire vitrification process.

561
(FEMP–2445)
Chemical treatment of mixed waste can be done.....Today!. Honigford, L. (Fernald Environmental Restoration Management Corp., Cincinnati, OH (United States)); Dilday, D.; Cook, D.; Sattler, J. Fernald Environmental Restoration Management Corp., Cincinnati, OH (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC24-92OR21972. (CONF-960212–13: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96007278. Source: OSTI; NTIS; INIS; GPO Dep.

The Chemical Treatment Project is one in a series of projects implemented by the FEMP to treat mixed waste. The projects were initiated to address concerns regarding treatment capacity for mixed waste and to comply with requirements established by the Federal Facility Compliance Act. The Chemical Treatment Project is designed to utilize

commercially available mobile technologies to perform treatment at the FEMP site. The waste in the Project consists of a variety of waste types with a wide range of hazards and physical characteristics. The treatment processes to be established for the waste types will be developed by a systematic approach including waste streams evaluation, projectization of the waste streams, and categorization of the stream. This information is utilized to determine the proper train of treatment which will be required to lead the waste to its final destination (i.e., disposal). This approach allows flexibility to manage a wide variety of waste in a cheaper, faster manner than designing a single treatment technology diverse enough to manage all the waste streams.

562
(INEL–95/00458)
Stored Transuranic Waste Management Program at the Idaho National Engineering Laboratory. Clements, T.L. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960212–76: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96009059. Source: OSTI; NTIS; INIS; GPO Dep.

Since 1970, INEL has provided interim storage capacity for transuranic (TRU)-contaminated wastes generated by activities supporting US national defense needs. About 60% of the nation's current inventory of TRU-contaminated waste is stored at INEL, awaiting opening of the Waste Isolation Pilot Plant (WIPP), the designated federal repository. A number of activities are currently underway for enhancing current management capabilities, conducting projects that support local and national TRU management activities, and preparing for production-level waste retrieval, characterization, examination, certification, and shipment of untreated TRU waste to WIPP in April 1998. Implementation of treatment capability is planned in 2003 to achieve disposal of all stored TRU-contaminated waste by a target date of December 31, 2015, but no later than December 31, 2018.

563
(INEL–96/00041)
A comparison of the costs of treating wastes from a radio analytical laboratory. Moore, R. (Dept. of Energy, Idaho Falls, ID (United States). Idaho Field Office); Pole, S.B. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 15p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-9604123–1: Conference on hazardous wastes and materials, Idaho Falls, ID (United States), 3-4 Apr 1996). Order Number DE96009117. Source: OSTI; NTIS; INIS; GPO Dep.

The Radiological and Environmental Sciences Laboratory (RESL) is a government-owned, government-operated facility at the Idaho National Engineering Laboratory (INEL). RESL's traditional strengths are in precise radionuclide analysis and dosimetry measurements. RESL generates small quantities of various types of waste. This study identified potential waste management options for a solvent extraction process waste stream and the cost differences resulting from either process changes, improved technology usage, or material substitutions or changes at RESL. Where possible, this report identifies changes that have resulted or may result in waste reduction and cost savings. DOE P2 directs the lab to review processes, evaluate waste practices, and estimate potential reductions in waste volumes and waste management costs. This study focused on selected processes, but the processes are illustrative of potential waste volume reductions and cost minimizations that may be achieved elsewhere at the INEL and throughout the DOE complex. In analyzing a waste disposal process, the authors allocated component costs to functional categories. These categories included the following: (1) operational costs, included waste generation and collection into a storage area; (2) administrative costs, including worker training, routine inspections, and reporting; and (3) disposal costs, including preparing the waste for shipment and disposing of it.

564
(INEL–96/00047)
Survey of commercial firms with mixed-waste treatability study capability. McFee, J. (Lockheed Idaho Technologies Co., Idaho Falls, ID (United States)); McNeel, K.; Eaton, D.; Kimmel, R. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960212–78: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96009016. Source: OSTI; NTIS; INIS; GPO Dep.

According to the data developed for the Proposed Site Treatment Plans, the US Department of Energy (DOE) mixed low-level and mixed transuranic waste inventory was estimated at 230,000 m^3 and embodied in approximately 2,000 waste streams. Many of these streams are unique and may require new technologies to facilitate compliance with Resource Conservation and Recovery Act disposal requirements. Because most waste streams are unique, a demonstration of the selected technologies is justified. Evaluation of commercially available or innovative technologies in a treatability study is a cost-effective method of providing a demonstration of the technology and supporting decisions on technology selection. This paper summarizes a document being prepared by the Mixed Waste Focus Area of the DOE Office of Science and Technology (EM-50). The document will provide DOE waste managers with a list of commercial firms (and universities) that have mixed-waste treatability study capabilities and with the specifics regarding the technologies available at those facilities. In addition, the document will provide a short summary of key points of the relevant regulations affecting treatability studies and will compile recommendations for successfully conducting an off-site treatability study. Interim results of the supplier survey are tabulated in this paper. The tabulation demonstrates that treatment technologies in 17 of the US Environmental Protection Agency's technology categories are available at commercial facilities. These technologies include straightforward application of standard technologies, such as pyrolysis, as well as proprietary technologies developed specifically for mixed waste. The paper also discusses the key points of the management of commercial mixed-waste treatability studies.

565
(INEL–96/00055)
Life cycle cost and risk estimation of environmental management options. Shropshire, D.; Sherick, M. Lockheed Idaho Technologies Co., Idaho Falls, ID (United

States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960212–77: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96009014. Source: OSTI; NTIS; INIS; GPO Dep.

The evaluation process is demonstrated in this paper through comparative analysis of two alternative scenarios identified for the management of the alpha-contaminated fixed low-level waste currently stored at INEL. These two scenarios, the Base Case and the Delay Case, are realistic and based on actual data, but are not intended to exactly match actual plans currently being developed at INEL. Life cycle cost estimates were developed for both scenarios using the System Cost Model; resulting costs are presented and compared. Life cycle costs are shown as a function of time and also aggregated by pretreatment, treatment, storage, and disposal activities. Although there are some short-term cost savings for the Delay Case, cumulative life cycle costs eventually become much higher than costs for the Base Case over the same period of time, due mainly to the storage and repackaging necessary to accommodate the longer Delay Case schedule. Life cycle risk estimates were prepared using a new risk analysis method adapted to the System Cost Model architecture for automated, systematic cost/risk applications. Relative risk summaries are presented for both scenarios as a function of time and also aggregated by pretreatment, treatment, storage, and disposal activities. Relative risk of the Delay Case is shown to be higher than that of the Base Case. Finally, risk and cost results are combined to show how the collective information can be used to help identify opportunities for risk or cost reduction and highlight areas where risk reduction can be achieved most economically.

566
(INEL–96/00056)
The System Cost Model: A tool for life cycle cost and risk analysis. Hsu, K.; Lundeen, A.; Shropshire, D.; Sherick, M. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960212–75: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96009013. Source: OSTI; NTIS; INIS; GPO Dep.

In May of 1994, Lockheed Idaho Technologies Company (LITCO) in Idaho Falls, Idaho and subcontractors began development of the System Cost Model (SCM) application. The SCM estimates life cycle costs of the entire US Department of Energy (DOE) complex for designing; constructing; operating; and decommissioning treatment, storage, and disposal (TSD) facilities for mixed low-level, low-level, and transuranic waste. The SCM uses parametric cost functions to estimate life cycle costs for various treatment, storage, and disposal modules which reflect planned and existing waste management facilities at DOE installations. In addition, SCM can model new TSD facilities based on capacity needs over the program life cycle. The user can provide input data (default data is included in the SCM) including the volume and nature of waste to be managed, the time period over which the waste is to be managed, and the configuration of the waste management complex (i.e., where each installation's generated waste will be treated, stored, and disposed). Then the SCM uses parametric cost equations to estimate the costs of pre-operations (designing), construction, operations and maintenance, and decommissioning these waste management facilities. The SCM also provides transportation costs for DOE wastes. Transportation costs are provided for truck and rail and include transport of contact-handled, remote-handled, and alpha (transuranic) wastes. A complement to the SCM is the System Cost Model-Risk (SCM-R) model, which provides relative Environmental, Safety, and Health (ES and H) risk information. A relative ES and H risk basis has been developed and applied by LITCO at the INEL. The risk basis is now being automated in the SCM-R to facilitate rapid risk analysis of system alternatives. The added risk functionality will allow combined cost and risk evaluation of EM alternatives.

567
(INEL–96/0155)
Mixed waste focus area integrated master schedule (current as of May 6, 1996). Idaho National Engineering Lab., Idaho Falls, ID (United States). 1996. 84p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE96010270. Source: OSTI; NTIS; INIS; GPO Dep.

The mission of the Mixed Waste Characterization, Treatment, and Disposal Focus Area (MWFA) is to provide acceptable treatment systems, developed in partnership with users and with the participation of stakeholders, tribal governments, and regulators, that are capable of treating the Department of Energy's (DOE's) mixed wastes. In support of this mission, the MWTA produced the Mixed Waste Focus Area Integrated Technical Baseline Report, Phase I Volume 1, January 16, 1996, which identified a prioritized list of 30 national mixed waste technology deficiencies. The MWFA is targeting funding toward technology development projects that address the current list of deficiencies. A clear connection between the technology development projects and the EM-30 and EM-40 treatment systems that they support is essential for optimizing the MWFA efforts. The purpose of the Integrated Master Schedule (IMS) is to establish and document these connections and to ensure that all technology development activities performed by the MWFA are developed for timely use in those treatment systems. The IMS is a list of treatment systems from the Site Treatment Plans (STPs)/Consent Orders that have been assigned technology development needs with associated time-driven schedules, Technology deficiencies and associated technology development (TD) needs have been identified for each treatment system based on the physical, chemical, and radiological characteristics of the waste targeted for the treatment system. The schedule, the technology development activities, and the treatment system have been verified through the operations contact from the EM-30 organization at the site.

568
(INEL–96/0247)
Comparison of alternative treatment systems for DOE mixed low-level waste. Schwinkendorf, W.E. Idaho National Engineering Lab., Idaho Falls, ID (United States). Mar 1997. 153p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052941. Source: OSTI; NTIS; INIS; GPO Dep.

From 1993 to 1996, the Department of Energy, Environmental Management, Office of Science and Technology (OST), has sponsored a series of systems analyses to guide its future research and development (R&D) programs for the treatment of mixed low-level waste (MLLW) stored in the DOE complex. The two original studies were of 20 mature and innovative thermal systems. As a result of a technical review of these thermal system studies, a similar study of five innovative nonthermal systems was conducted in which unit operations are limited to temperatures less than 350°C to minimize volatilization of heavy metals and radionuclides, and de novo production of dioxins and furans in the offgas. Public involvement in the INTS study was established through a working group of 20 tribal and stakeholder representatives to provide input to the INTS studies and identify principles against which the systems should be designed and evaluated. Pre-conceptual designs were developed for all systems to treat the same waste input (2927 lbs/hr) in a single centralized facility operating 4032 hours per year for 20 years. This inventory consisted of a wide range of combustible and non-combustible materials such as paper, plastics, metals, concrete, soils, sludges, liquids, etc., contaminated with trace quantities of radioactive materials and RCRA regulated wastes. From this inventory, an average waste profile was developed for simulated treatment using ASPEN PLUS© for mass balance calculations. Seven representative thermal systems were selected for comparison with the five nonthermal systems. This report presents the comparisons against the TSWG principles, of total life cycle cost (TLCC), and of other system performance indicators such as energy requirements, reagent requirements, land use, final waste volume, aqueous and gaseous effluents, etc.

569
(INEL–96/00268)
Comparison of costs for alternative mixed low-level waste treatment systems. Schwinkendorf, W.E. (Lockheed Idaho Technologies Co., Idaho Falls, ID (United States)); Harvego, L.; Cooley, C.R.; Biagi, C. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 13p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-970335–55: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97052144. Source: OSTI; NTIS; INIS; GPO Dep.

Total life cycle costs (TLCCs), including disposal costs, of thermal, nonthermal and enhanced nonthermal systems were evaluated to guide future research and development programs for the treatment of mixed low-level waste (MLLW) consisting of RCRA hazardous and low-level radioactive wastes. In these studies, nonthermal systems are defined as those systems that process waste at temperatures less than 350 C. Preconceptual designs and costs were developed for thirty systems with a capacity (2,927 lbs/hr) to treat the DOE MLLW stored inventor y(approximately 236 million pounds) in 20 years in a single, centralized facility. A limited comparison of the studies' results is presented in this paper. Sensitivity of treatment costs with respect to treatment capacity, number of treatment facilities, and system availability were also determined. The major cost element is operations and maintenance (O and M), which is 50 to 60% of the TLCC for both thermal and nonthermal systems. Energy costs constitute a small fraction (< 1%) of the TLCCs. Equipment cost is only 3 to 5% of the treatment cost. Evaluation of subsystem costs demonstrate that receiving and preparation is the highest cost subsystem at about 25 to 30% of the TLCC for both thermal and nonthermal systems. These studies found no cost incentives to use nonthermal or hybrid (combined nonthermal treatment with stabilization by vitrification) systems in place of thermal systems. However, there may be other incentives including fewer air emissions and less local objection to a treatment facility. Building multiple treatment facilities to treat the same total mass of waste as a single facility would increase the total treatment cost significantly, and improved system availability decreases unit treatment costs by 17% to 30%.

570
(INEL–96/0273)
Integrated nonthermal treatment system study. Biagi, C. (Morrison Knudsen Corp. (United States)); Bahar, D.; Teheranian, B.; Vetromile, J.; Quapp, W.J.; Bechtold, T.; Brown, B.; Schwinkendorf, W.; Swartz, G. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Jan 1997. 405p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052948. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results of a study of nonthermal treatment technologies. The study consisted of a systematic assessment of five nonthermal treatment alternatives. The treatment alternatives consist of widely varying technologies for safely destroying the hazardous organic components, reducing the volume, and preparing for final disposal of the contact-handled mixed low-level waste (MLLW) currently stored in the US Department of Energy complex. The alternatives considered were innovative nonthermal treatments for organic liquids and sludges, process residue, soil and debris. Vacuum desorption or various washing approaches are considered for treatment of soil, residue and debris. Organic destruction methods include mediated electrochemical oxidation, catalytic wet oxidation, and acid digestion. Other methods studied included stabilization technologies and mercury separation of treatment residues. This study is a companion to the integrated thermal treatment study which examined 19 alternatives for thermal treatment of MLLW waste. The quantities and physical and chemical compositions of the input waste are based on the inventory database developed by the US Department of Energy. The Integrated Nonthermal Treatment Systems (INTS) systems were evaluated using the same waste input (2,927 pounds per hour) as the Integrated Thermal Treatment Systems (ITTS). 48 refs., 68 figs., 37 tabs.

571
(INEL–96/0291-Rev.1)
Integrated thermal and nonthermal treatment technology and subsystem cost sensitivity analysis. Harvego, L.A.; Schafer, J.J. Idaho National Engineering Lab., Idaho Falls, ID (United States). Feb 1997. 64p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052945. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy's (DOE) Environmental Management Office of Science and Technology (EM-50) authorized studies on alternative systems for treating contact-handled DOE mixed low-level radioactive waste

(MLLW). The on-going Integrated Thermal Treatment Systems' (ITTS) and the Integrated Nonthermal Treatment Systems' (INTS) studies satisfy this request. EM-50 further authorized supporting studies including this technology and subsystem cost sensitivity analysis. This analysis identifies areas where technology development could have the greatest impact on total life cycle system costs. These areas are determined by evaluating the sensitivity of system life cycle costs relative to changes in life cycle component or phase costs, subsystem costs, contingency allowance, facility capacity, operating life, and disposal costs. For all treatment systems, the most cost sensitive life cycle phase is the operations and maintenance phase and the most cost sensitive subsystem is the receiving and inspection/preparation subsystem. These conclusions were unchanged when the sensitivity analysis was repeated on a present value basis. Opportunity exists for technology development to reduce waste receiving and inspection/preparation costs by effectively minimizing labor costs, the major cost driver, within the maintenance and operations phase of the life cycle.

572
(INEL–96/00295)
A preliminary evaluation of certain NDA techniques for RH-TRU characterization. Hartwell, J.K.; Yoon, W.Y.; Peterson, H.K. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 22p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-970126–16: 5. nondestructive assay/nondestructive examination waste characterization conference, Salt Lake City, UT (United States), 14-16 Jan 1997). Order Number DE97052148. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results of modeling efforts to evaluate selected NDA assay methods for RH-TRU waste characterization. The target waste stream was Content Code 104/107 113-liter waste drums that comprise the majority of the INEL's RH-TRU waste inventory. Two NDA techniques are treated in detail. One primary NDA technique examined is gamma-ray spectrometry to determine the drum fission and activation product content, and fuel sample inventory calculations using the ORIGEN code to predict the total drum inventory. A heavily shielded and strongly collimated HPGE spectrometer system was designed using MCNP modeling. Detection limits and expected precision of this approach were estimated by a combination of Monte Carlo modeling and synthetic gamma-ray spectrum generation. This technique may allow the radionuclide content of these wastes to be determined with relative standard deviations of 20 to 55% depending on the drum matrix and radionuclide. The INEL Passive/Active Neutron (PAN) assay system is the second primary technique considered. A shielded overpack for the 113-liter CC104/107 RH-TRU drums was designed to shield the PAN detectors from excessive gamma radiation. MCNP modeling suggests PAN detection limits of about 0.06 g ^{235}U and 0.04 g ^{239}Pu during active assays.

573
(INEL–96/0330)
Proposed research and development plan for mixed low-level waste forms. O'Holleran, T.O. (and others); Feng, X.; Kalb, P. Idaho National Engineering Lab., Idaho Falls, ID (United States). Dec 1996. 83p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052946. Source: OSTI; NTIS; INIS; GPO Dep.

The objective of this report is to recommend a waste form program plan that addresses waste form issues for mixed low-level waste (MLLW). The report compares the suitability of proposed waste forms for immobilizing MLLW in preparation for permanent near-surface disposal and relates them to their impact on the U.S. Department of Energy's mixed waste mission. Waste forms are classified into four categories: high-temperature waste forms, hydraulic cements, encapsulants, and specialty waste forms. Waste forms are evaluated concerning their ability to immobilize MLLW under certain test conditions established by regulatory agencies and research institutions. The tests focused mainly on leach rate and compressive strength. Results indicate that all of the waste forms considered can be tailored to give satisfactory performance immobilizing large fractions of the Department's MLLW inventory. Final waste form selection will ultimately be determined by the interaction of other, often nontechnical factors, such as economics and politics. As a result of this report, three top-level programmatic needs have been identified: (1) a basic set of requirements for waste package performance and disposal; (2) standardized tests for determining waste form performance and suitability for disposal; and (3) engineering experience operating production-scale treatment and disposal systems for MLLW.

574
(INEL–96/0375)
Performance assessment for a hypothetical low-level waste disposal facility. Smith, C.S. (and others); Rohe, M.J.; Ritter, P.D. Idaho National Engineering Lab., Idaho Falls, ID (United States). Jan 1997. 112p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97053012. Source: OSTI; NTIS; INIS; GPO Dep.

Disposing of low-level waste (LLW) is a concern for many states throughout the United States. A common disposal method is below-grade concrete vaults. Performance assessment analyses make predictions of contaminant release, transport, ingestion, inhalation, or other routes of exposure, and the resulting doses for various disposal methods such as the below-grade concrete vaults. Numerous assumptions are required to simplify the processes associated with the disposal facility to make predictions feasible. In general, these assumptions are made conservatively so as to underestimate the performance of the facility. The objective of this report is to describe the methodology used in conducting a performance assessment for a hypothetical waste facility located in the northeastern United States using real data as much as possible. This report consists of the following: (a) a description of the disposal facility and site, (b) methods used to analyze performance of the facility, (c) the results of the analysis, and (d) the conclusions of this study.

575
(INEL–96/0430)
Portable treatment systems study. Sherick, M.J.; Schwinkendorf, W.E.; Bechtold, T.E.; Cole, L.T. Idaho National Engineering Lab., Idaho Falls, ID (United States). Mar 1997. 249p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC

(United States). DOE Contract AC07-94ID13223. Order Number DE97052949. Source: OSTI; NTIS; INIS; GPO Dep.

In developing their Site Treatment Plans (STPs), many of the Department of Energy installations identified some form of portable treatment, to facilitate compliant disposition of select mixed low-level wastestreams. The Environmental Management Office of Science and Technology requested that a systems study be performed to better define the potential role of portable treatment with respect to mixed low-level waste, highlight obstacles to implementation, and identify opportunities for future research and development emphasis. The study was performed by first establishing a representative set of mixed waste, then formulating portable treatment system concepts to meet the required processing needs for these wastes. The portable systems that were conceptualized were evaluated and compared to a fixed centralized treatment alternative. The system evaluations include a life-cycle cost analysis and an assessment of regulatory, institutional, and technical issues associated with the potential use of portable systems. The results of this study show that when all costs are included, there are no significant cost differences between portable systems and fixed systems. However, it is also emphasized that many uncertainties exist that could impact the cost of implementing portable treatment systems. Portable treatment could be made more attractive through private sector implementation, although there is little economic incentive for a commercial vendor to develop small, specialized treatment capabilities with limited applicability. Alternatively, there may also be valid reasons why fixed units cannot be used for some problematic wastestreams. In any event, there are some site-specific problems that still need to be addressed, and there may be some opportunity for research and development to make a positive impact in these areas.

576
(INEL–96/0450)
Partitioning planning studies: Preliminary evaluation of metal and radionuclide partitioning the high-temperature thermal treatment systems. Liekhus, K. (and others); Grandy, J.; Chambers, A. Idaho National Engineering Lab., Idaho Falls, ID (United States). Mar 1997. 492p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052964. Source: OSTI; NTIS; INIS; GPO Dep.

A preliminary study of toxic metals and radionuclide partitioning during high-temperature processing of mixed waste has been conducted during Fiscal Year 1996 within the Environmental Management Technology Evaluation Project. The study included: (a) identification of relevant partitioning mechanisms that cause feed material to be distributed between the solid, molten, and gas phases within a thermal treatment system; (b) evaluations of existing test data from applicable demonstration test programs as a means to identify and understand elemental and species partitioning; and, (c) evaluation of theoretical or empirical partitioning models for use in predicting elemental or species partitioning in a thermal treatment system. This preliminary study was conducted to identify the need for and the viability of developing the tools capable of describing and predicting toxic metals and radionuclide partitioning in the most applicable mixed waste thermal treatment processes. This document presents the results and recommendations resulting from this study that may serve as an impetus for developing and implementing these predictive tools.

577
(INEL–96/0473)
Enhanced integrated nonthermal treatment system study. Biagi, C.; Schwinkendorf, B.; Teheranian, B. Idaho National Engineering Lab., Idaho Falls, ID (United States). Feb 1997. 228p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052947. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of the Enhanced Nonthermal Treatment Systems (ENTS) study is to evaluate alternative configurations of one of the five systems evaluated in the Integrated Nonthermal Treatment Systems (INTS) study. Five alternative configurations are evaluated. Each is designed to enhance the final waste form performance by replacing grout with improved stabilization technologies, or to improve system performance by improving the destruction efficiency for organic contaminants. AU enhanced systems are alternative configurations of System NT-5, which has the following characteristics: Nonthermal System NT-5: (1) catalytic wet oxidation (CWO) to treat organic material including organic liquids, sludges, and soft (or combustible) debris, (2) thermal desorption of inorganic sludge and process residue, (3) washing of soil and inorganic debris with treatment by CWO of removed organic material, (4) metal decontamination by abrasive blasting, (5) stabilization of treated sludge, soil, debris, and untreated debris with entrained contamination in grout, and (6) stabilization of inorganic sludge, salts and secondary waste in polymer. System NT-5 was chosen because it was designed to treat combustible debris thereby minimizing the final waste form volume, and because it uses grout for primary stabilization. The enhanced nonthermal systems were studied to determine the cost and performance impact of replacing grout (a commonly used stabilization agent in the DOE complex) with improved waste stabilization methods such as vitrification and polymer.

578
(INEL/CON–97-00109)
Incineration of DOE offsite mixed waste at the Idaho National Engineering Laboratory. Kristofferson, K. (Lockheed Idaho Technologies Co., Idaho Falls, ID (United States)); Harris, J.D.; Rasch, D.N. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). 31 Jan 1997. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-970335–51: Waste Management '97, Tucson, AZ (United States), 2-7 Mar 1997). Order Number DE97052136. Source: OSTI; NTIS; INIS; GPO Dep.

Contained within the Idaho National Engineering Laboratory (INEL) Site Treatment Plan (STP) is language addressing receipt, storage, and treatment of DOE mixed waste from offsite facilities. The Waste Experimental Reduction Facility (WERF) incinerator has been identified by several DOE sites as the preferred treatment facility for their mixed wastes. The WERF incinerator has an annual treatment capacity of 2,000 m^3. A small portion of this capacity, 136 m^3 per year through 2002, will be used by the INEL, leaving 1,864 m^3 of available capacity for mixed waste treatment each year that WERF operates. Since signing the STP, several DOE sites have requested the addition of

waste streams to the INEL STP because the WERF incinerator is operating and treating mixed waste. In addition, budget cuts have eliminated many planned treatment facilities, which now makes WERF a viable option for treating offsite mixed waste. Pre- and post-treatment storage of offsite mixed waste and waste treatment residues at the INEL, other than the waste received from Naval shipyards facing closure, requires approval of DOE-ID and the State of Idaho. Offsite waste treated at the WERF incinerator, and waste treatment residues (characteristic or listed), will not be disposed at the INEL. Rather, treated waste and waste treatment residues from incineration will be temporarily stored at the INEL until a disposal facility can be identified and arrangements made to transport the waste to the disposal facility. If no disposal facility can be found, the treatment residues is returned to the generator.

579
(INEL/EXT–97-00063)
Evaluation of a self-guided transport vehicle for remote transportation of transuranic and other hazardous waste. Rice, P.M. (and others); Moody, S.J.; Peterson, R. Idaho National Engineering Lab., Idaho Falls, ID (United States). Apr 1997. 214p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052939. Source: OSTI; NTIS; INIS; GPO Dep.

Between 1952 and 1970, over two million cubic ft of transuranic mixed waste was buried in shallow pits and trenches in the Subsurface Disposal Area at the Idaho National Engineering Laboratory's Radioactive Waste Management Complex. Commingled with this two million cubic ft of waste is up to 10 million cubic ft of fill soil. The pits and trenches were constructed similarly to municipal landfills with both stacked and random dump waste forms such as barrels and boxes. The main contaminants are micron-sized particles of plutonium and americium oxides, chlorides, and hydroxides. Retrieval, treatment, and disposal is one of the options being considered for the waste. This report describes the results of a field demonstration conducted to evaluate a technology for transporting exhumed transuranic wastes at the Idaho National Engineering and Environmental Laboratory (INEEL) and at other hazardous or radioactive waste sites through the U.S. Department of Energy complex. The full-scale demonstration, conducted at the INEEL Robotics Center in the summer of 1995, evaluated equipment performance and techniques for remote transport of exhumed buried waste. The technology consisted of a Self-Guided Transport Vehicle designed to remotely convey retrieved waste from the retrieval digface and transport it to a receiving/processing area with minimal human intervention. Data were gathered and analyzed to evaluate performance parameters such as precision and accuracy of navigation and transportation rates.

580
(INEL/EXT–97/00171)
Time and motion study for alternative mixed low-level waste treatment systems. Biagi, C.; Vetromile, J.; Teheranian, B. Idaho National Engineering Lab., Idaho Falls, ID (United States). Feb 1997. 145p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97052943. Source: OSTI; NTIS; INIS; GPO Dep.

The time and motion study was developed to look at time-related aspects of the technologies and systems studied in the Integrated Thermal Treatment Systems (ITTS) and Integrated Nonthermal Treatment Systems (INTS) studies. The INTS and ITTS studies combined technologies into systems and subsystems for evaluation. The system approach provides DOE a method of measuring advantages and disadvantages of the many technologies currently being researched. For example, technologies which are more likely to create secondary waste or require extensive pretreatment handling may be less desirable than technologies which require less support from other processes. The time and motion study was designed to address the time element in the INTS and ITTS systems studies. Previous studies have focused on material balance, cost, technical effectiveness, regulatory issues, community acceptance, and operability. This study looks at system dynamics by estimating the treatment time required for a unit of waste, from receipt to certification for shipping. Labor estimates are also developed, based on the time required to do each task for each process. This focus on time highlights critical path processes and potential bottlenecks in the INTS and ITTS systems.

581
(LA-UR–96-1102)
Ready, set,...quit! A review of the controlled-air incinerator. Reader, G.E. California Univ., Irvine, CA (United States). 1996. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960535–1: 15. international conference on incineration and thermal treatment technologies, Savannah, GA (United States), 6-10 May 1996). Order Number DE96009034. Source: OSTI; NTIS; INIS; GPO Dep.

The Los Alamos National Laboratory (LANL) Controlled-Air Incinerator (CAI) has had a long and productive past as a research and development tool. It now appears that use of the CAI to treat LANL legacy and other wastes under the Federal Facilities Compliance Act is no longer viable due to numerous programmatic problems. This paper will review the history of the CAI. Various aspects associated with the CAI and how those aspects resulted in the loss of this Department of Energy asset as a viable waste treatment option will also be discussed. Included are past missions and tests-CAI capabilities, emissions, and permits; Federal Facility Compliance Act and associated Agreement; National Environmental Policy Act coverage; cost; budget impacts; public perception; the U.S. Environmental Protection Agency Combustion Strategy; Independent Technical Review "Red" Team review; waste treatment alternative technologies; the New Mexico Environment Department; and future options and issues.

582
(LA-UR–96-1103)
Evaluation of pressure response in the Los Alamos controlled air incinerator during three incident scenarios. Vavruska, J.S. (Equinox, Ltd., Santa Fe, NM (United States)); Elsberry, K.; Thompson, T.K.; Pendergrass, J.A. Los Alamos National Lab., NM (United States). 1996. 28p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960535–3: 15. international conference on incineration and thermal treatment technologies, Savannah, GA (United States), 6-10 May 1996). Order Number DE96009035. Source: OSTI; NTIS; INIS; GPO Dep.

The Los Alamos Controlled Air Incinerator (CAI) is a system designed to accept radioactive mixed waste containing alpha-emitting radionuclides. A mathematical model was developed to predict the pressure response throughout the offgas treatment system of the CAI during three hypothetical incident scenarios. The scenarios examined included: (1) loss of burner flame and failure of the flame safeguard system with subsequent reignition of fuel gas in the primary chamber, (2) pyrolytic gas buildup from a waste package due to loss of induced draft and subsequent restoration of induced draft, and (3) accidental charging of propellant spray cans in a solid waste package to the primary chamber during a normal feed cycle. For each of the three scenarios, the finite element computer model was able to determine the transient pressure surge and decay response throughout the system. Of particular interest were the maximum absolute pressures attainable at critical points in the system as well as maximum differential pressures across the high efficiency particulate air (HEPA) filters. Modeling results indicated that all three of the scenarios resulted in maximum HEPA filter differential pressures well below the maximum allowable levels.

583
(LA-UR–96-2574)
Determination of fission neutron transmission through waste matrix material using neutron signal correlation from active assay of ^{239}Pu. Hollas, C.L.; Arnone, G.; Brunson, G.; Coop, K. Los Alamos National Lab., NM (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960767–43: 37. annual meeting of the Institute of Nuclear Materials Management, Naples, FL (United States), 28 Jul - 1 Aug 1996). Order Number DE96014207. Source: OSTI; NTIS; INIS; GPO Dep.

The accuracy of TRU (transuranic) waste assay using the differential die-away technique depends upon significant corrections to compensate for the effects of the matrix material in which the TRU waste is located. The authors have used a new instrument, the Combined Thermal/Epithermal Neutron (CTEN) instrument for the assay of TRU waste, to develop methods to improve the accuracy of these corrections. Neutrons from a pulsed 14-MeV neutron generator are moderated in the walls of the CTEN cavity and induce fission in the TRU material. The prompt neutrons from these fission events are detected in cadmium-wrapped ^{3}He neutron detectors. They report new methods of data acquisition and analysis to extract correlation in the neutron signals resulting form fission during active interrogation. They use the correlation information in conjunction with the total number of neutrons to determine the fraction of fission neutrons transmitted through the matrix material into the ^{3}He detectors. This determination allows them to cleanly separate the matrix effects into two processes: matrix modification upon the neutron interrogating flux and matrix modification upon the fraction of fission neutrons transmitted to the neutron detectors. This transmission information is also directly applied in a neutron multiplicity analysis in the passive assay of ^{240}Pu.

584
(ORNL/ER–383)
Contingency plan for the Old Hydrofracture Facility tanks sluicing project at Oak Ridge National Laboratory, Oak Ridge, Tennessee. CDM Federal Programs Corp., Oak Ridge, TN (United States). Oct 1996. 43p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97050800. Source: OSTI; NTIS; INIS; GPO Dep.

Lockheed Martin Energy Systems, Inc. (Energy Systems), plans to begin a sluicing (flushing) and pumping project to remove the contents from five inactive, underground storage tanks at the Old Hydrofracture Facility (OHF) at the Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. The tank contents will be transferred to the Melton Valley Storage Tanks, which are part of the active waste treatment system at ORNL. The purpose of the project is to minimize the risk of leaking the highly radioactive material to the environment. The five OHF tanks each contain a layer of sludge and a layer of supernatant. Based on a sampling project undertaken in 1995, the sludge in the tanks has been characterized as transuranic and mixed waste and the supernatants have been characterized as mixed waste. The combined radioactivity of the contents of the five tanks is approximately 29,500 Ci. This contingency plan is based on the preliminary design for the project and describes a series of potential accident/release scenarios for the project. It outlines Energy Systems' preliminary plans for prevention, detection, and mitigation. Prevention/detection methods range from using doubly contained pipelines to alarmed sensors and automatic pump cutoff systems. Plans for mitigation range from pumping leaked fluids from the built-in tank drainage systems and cleaning up spilled liquids to personnel evacuation.

585
(PNNL–11690)
Bench-scale feasibility testing of pulsed-air technology for in-tank mixing of dry cementitious solids with tank liquids and settled solids. Whyatt, G.A.; Hymas, C.R. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 77p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054534. Source: OSTI; NTIS; INIS; GPO Dep.

This report documents the results of testing performed to determine the feasibility of using a pulsed-air mixing technology (equipment developed by Pulsair Systems, Inc., Bellevue, WA) to mix cementitious dry solids with supernatant and settled solids within a horizontal tank. The mixing technology is being considered to provide in situ stabilization of the "V" tanks at the Idaho National Engineering and Environmental Laboratory (INEEL). The testing was performed in a vessel roughly 1/6 the scale of the INEEL tanks. The tests used a fine soil to simulate settled solids and water to simulate tank supernatants. The cementitious dry materials consisted of Portland cement and Aquaset-2H (a product of Fluid Tech Inc. consisting of clay and Portland cement). Two scoping tests were conducted to allow suitable mixing parameters to be selected. The scoping tests used only visual observations during grout disassembly to assess mixing performance. After the scoping tests indicated the approach may be feasible, an additional two mixing tests were conducted. In addition to visual observations during disassembly of the solidified grout, these tests included addition of chemical tracers and chemical analysis of samples to determine the degree of mixing uniformity achieved. The final two mixing tests demonstrated that the pulsed-air mixing technique is capable of producing slurries containing substantially more cementitious dry solids than indicated by the formulations

suggested by INEEL staff. Including additional cement in the formulation may have benefits in terms of increasing mobilization of solids, reducing water separation during curing, and increasing the strength of the solidified product. During addition to the tank, the cementitious solids had a tendency to form clumps which broke down with continued mixing.

586
(SAND–96-0178C)
Effects of simulant Hanford tank waste on plastic packaging components. Nigrey, P.J.; Dickens, T.G. Sandia National Labs., Albuquerque, NM (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960804–34: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96010548. Source: OSTI; NTIS; INIS; GPO Dep.

In this paper, the authors describe a chemical compatibility testing program for packaging components which might be used to transport mixed wastes. They mention the results of the screening phase of this program and then present the results of the second phase of this experimental program. This effort involved the comprehensive testing of five plastic liner materials in the aqueous mixed waste simulant. The testing protocol involved exposing the respective materials to ~ 140, 290, 570, and 3,670 krads of gamma radiation followed by 7, 14, 28, 180 day exposures to the waste simulant at 18, 50, and 60 C. From the data analysis performed to date in this study, they have identified the fluorocarbon Kel-F™ as having the greatest chemical compatibility after being exposed to gamma radiation followed by exposure to the Hanford Tank simulant mixed waste. The most striking observation from this study was the poor performance of Teflon under these conditions. The data obtained from this testing program will be available to packaging designers for the development of mixed waste packagings. The implications of the testing results on the selection of appropriate materials as packaging components are discussed.

587
(SAND–96-0297C)
Stabilization of liquid low-level and mixed wastes: a treatability study. Carson, S.; Cheng, Yu-Cheng; Yellowhorse, L.; Peterson, P. Sandia National Labs., Livermore, CA (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960212–11: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96007428. Source: OSTI; NTIS; INIS; GPO Dep.

A treatability study has been conducted on liquid low-level and mixed wastes using the stabilization agents Aquaset, Aquaset II, Aquaset II-H, Petroset, Petroset-H, and Petroset and Petroset II. A total of 40 different waste types with activities ranging from 10^{-14} to 10^{-4} curies/ml have been stabilized. Reported data for each waste include its chemical and radiological composition and the optimum composition or range of compositions (weight of agent/volume of waste) for each stabilization agent used. All wastes were successfully stabilized with one or more of the stabilization agents and all final waste forms passed the Paint Filter Liquids Test (EPA Method 9095).

588
(SAND–96-0377C)
Scoping analysis of toxic metal performance in DOE low-level waste disposal facilities. Waters, R.D; Bougai, D.A.; Pohl, P.I. Sandia National Labs., Albuquerque, NM (United States). [1996]. 13p. Sponsored by USDOE, Washington, DC (United States);National Academy of Sciences, Washington, DC (United States);National Research Council, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960212–46: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006479. Source: OSTI; NTIS; INIS; GPO Dep.

This study provides a scoping safety assessment for disposal of toxic metals contained in Department of Energy (DOE) mixed low-level waste (MLLW) at six DOE sites that currently have low-level waste (LLW) disposal facilities–Savannah River Site, Oak Ridge Reservation, Los Alamos National Laboratory, Hanford Reservation, Nevada Test Site, and Idaho National Engineering Laboratory. The study has focused on the groundwater contaminant pathway, which is considered to be the dominant human exposure pathway from shallow land MLLW disposal. A simple and conservative transport analysis has been performed using site hydrological data to calculate site-specific "permissible" concentrations of toxic metals in grout-immobilized waste. These concentrations are calculated such that, when toxic metals are leached from the disposal facility by infiltrating water and attenuated in local ground-water system the toxic metal concentrations in groundwater below the disposal facility do not exceed the Maximum Contaminant Levels as stated in the National Primary Drinking Water Regulation. The analysis shows that and sites allow about l00 times higher toxic metal concentrations in stabilized waste leachate than humid sites. From the limited available data on toxic metal concentrations in DOE MLLW, a margin of protection appears to exist in most cases when stabilized wastes containing toxic metals are disposed of at the DOE sites under analysis. Possible exceptions to this conclusion are arsenic, chromium selenium, and mercury when disposed of at some humid sites such as the Oak Ridge Reservation. This analysis also demonstrates that the US Environmental Protection Agency's prescriptive regulatory approach that defines rigid waste treatment standards does not inherently account for the variety of disposal environments encountered nationwide and may result in either underprotection of groundwater resources (at humid sites) or an excessive margin of protection (at and sites).

589
(SAND–96-0378C)
Disposal of mixed waste: Technical, institutional, and policy factors. Waters, R.D. (Sandia National Labs., Albuquerque, NM (United States)); Gruebel, M.M.; Letourneau, M.J.; Case, J.T. Sandia National Labs., Albuquerque, NM (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960212–47: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006474. Source: OSTI; NTIS; INIS; GPO Dep.

In conjunction with the affected States as part of their interactions required by the Federal Facilities Compliance Act,

the Department of Energy has been developing a process for a disposal configuration for its mixed low-level waste (MLLW). This effort, spanning more than two years, has reduced the potential disposal sites from 49 to 15. The remaining 15 sites have been subjected to a performance evaluation to determine their strengths and weaknesses for disposal of MLLW. The process has included institutional and policy factors as well as strictly technical analyses, and technical analyses must be supported by technical analyses, and technical analyses must be performed within a framework which includes some institutional considerations, with the institutional considerations selected for inclusion largely a matter of policy. While the disposal configuration process is yet to be completed, the experience to date offers a viable approach for solving some of these issues. Additionally, several factors remain to be addressed before an MLLW disposal configuration can be developed.

590
(SAND–96-0815C)
Compatibility of packaging components with simulant mixed waste. Nigrey, P.J.; Dickens, T.G. Sandia National Labs., Albuquerque, NM (United States). [1996]. 3p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9604104–7: 20. compatibility, aging and stockpile stewardship conference, Kansas City, KS (United States), 30 Apr - 2 May 1996). Order Number DE96008165. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of hazardous and radioactive materials packaging is to enable these materials to be transported without posing a threat to the health or property of the general public. To achieve this aim, regulations in the US have been written establishing general design requirements for such packagings. While no regulations have been written specifically for mixed waste packaging, regulations for the constituents of mixed wastes, i.e., hazardous and radioactive substances, have been codified by the US Department of Transportation (US DOT, 49 CFR 173) and the US Nuclear Regulatory Commission (NRC, 10 CFR 71). Based on these national requirements, a Chemical Compatibility Testing Program was developed in the Transportation Systems Department at Sandia National Laboratories (SNL). The program provides a basis to assure any regulatory body that the issue of packaging material compatibility towards hazardous and radioactive materials has been addressed. In this paper, the authors present the results of the second phase of this testing program. The first phase screened five liner materials and six seal materials towards four simulant mixed wastes. This phase involved the comprehensive testing of five candidate liner materials to an aqueous Hanford Tank simulant mixed waste. The comprehensive testing protocol involved exposing the respective materials a matrix of four gamma radiation doses (~ 1, 3, 6, and 40 kGy), three temperatures (18, 50, and 60 C), and four exposure times (7, 14, 28, and 180 days). Following their exposure to these combinations of conditions, the materials were evaluated by measuring five material properties. These properties were specific gravity, dimensional changes, hardness, stress cracking, and mechanical properties.

591
(SAND–96-1318C)
Treatment of anisotropic damage development within a scalar damage formulation. Chan, K.S. (Southwest Research Inst., San Antonio, TX (United States)); Bodner, S.R.; Munson, D.E. Sandia National Labs., Albuquerque, NM (United States). [1996]. 15p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606285–1: Innovative computational methods for fracture and damage, Dublin (Ireland), 30 Jun - 1 Jul 1996). Order Number DE96013950. Source: OSTI; NTIS; INIS; GPO Dep.

This paper is concerned with describing a damage mechanics formulation which provides for non-isotropic effects using a scalar damage variable. An investigation has been in progress for establishing the constitutive behavior of rock salt at long times and low to moderate confining pressures in relation to the possible use of excavated rooms in rock salt formations as repositories for nuclear waste. An important consideration is the effect of damage manifested principally by the formation of shear induced wing cracks which have a stress dependent orientation. The analytical formulation utilizes a scalar damage parameter, but is capable of indicating the non- isotropic dependence of inelastic straining on the stress state and the confining pressure. Also, the equations indicate the possibility of volumetric expansions leading to the onset of tertiary creep and eventually rupture if the damage variable reaches a critical value.

592
(SAND–97-1098)
Analysis of the technical capabilities of DOE sites for disposal of residuals from the treatment of mixed low-level waste. Waters, R.D.; Gruebel, M.M.; Langkopf, B.S.; Kuehne, P.B. Sandia National Labs., Albuquerque, NM (United States). Apr 1997. 121p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97006766. Source: OSTI; NTIS; INIS; GPO Dep.

The US Department of Energy (DOE) has stored or expects to generate over the next five years more than 130,000 m^3 of mixed low-level waste (MLLW). Before disposal, MLLW is usually treated to comply with the land disposal restrictions of the Resource Conservation and Recovery Act. Depending on the type of treatment, the original volume of MLLW and the radionuclide concentrations in the waste streams may change. These changes must be taken into account in determining the necessary disposal capacity at a site. Treatment may remove the characteristic in some waste that caused it to be classified as mixed. Treatment of some waste may, by reduction of the mass, increase the concentrations of some transuranic radionuclides sufficiently so that it becomes transuranic waste. In this report, the DOE MLLW streams were analyzed to determine after-treatment volumes and radionuclide concentrations. The waste streams were reclassified as residual MLLW or low-level or transuranic waste resulting from treatment. The volume analysis indicated that about 89,000 m^3 of waste will require disposal as residual MLLW. Fifteen DOE sites were then evaluated to determine their capabilities for hosting disposal facilities for some or all of the residual MLLW. Waste streams associated with about 90% of the total residual MLLW volume are likely to present no significant issues for disposal and require little additional analysis. Future studies should focus on the remaining waste streams that are potentially problematic by examining site-specific waste

acceptance criteria, alternative treatment processes, alternative waste forms for disposal, and pending changes in regulatory requirements.

593
(SAND–97-1150)
Scoping evaluation of the technical capabilities of DOE sites for disposal of hazardous metals in mixed low-level waste. Gruebel, M.M.; Waters, R.D.; Langkopf, B.S. Sandia National Labs., Albuquerque, NM (United States). May 1997. 157p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97006765. Source: OSTI; NTIS; INIS; GPO Dep.

A team of analysts designed and conducted a scoping evaluation to estimate the technical capabilities of fifteen Department of Energy sites for disposal of the hazardous metals in mixed low-level waste (i.e., waste that contains both low-level radioactive materials and hazardous constituents). Eight hazardous metals were evaluated: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. The analysis considered transport only through the groundwater pathway. The results are reported as site-specific estimates of maximum concentrations of each hazardous metal in treated mixed low-level waste that do not exceed the performance measures established for the analysis. Also reported are site-specific estimates of travel times of each hazardous metal to the point of compliance.

594
(WSRC-MS–96-0022)
Physical sampling for site and waste characterization. Bonnough, T.L. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-960421–46: 7. annual international high-level radioactive waste management conference, Las Vegas, NV (United States), 29 Apr - 3 May 1996). Order Number DE96012425. Source: OSTI; NTIS; INIS; GPO Dep.

Physical sampling plays a basic role in high-level radioactive waste management program effort. The term "physical sampling" used here means collecting tangible, physical samples of soil, water, air, waste streams, or other materials. The industry defines the term "physical sampling" broadly to include measurements of physical conditions such as temperature, wind conditions, and pH, which are also often taken in a sample collection effort. Most environmental compliance actions are supported by the results of taking, recording, and analyzing physical samples and the measurements of physical conditions taken in association with sample collecting. Therefore, the when and how to take samples is needed to be known and planned.

595
(WSRC-MS–96-0144)
Analytical support for characterization of americium-curium solution at SRS. Maxwell, S.L. III; Nelson, M.R. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-960767–73: 37. annual meeting of the Institute of Nuclear Materials Management, Naples, FL (United States), 28 Jul - 1 Aug 1996). Order Number DE97000421. Source: OSTI; NTIS; INIS; GPO Dep.

Americium-Curium (Am-Cm) solution in F-Canyon was produced during the Mk 40 and Mk 41 campaigns in the mid and late 1970's. The Savannah River Site (SRS) Central Laboratory recently characterized this important solution of nuclear material to enable assessment by Westinghouse Savannah River Company and Department of Energy of disposition options. The tank had last been sampled and analyzed in 1986. A wide range of analyses were performed to determine the tank contents. New radiochemical column separation methods were developed to fully characterize the solution for actinides, metals, anions, and isotopics to support the disposition study in a timely manner. Current disposition is to perform a vitrification process on the Am/Cm solution at SRS to produce glass canisters for safe shipment and storage of this material. The SRS Am/Cm waste solution will be converted, in effect, to a product for an outside customer. Oak Ridge National Laboratory. To support the Am/Cm vitrification processing, process support analyses are required after completion of denitration, precipitation and redissolution steps. Full elemental chemistry characterization will be required on the final melter feed solution.

596
(WSRC-MS–96-0256)
Vitrification demonstration with surrogate Oak Ridge Reservation K-25 B and C pond sludge. Cicero, C.A. (Westinghouse Savannah River Co., Aiken, SC (United States)); Overcamp, T.J.; Erich, D.L. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-9605199–1: International symposium on the environmental issues and waste management technologies in ceramic and nuclear industry, Indianapolis, IN (United States), 31 May 1996). Order Number DE96060060. Source: OSTI; NTIS; INIS; GPO Dep.

Surrogate Oak Ridge Reservation (ORR) K-25 B&C Pond sludge was vitrified in a pilot-scale EnVit Co melter operated by Clemson University at the DOE/Industrial Center for Vitrification Research Center. This demonstration was performed for the Savannah River Technology Center (SRTC) in support of a Department of Energy (DOE) - Office of Technology Development (OTD) Technical Task Plan. The intent of the demonstration was to determine the feasibility of vitrifying actual K-25 B&C Pond sludge in an EnVitCo type melter. B&C Pond sludge is a mixed waste consisting primarily of various amounts of Ca, Fe, and Si, with Ni and U as the principal hazardous and radioactive components. The demonstration was successfully completed and homogeneous, durable glass was produced. Characterization of the glass product, as well as details of the demonstration, will be discussed.

597
(WSRC-TR–95-0454)
Evaluation of processing alternatives for the in-tank precipitation facility using flowsheet modeling to reduce waste streams. Taylor, G.A. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-960212–84: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96009656. Source: OSTI; NTIS; INIS; GPO Dep.

Due to increasing cost and decreasing funding it is becoming more important than ever to reduce the waste streams generated by the Savannah River Site's High Level Waste Management division. One of the process that generates a waste stream is the In-Tank Precipitation Facility. This study seeks to reduce the waste stream of excess washwater from the ITP facility. At the ITP, high level liquid waste is processed at a high sodium content in order to remove radionuclides. After the radionuclides have been precipitated and concentrated the sodium molarity must be reduced. This is done by washing the concentrate with a washwater stream. The washwater is then sent to either the Saltstone Facility to be turned into grout for final disposal or set to the evaporator system for volume reduction. It is this washwater stream that this study seeks to reduce.

598
(WSRC-TR–96-0003)
Operation of a 1/10 scale mixed water incinerator air pollution control system. Burns, D.B.; Wong, A.; Walker, W. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 12p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-960212–96: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96012427. Source: OSTI; NTIS; INIS; GPO Dep.

The Consolidated Incineration Facility (CIF) at the Savannah River Site is designed to treat solid and liquid RCRA hazardous and mixed wastes generated by site operations and clean-up activities. The technologies selected for use in the CIF air pollution control system (APCS) were based on reviews of existing commercial and DOE incinerators, on-site air pollution control experience, and recommendations from contracted consultants. In order to study the CIF APCS prior to operation, a 1/10 scale pilot facility, known as the Offgas Components Test Facility (OCTF) was constructed and has been in operation since late 1994. Its current mission is to demonstrate the design integrity of the CIF APCS and optimize equipment/instrument performance of the full scale production facility. Due to the nature of the wastes to be incinerated at the CIF, High Efficiency Particulate Air (HEPA) filters are used to remove hazardous and radioactive particulates from the exhaust gas stream before being released into the atmosphere. The HEPA filter change-out frequency has been a potential issue and was the first technical issue to be studied at the OCTF. Tests were conducted to evaluate the performance of HEPA filters under different operating conditions. These tests included evaluating the impact on HEPA life of scrubber operating parameters and the type of HEPA prefilter used. This pilot-scale testing demonstrated satisfactory HEPA filter life when using cleanable metal prefilters and high flows of steam and water in the offgas scrubber.

599
(WSRC-TR–97-0168)
The characterization of activation product radionuclides in reactor scrap metals. Hochel, R.C. Westinghouse Savannah River Co., Aiken, SC (United States). 1 Jun 1997. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE97053992. Source: OSTI; NTIS; INIS; GPO Dep.

In the Spent Fuels Storage Program at the Savannah River Site (SRS), fuels from numerous foreign and domestic research reactors are received and can be stored in several of the site's underwater basins. To efficiently store these fuels, they are usually bundled into long aluminum outer tubes, which typically may contain about a half-dozen individual assemblies. Often, prior to bundling, the ends of fuels must be cropped so that only the uranium bearing portion of the assembly is stored. The end pieces that remain from the cropping are usually stored as scrap until enough of it accumulates to warrant removal. The bulk of the scrap is aluminum. But sometimes these may include special fittings or attachments made of stainless steel, Zircaloy, or Inconel. All of these materials, as a result of their exposure to neutrons, will contain various activation products. Because the accumulated scrap materials are of different ages and compositions, the radionuclide distributions and activity levels are not the same. LLW must be characterized to meet the Waste Acceptance Criteria (WAC) of its intended disposal facility. The SRS WAC specifically requires characterization for over twenty radionuclides to levels down to 1% of the total activity in a package. At first glance this would seem to present a sizable waste characterization challenge; however, this report shows that many potential radionuclides can be eliminated from consideration, and quantification of the remainder can be inferred from the measurements of one or two key gamma-ray emitters.

600
(WSRC-TR–97-0259)
APT generation of long-lived radionuclides to include greater than Class C low-level radioactive waste requiring special disposal considerations. Reynolds, R.W. (Westinghouse Savannah River Company, AIKEN, SC (United States)); England, J. Westinghouse Savannah River Co., Aiken, SC (United States). 20 Aug 1997. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98050610. Source: OSTI; NTIS; INIS; GPO Dep.

The Accelerator Production of Tritium (APT) Facility will generate radioactive waste during routine operations of the plant. All of the waste generated will be Low Level Radioactive Waste (LLRW) or Mixed Low Level Waste (MLLW). Some APT wastes to be generated contain combinations of short lived and long lived radionuclides exceeding the current Waste Acceptance Criteria (WAC) of all Department of Energy (DOE) disposal locations. Some of the wastes would be classified Greater Than Class C (GTCC) LLRW under the Nuclear Regulatory Commission. The Nuclear Regulatory Commission (NRC) specifies a geologic repository for GTCC wastes. The Department of Energy specifies in 5820.2A geologic disposal shall comply with both Nuclear Regulatory Commission regulations and EPA standards.

RADIOACTIVE TANK WASTE REMEDIATION

601
(ANL–97/2)
Mobile evaporator corrosion test results. Rozeveld, A.; Chamberlain, D.B. Argonne National Lab., IL (United

States). May 1997. 96p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31-109-ENG-38. Order Number DE98002708. Source: OSTI; NTIS; INIS; GPO Dep.

Laboratory corrosion tests were conducted on eight candidates to select a durable and cost-effective alloy for use in mobile evaporators to process radioactive waste solutions. Based on an extensive literature survey of corrosion data, three stainless steel alloys (304L, 316L, AL-6XN), four nickel-based alloys (825, 625, 690, G-30), and titanium were selected for testing. The corrosion tests included vapor phase, liquid junction (interface), liquid immersion, and crevice corrosion tests on plain and welded samples of candidate materials. Tests were conducted at 80°C for 45 days in two different test solutions: a nitric acid solution. to simulate evaporator conditions during the processing of the cesium ion-exchange eluant and a highly alkaline sodium hydroxide solution to simulate the composition of Tank 241-AW-101 during evaporation. All of the alloys exhibited excellent corrosion resistance in the alkaline test solution. Corrosion rates were very low and localized corrosion was not observed. Results from the nitric acid tests showed that only 316L stainless steel did not meet our performance criteria. The 316L welded interface and crevice specimens had rates of 22.2 mpy and 21.8 mpy, respectively, which exceeds the maximum corrosion rate of 20 mpy. The other welded samples had about the same corrosion resistance as the plain samples. None of the welded samples showed preferential weld or heat-affected zone (HAZ) attack. Vapor corrosion was negligible for all alloys. All of the alloys except 316L exhibited either "satisfactory" (2-20 mpy) or "excellent" (<2 mpy) corrosion resistance as defined by National Association of Corrosion Engineers. However, many of the alloys experienced intergranular corrosion in the nitric acid test solution, which could indicate a susceptibility to stress corrosion cracking (SCC) in this environment.

602
(ANL/CHM/RP–94829)
The NO_x system in nuclear waste. Annual report. Meisel, D. (Argonne National Lab., IL (United States). Chemistry Div.); Camaioni, D.; Orlando, T. Argonne National Lab., IL (United States). 30 Sep 1997. 22p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98001444. Source: OSTI; NTIS; INIS; GPO Dep.

The authors highlight their results from the title project. The project is a coordinated effort of the three Co-PIs to assist the Safety Programs at the Hanford and other DOE Environmental Management Sites. They present in the report their observations and interactively discuss their implications for safety concerns. They focus on three issues: (1) reducing radicals in the NO_x system; (2) aging of organic chelators and their degradation products by NO_2; and (3) interfacial processes in aqueous suspensions. The goal of this project is to establish the chemistry and physics that dominate the radiolytically initiated processes that occur in waste tanks across the DOE complex.

603
(ANL/EAD/TM–17)
High-level waste inventory, characteristics, generation, and facility assessment for treatment, storage, and disposal alternatives considered in the US Department of Energy eenvironmental management programmatic environmental impact statement. Folga, S.M.; Conzelmann, G.; Gillette, J.L.; Kier, P.H.; Poch, L.A. Argonne National Lab., IL (United States). Dec 1996. 188p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000957. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides data and information needed to support the risk and impact assessments of high-level waste (HLW) management alternatives in the U.S. Department of Energy Waste Management (WM) Programmatic Environmental Impact Statement (PEIS). Available data on the physical form, chemical and isotopic composition, storage locations, and other waste characteristics of interest are presented. High-level waste management follows six implementation phases: current storage, retrieval, pretreatment, treatment, interim canister storage, and geologic repository disposal; pretreatment, treatment, and repository disposal are outside the scope of the WM PEIS. Brief descriptions of current and planned HLW management facilities are provided, including information on the type of waste managed in the facility, costs, product form, resource requirements, emissions, and current and future status. Data sources and technical and regulatory assumptions are identified. The range of HLW management alternatives (including decentralized, regionalized, and centralized approaches) is described. The required waste management facilities include expanded interim storage facilities under the various alternatives. Resource requirements for construction (e.g., land and materials) and operation (e.g., energy and process chemicals), work force, costs, effluents, design capacities, and emissions are presented for each alternative.

604
(BHI–00921)
Temporary septic holding tank at the 100-C remedial action restroom facility – Engineering report. Jackson, G.J. Bechtel Hanford, Inc., Richland, WA (United States). Oct 1996. 45p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050594. Source: OSTI; NTIS; INIS; GPO Dep.

The primary mission of the Hanford Site from 1943 to 1990 was to produce nuclear materials for national defense. Waste disposal activities associated with this mission resulted in the creation of more than 1,000 waste sites contaminated with radioactive and chemically hazardous constituents. Investigation and remediation of these waste sites is governed by the Tri-Party Agreement. The agreement grouped the waste sites into 78 operable units, each of which was to be investigated and remediated separately. The 100-C Remedial Action Restroom Trailer Facility will be required near the 105-C Reactor to support the 105-C Interim Storage Project. This project is part of the decommissioning of the eight surplus reactor buildings along the Columbia River in the 100 Area. This facility will be a temporary, modular building sized to provide restroom facilities for the supervisors, engineers, technicians, and craft personnel assigned to the project and engaged in the associated field work. This facility will be a temporary, modular building sized to provide restroom facilities for the supervisors, engineers, technicians, and raft personnel assigned to the

project and engaged in the associated field work. The paper describes the project location, geology and flooding potential, design criteria, and operations and maintenance.

605
(BHI–01050)
Verification sampling of soils underlying 190-C main pumphouse and 105-C water tunnels - data summary. Brown, T.M. Bechtel Hanford, Inc., Richland, WA (United States). Aug 1997. 115p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE98050447. Source: OSTI; NTIS; GPO Dep.

The 190-C Main Pumphouse is currently undergoing decontamination and decommissioning activities in preparation for collapse of the building into the basement by January 28, 1998. Process history for the 190-C Main Pumphouse and the adjacent 105-C Water Tunnels suggests the potential for past releases of contamination to soil underlying the building and tunnels. Because of the uncertainty about possible soil contamination beneath these facilities, the U.S. Department of Energy, Richland Operations Office (RL) initiated verification sampling and laboratory analyses for soil beneath the 190-C Main Pumphouse and the 105-C Water Tunnels during April and May 1997. The objective of this characterization effort was to provide sufficient data to determine whether contaminants of concern (COCs) are present in soils underlying the 190-C Main Pumphouse and the 105- C Water Tunnels at levels exceeding cleanup criteria as defined in the Data Quality Objectives (DQO) process for this project.

606
(BNL–52526)
Dynamics of solid-containing tanks. Veletsos, A.S.; Younan, A.H.; Bandyopadhyay, K. Brookhaven National Lab., Upton, NY (United States). Jan 1997. 87p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC02-76CH00016. Order Number DE97004152. Source: OSTI; NTIS; INIS; GPO Dep.

Making use of a relatively simple, approximate but reliable method of analysis, a study is made of the responses to horizontal base shaking of vertical, circular cylindrical tanks that are filled with a uniform viscoelastic material. The method of analysis is described, and comprehensive numerical data are presented that elucidate the underlying response mechanisms and the effects and relative importance of the various parameters involved. In addition to the characteristics of the ground motion and a dimensionless measure of the tank wall flexibility relative to the contained medium, the parameters examined include the ratio of tank-height to tank-radius and the physical properties of the contained material. Both harmonic and earthquake-induced ground motions are considered. The response quantities investigated are the dynamic wall pressures, the critical forces in the tank wall, and the forces exerted on the foundation. Part A of the report deals with rigid tanks while the effects of tank wall flexibility are examined in Part B. A brief account is also given in the latter part of the interrelationship of the critical responses of solid-containing tanks and those induced in tanks storing a liquid of the same mass density.

607
(CONF-960158–3)
Solvent extraction of radionuclides from aqueous tank waste. Bonnesen, P.V.; Sachleben, R.A.; Moyer, B.A. Oak Ridge National Lab., TN (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From Efficient separations and processing crosscutting program 1996 technical meeting; Gaithersburg, MD (United States); 16-19 Jan 1996. Order Number DE96005368. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this task is to develop an efficient solvent-extraction and stripping process for the removal of the fission products Tc-99, Sr-90, and Cs-137 from alkaline tank wastes, such as those stored at Hanford and Oak Ridge. As such, this task expands upon FY 1995's successful development of a solvent-extraction and stripping process for technetium separation from @e tank-waste solutions. This process has in fact already been extended to include the capability of removing both Tc and Sr simultaneously. In this form, the process has been given the name SRTALK and will be developed further in this program as a prelude to developing a system capable of removing Tc, Sr, and Cs together. Such a system could potentially simplify and improve fission-product removal from tank waste. In addition, it would possess the advantages already inherent in our Tc solvent-extraction process: No required feed adjustment, economical water stripping, low consumption of materials, and low waste volume.

608
(CONF-960421–35)
Benefits/impacts of utilizing depleted uranium silicate glass as backfill for spent fuel waste packages. Pope, R.B.; Forsberg, C.W.; Ashline, R.C.; DeHart, M.D.; Childs, K.W.; Tang, J.S. Oak Ridge National Lab., TN (United States). [1996]. 3p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From 7. annual international high-level radioactive waste management conference; Las Vegas, NV (United States); 29 Apr - 3 May 1996. Order Number DE96008810. Source: OSTI; NTIS; INIS; GPO Dep.

An assessment has been made of the benefits and impacts which can be derived by filling a spent nuclear fuel multi-purpose canister with depleted uranium silicate (DUS) glass at a reactor site. Although the primary purpose of the DUS glass fill would be to enhance repository performance assessment and control criticality of geologic times, a number of benefits to the waste management system can be derived from adding the DUS glass prior to shipment from the reactor site.

609
(DOE/NE/44139–68)
Integrated radwaste treatment system lessons learned from $2\frac{1}{2}$ years of operation. Baker, M.N.; Fussner, R.J. West Valley Nuclear Services Co., Inc., West Valley, NY (United States). May 1997. 31p. Sponsored by USDOE Assistant Secretary for Nuclear Energy, Washington, DC (United States). DOE Contract AC24-81NE44139. Order Number DE97006912. Source: OSTI; NTIS; INIS; GPO Dep.

The Integrated Radwaste Treatment System (IRTS) at the West Valley Demonstration Project (WVDP) is a pretreatment scheme to reduce the amount of salts in the high-level radioactive waste (vitrification) stream. Following removal of cesium-137 (Cs-137) by ion-exchange in the Supernatant

Treatment System (STS), the radioactive waste liquid is volume-reduced by evaporation. Trace amounts of Cs-137 in the resulting distillate are removed by ion-exchange, then the distillate is discharged to the existing plant water treatment system. The concentrated product, 37 to 41 percent solids by weight, is encapsulated in cement producing a stable, low-level waste form. The Integrated Radwaste Treatment System (IRTS) operated in this mode from May 1988 through November 1990, decontaminating 450,000 gallons of high-level waste liquid; evaporating and encapsulating the resulting concentrates into 10,393 71-gallon square drums. A number of process changes and variations from the original operating plan were required to increase the system flow rate and minimize waste volumes. This report provides a summary of work performed to operate the IRTS, including system descriptions, process highlights, and lessons learned.

610
(DOE/NE/44139–73)
Design of equipment used for high-level waste vitrification at the West Valley Demonstration Project. Vance, R.F. (and others); Brill, B.A.; Carl, D.E. West Valley Nuclear Services Co., Inc., West Valley, NY (United States). Jun 1997. 74p. Sponsored by USDOE Assistant Secretary for Nuclear Energy, Washington, DC (United States). DOE Contract AC24-81NE44139. Order Number DE97008732. Source: OSTI; NTIS; INIS; GPO Dep.

The equipment as designed, started, and operated for high-level radioactive waste vitrification at the West Valley Demonstration Project in western New York State is described. Equipment for the processes of melter feed make-up, vitrification, canister handling, and off-gas treatment are included. For each item of equipment the functional requirements, process description, and hardware descriptions are presented.

611
(DOE/NE/44139–74)
Corrosion control of carbon steel radioactive-liquid storage tanks. Chang, Ji Young. West Valley Nuclear Services Co., Inc., West Valley, NY (United States). May 1997. 28p. Sponsored by USDOE Assistant Secretary for Nuclear Energy, Washington, DC (United States). DOE Contract AC24-81NE44139. Order Number DE97006911. Source: OSTI; NTIS; INIS; GPO Dep.

As the West Valley Demonstration Project (WVDP) continues vitrification operation and begins decontamination activities, it is vital to continue to maintain the integrity of the high-level waste tanks and prevent further corrosion that may disrupt the operation. This report describes the current operational status and some corrosion concerns with corresponding control measure recommendations. 14 refs., 5 figs., 6 tabs.

612
(DOE/NE/44139–82)
THOREX processing and zeolite transfer for high-level waste stream processing blending. Kelly, S. Jr.; Meess, D.C. West Valley Nuclear Services Co., Inc., West Valley, NY (United States). Jul 1997. 25p. Sponsored by USDOE Assistant Secretary for Nuclear Energy, Washington, DC (United States). DOE Contract AC24-81NE44139. Order Number DE98000792. Source: OSTI; NTIS; INIS; GPO Dep.

The West Valley Demonstration Project (WVDP) completed the pretreatment of the high-level radioactive waste (HLW) prior to the start of waste vitrification. The HLW originated form the two million liters of plutonium/uranium extraction (PUREX) and thorium extraction (THOREX) wastes remaining from Nuclear Fuel Services' (NFS) commercial nuclear fuel reprocessing operations at the Western New York Nuclear Service Center (WNYNSC) from 1966 to 1972. The pretreatment process removed cesium as well as other radionuclides from the liquid wastes and captured these radioactive materials onto silica-based molecular sieves (zeolites). The decontaminated salt solutions were volume-reduced and then mixed with portland cement and other admixtures. Nineteen thousand eight hundred and seventy-seven 270-liter square drums were filled with the cement-wastes produced from the pretreatment process. These drums are being stored in a shielded facility on the site until their final disposition is determined. Over 6.4 million liters of liquid HLW were processed through the pretreatment system. PUREX supernatant was processed first, followed by two PUREX sludge wash solutions. A third wash of PUREX/THOREX sludge was then processed after the neutralized THOREX waste was mixed with the PUREX waste. Approximately 6.6 million curies of radioactive cesium-137 (Cs-137) in the HLW liquid were removed and retained on 65,300 kg of zeolites. With pretreatment complete, the zeolite material has been mobilized, size-reduced (ground), and blended with the PUREX and THOREX sludges in a single feed tank that will supply the HLW slurry to the Vitrification Facility.

613
(DOE/OR–01-1634&D1)
1997 structural integrity assessments for the Category C liquid low-level waste tank systems at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States); Environmental Systems Corp., Knoxville, TN (United States); Vista Research, Inc., Mountain View, CA (United States). Sep 1997. 106p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE98000444. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results of a series of evaluations to determine if the individual Category C tank systems retain sufficient structural integrity to continue being used for liquid storage. The approach used to reach the final certification/conclusion consisted of three phases, including: (1) Review of the original engineering design drawings and construction materials to determine whether the tank and line systems were capable of containing liquids without leaking (and also to check that the construction materials were compatible with liquids that might have been placed in these systems). While drawings in this report may be of poor quality, they are copies of the best available originals. (2) A qualitative corrosion assessment conducted in 1995 that further evaluated both the potential internal corrosion effects of materials in the tank and in the potential external corrosion effects of the backfill and native soil at the Oak Ridge National Laboratory (ORNL). The ability to accurately measure or predict the amount of corrosion present on both the internal and external walls of the tanks and pipelines is extremely limited. However, when available, data were used to assess the historical tank contents and usage and the probable corrosive

effects on the tank system materials of construction. (3) Performance of monthly leak tests were completed on the tanks and annual leak tests were completed on associated testable pipelines. This task was judged to be the most important criteria for determining structural integrity due to the proven performance of the technology and processes involved.

614
(EPD-CTG–960046)
Metal Poisons in Waste Tanks (U). Williamson, T.G. (Westinghouse Savannah River Company, AIKEN, SC (United States)). Westinghouse Savannah River Co., Aiken, SC (United States). 14 Oct 1996. 24p. Sponsored by US-DOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-961103–22: Winter meeting of the American Nuclear Society (ANS) and the European Nuclear Society (ENS), Washington, DC (United States), 10-14 Nov 1996). Order Number DE97060047. Source: OSTI; NTIS; INIS; GPO Dep.

Many of the storage tanks with waste from processing fissile materials contain, along with the fissile material, metals which may serve as nuclear criticality poisons. It would be advantageous to the criticality evaluation of these wastes if it can be demonstrated that the poisons remain with the fissile materials and if an always safe poison-to-fissile ratio can be established. The first task, demonstrating that the materials stay together, is the job of the chemist, the second, demonstrating an always safe ratio, is the job of the physicist. The latter task is the object of this paper

615
(LA-UR–96-1562)
A hazard and probabilistic safety analysis of a high-level waste transfer process. Bott, T.F.; Sasser, M.K. Los Alamos National Lab., NM (United States). 1996. 14p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-961105–6: 1996 international mechanical engineering congress and exhibition, Atlanta, GA (United States), 17-22 Nov 1996). Order Number DE96011258. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes a safety analysis of a transfer process for high-level radioactive and toxic waste. The analysis began with a hazard assessment that used elements of What If, Checklist, Failure Modes and Effects Analysis, and Hazards and Operability Study (HAZOP) techniques to identify and rough-in accident sequences. Based on this preliminary analysis, the most significant accident sequences were developed further using event trees. Quantitative frequency estimates for the accident sequences were based on operational data taken from the historical record of the site where the process is performed. Several modeling challenges were encountered in the course of the study. These included linked initiating and accident progression events, fire propagation modeling, accounting for administrative control violations, and handling mission-phase effects.

616
(ORNL/ER–382)
Safety analysis report for the North Tank Farm, Tank W-11, and the Gunite and Associated Tanks – Treatability Study, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Platfoot, J.H. Oak Ridge National Lab., TN (United States). Feb 1997. 113p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97004297. Source: OSTI; NTIS; INIS; GPO Dep.

The North Tank Farm (NTF) tanks consist of eight underground storage tanks which have been removed from service because of age and changes in liquid waste system needs and requirements. Tank W-11, which was constructed in 1943, has been removed from service, and contains several hundred gallons of liquid low-level waste (LLLW). The Gunite and Associated Tanks (GAAT) Treatability Study involves the demonstration of sludge removal techniques and equipment for use in other waste storage tanks throughout the Department of Energy (DOE) complex. The hazards associated with the NTF, Tank W-11, and the Treatability Study are identified in hazard identification table in Appendixes A, B, and C. The hazards identified for the NTF, Tank W-11, and the Treatability Study were analyzed in the preliminary hazards analyses (PHA) included as Appendices D and E. The PHA identifies potential accident scenarios and qualitatively estimates the consequences. Because of the limited quantities of materials present in the tanks and the types of energy sources that may result in release of the materials, none of the accidents identified are anticipated to result in significant adverse health effects to on-site or off-site personnel.

617
(ORNL/ER–396)
Evaluation and monitoring plan for consolidation tanks: Gunite and Associated Tanks Operable Unit, Waste Area Grouping 1, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States); Vista Research, Inc., Oak Ridge, TN (United States). Feb 1997. 59p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97004299. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the results of an integrity evaluation of Tanks W-8 and W-9, part of the Gunite and Associated Tanks (GAAT), in the South Tank Farm at Oak Ridge National Laboratory (ORNL), together with a plan for monitoring those tanks for potential releases during the GAAT CERCLA treatability study and waste removal activities. This work was done in support of an ORNL plan to use W-8 and W-9 as consolidation tanks during remediation of the other tanks in the North and South Tank Farms. The analysis portion of the report draws upon both tank-internal measurements of liquid volume change and tank-external measurements of the change in electrical conductivity of the groundwater in the dry wells adjacent to each tank. The results of the analysis show that both W-8 and W-9 are liquid-tight and are suitable for use as consolidation tanks. The recommended monitoring plan will utilize the dry well conductivity monitoring method as the primary release detection tool during the CERCLA activities. This method is expected to be able to detect releases of less than 0.5 gal/h with a 95% probability of detection, most of the time. The results described here validate three prior independent efforts: a liquid integrity assessment made in 1995, a structural integrity assessment made in 1995 by experts in the field of gunite tanks, and a structural integrity assessment made in 1994 using a three-dimensional, finite-element computer model. This work, along with the three prior efforts, shows that Tanks W-8 and W-9 are structurally sound and liquid-tight. Based upon this work it is concluded that these tanks are suitable for use as

consolidation tanks during the GAAT CERCLA treatability study and waste removal actions and it is recommended that the tanks be monitored for potential releases during this period using the methods described in this report.

618
(PNNL–11025)
Comparison of simulants to actual neutralized current acid waste: process and product testing of three NCAW core samples from Tanks 101-AZ and 102-AZ. Morrey, E.V.; Tingey, J.M.; Elliott, M.L. Pacific Northwest National Lab., Richland, WA (United States). Oct 1996. 270p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050326. Source: OSTI; NTIS; INIS; GPO Dep.

A vitrification plant is planned to process the high-level waste (HLW) solids from Hanford Site tanks into canistered glass logs for disposal in a national repository. Programs were established within the Pacific Northwest Laboratory Vitrification Technology Development (PVTD) Project to test and model simulated waste to support design, feed processability, operations, permitting, safety, and waste-form qualification. Parallel testing with actual radioactive waste was performed on a laboratory-scale to confirm the validity of using simulants and glass property models developed from simulants. Laboratory-scale testing has been completed on three radioactive core samples from tanks 101-AZ and 102-AZ containing neutralized current acid waste (NCAW), which is one of the first waste types to be processed in the high-level waste vitrification plant under a privatization scenario. Properties of the radioactive waste measured during process and product testing were compared to simulant properties and model predictions to confirm the validity of simulant and glass property ,models work. This report includes results from the three NCAW core samples, comparable results from slurry and glass simulants, and comparisons to glass property model predictions.

619
(PNNL–11254)
Tank Vapor Characterization Project: Headspace vapor characterization of Hanford Tank 241-TY-102: Results from samples collected on 04/12/96. Evans, J.C. (and others); Pool, K.H.; Thomas, B.L. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 61p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051561. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-TY-102 (Tank TY-102) at the Hanford Site in Washington State. The results described in this report were obtained to'characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes, and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in Table S.1. The three highest concentration analytes detected in SUMMA™ canister and triple sorbent trap samples are also listed in Table S.1. Detailed descriptions of the analytical results appear in the appendices.

620
(PNNL–11261)
Tank Vapor Characterization Project: Headspace vapor characterization of Hanford Tank 241-S-107: Results from samples collected on 06/18/96. Pool, K.H. (and others); Evans, J.C.; Thomas, B.L. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 36p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051562. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-S-107 (Tank S-107) at the Hanford Site in Washington State. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National. Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, on sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in Table S.1. Detailed descriptions of the analytical results appear in the appendices.

621
(PNNL–11265)
Headspace vapor characterization of Hanford Waste Tank 241-U-112: Results from samples collected on 7/09/96. Evans, J.C.; Pool, K.H.; Thomas, B.L.; Olsen, K.B.; Fruchter, J.S.; Silvers, K.L. Pacific Northwest National Lab., Richland, WA (United States). Jan 1997. 78p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051518. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-U-112 at the Hanford Site in Washington State. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company.

622
(PNNL–11270)
Tank vapor characterization project: Headspace vapor characterization of Hanford Waste Tank 241-S-102: Second comparison study results from samples collected on 04/04/96. Pool, K.H. (and others); Evans, J.C.; Thomas, B.J. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 78p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington,

DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051564. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of waste storage tank 241-S-102 (Tank S-102) at the Hanford Site in Washington State. The results described in this report is the second in a series comparing vapor sampling of the tank headspace using the Vapor Sampling System (VSS) and In Situ Vapor Sampling (ISVS) system without high efficiency particulate air (HEPA) prefiltration. The results include air concentrations of water (H_2O) and ammonia (NH_3), permanent gases, total non-methane organic compounds (TO-12), and individual organic analytes collected in SUMMA™ canisters and on triple sorbent traps (TSTs). Samples were collected by Westinghouse Hanford Company (WHC) and analyzed by Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, sample volume measurements provided by WHC.

623
(PNNL–11297)
Status and integration of studies of gas generation in Hanford wastes. Pederson, L.R.; Bryan, S.A. Pacific Northwest Lab., Richland, WA (United States). Oct 1996. 83p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050704. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to review recent progress in determining the mechanism, kinetics, and stoichiometry of gas generation in Hanford waste tanks. Information has been gathered from the results of (1) laboratory studies with simulated wastes; (2) laboratory studies with actual waste core samples (Tanks SY-101 and SY-103); (3) studies of thermal and radiolytic reactions in the gas phase; (4) gas solubility evaluations; and (5) in-tank gas composition data. The results of laboratory studies using simulated wastes, which were aimed at determining chemical mechanisms responsible for gas generation, are summarized in Section 2. Emphasized are findings from work performed at the Georgia Institute of Technology (GIT), which was conducted under subcontract to Pacific Northwest National Laboratory (PNNL) and completed in FY 1996. Thermally activated pathways for the decomposition of hydroxyethylethylenediaminetriacetic acid (HEDTA, trisodium salt) in simulated wastes were established by this work, among other accomplishments.

624
(PNNL–11299)
Tank Vapor Characterization Project: Headspace vapor characterization of Hanford Tank 241-B-105: Results from samples collected on 07/30/96. Pool, K.H. (and others); Evans, J.C.; Thomas, B.L. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 64p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051563. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-B-105 (Tank B-105) at the Hanford Site in Washington State. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in Table S.1. The three highest concentration analytes detected in SUMMA™ canister and triple sorbent trap samples are also listed in Table S.1. Detailed descriptions of the analytical results appear in the appendices.

625
(PNNL–11312)
Organic tanks safety program FY96 waste aging studies. Camaioni, D.M.; Samuels, W.D.; Linehan, J.C.; Clauss, S.A.; Sharma, A.K.; Wahl, K.L.; Campbell, J.A. Pacific Northwest National Lab., Richland, WA (United States). Oct 1996. 87p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050509. Source: OSTI; NTIS; INIS; GPO Dep.

Uranium and plutonium production at the Hanford Site produced large quantities of radioactive by-products and contaminated process chemicals, which are stored in underground tanks awaiting treatment and disposal. Having been made strongly alkaline and then subjected to successive water evaporation campaigns to increase storage capacity, the wastes now exist in the physical forms of salt cakes, metal oxide sludges, and partially saturated aqueous brine solutions. The tanks that contain organic process chemicals mixed with nitrate/nitrite salt wastes may be at risk for fuel-nitrate combustion accidents. The purpose of the Waste Aging Task is to elucidate how chemical and radiological processes will have aged or degraded the organic compounds stored in the tanks. Ultimately, the task seeks to develop quantitative measures of how aging changes the energetic properties of the wastes. This information will directly support efforts to evaluate the hazard as well as to develop potential control and mitigation strategies.

626
(PNNL–11376)
Bench-scale cross flow filtration of Tank S-107 sludge slurries and Tank C-107 supernatant. Geeting, J.G.H.; Reynolds, B.A. Pacific Northwest National Lab., Richland, WA (United States). Oct 1996. 132p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050513. Source: OSTI; NTIS; INIS; GPO Dep.

Hanford tank waste filtration experiments were conducted using a bench-scale cross flow filter on 8 wt%, 1.5 wt%, and 0.05 wt% Tank S- 107 sludge slurries and on Tank C-107 supernatant. For comparison, two simulants each with solids loadings of 8 wt% and 0.05 wt% were also tested. The purpose of the tests was to determine the efficacy of cross flow filtration on slurries of various solids loadings. -In addition, filtrate flux dependency on axial velocity and transmembrane pressure was sought so that conditions for future

experiments might be better selected. The data gathered are compared to the simulants and three cross flow filtration models. A two- parameter central composite design which tested. transmembrane pressure from 5 to 40 psig and axial Velocity from 3 to 9 ft/s was used for all feeds. The cross flow filter effectively removed solids from the liquid, as 19 of 20 filtrate samples had particle concentrations below the resolution limit of the photon correlation spectrometer used in the Hanford Radiocolloid Laboratory. Radiochemical analysis indicate that all filtrate samples were below Class A waste classification standards for 90Sr and transuranics.

627
(PNNL–11381)
Washing and caustic leaching of Hanford Tank C-106 sludge. Lumetta, G.J.; Wagner, M.J.; Hoopes, F.V.; Steele, R.T. Pacific Northwest Lab., Richland, WA (United States). Oct 1996. 42p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97050541. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the results of a laboratory-scale washing and caustic leaching test performed on sludge from Hanford Tank C-106. The purpose of this test was to determine the behavior of important sludge components when subjected to washing with dilute or concentrated sodium hydroxide solutions. The results of this laboratory-scale test were used to support the design of a bench-scale washing and leaching process used to prepare several hundred grams of high-level waste solids for vitrification tests to be done by private contractors. The laboratory-scale test was conducted at Pacific Northwest Laboratory in FY 1996 as part of the Hanford privatization effort. The work was funded by the US Department of Energy through the Tank Waste Remediation System (TWRS; EM-30).

628
(PNNL–11386)
Technetium in alkaline, high-salt, radioactive tank waste supernate: Preliminary characterization and removal. Blanchard, D.L. Jr. (and others); Brown, G.N.; Conradson, S.D. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 51p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051560. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the initial work conducted at Pacific Northwest National Laboratory to study technetium (Tc) removal from Hanford tank waste supernates and Tc oxidation state in the supernates. Filtered supernate samples from four tanks were studied: a composite double shell slurry feed (DSSF) consisting of 70% from Tank AW-101, 20% from AP-106, and 10% from AP-102; and three complexant concentrate (CC) wastes (Tanks AN-107, SY-101, ANS SY-103) that are distinguished by having a high concentration of organic complexants. The work included batch contacts of these waste samples with Reillex™-HPQ (anion exchanger from Reilly Industries) and ABEC 5000 (a sorbent from Eichrom Industries), materials designed to effectively remove Tc as pertechnetate from tank wastes. A short study of Tc analysis methods was completed. A preliminary identification of the oxidation state of non-pertechnetate species in the supernates was made by analyzing the technetium x-ray absorption spectra of four CC waste samples. Molybdenum (Mo) and rhenium (Re) spiked test solutions and simulants were tested with electrospray ionization-mass spectrometry to evaluate the feasibility of the technique for identifying Tc species in waste samples.

629
(PNNL–11391)
Gas retention and release behavior in Hanford single-shell waste tanks. Stewart, C.W.; Brewster, M.E.; Gauglitz, P.A.; Mahoney, L.A.; Meyer, P.A.; Recknagle, K.P.; Reid, H.C. Pacific Northwest National Lab., Richland, WA (United States). Dec 1996. 144p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051412. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the current understanding of flammable gas retention and release in Hanford single-shell waste tanks based on theory, experimental results, and observations of tank behavior. The single-shell tanks likely to pose a flammable gas hazard are listed and described, and photographs of core extrusions and the waste surface are included. The credible mechanisms for significant flammable gas releases are described, and release volumes and rates are quantified as much as possible. The only mechanism demonstrably capable of producing large (~100 m^3) spontaneous gas releases is the buoyant displacement, which occurs only in tanks with a relatively deep layer of supernatant liquid. Only the double-shell tanks currently satisfy this condition. All release mechanisms believed plausible in single-shell tanks have been investigated, and none have the potential for large spontaneous gas releases. Only small spontaneous gas releases of several cubic meters are likely by these mechanisms. The reasons several other postulated gas release mechanisms are implausible or incredible are also given.

630
(PNNL–11395)
Application of value of information of tank waste characterization: A new paradigm for defining tank waste characterization requirements. Fassbender, L.L. (and others); Brewster, M.E.; Brothers, A.J. Pacific Northwest National Lab., Richland, WA (United States). Nov 1996. 165p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052905. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the rationale for adopting a recommended characterization strategy that uses a risk-based decision-making framework for managing the Tank Waste Characterization program at Hanford. The risk-management/value-of-information (VOI) strategy that is illustrated explicitly links each information-gathering activity to its cost and provides a mechanism to ensure that characterization funds are spent where they can produce the largest reduction in risk. The approach was developed by tailoring well-known decision analysis techniques to specific tank waste characterization applications. This report illustrates how VOI calculations are performed and demonstrates that the VOI approach can definitely be used for real Tank Waste Remediation System (TWRS) characterization problems.

631
(PNNL–11416)
Mechanisms of stability of armored bubbles: FY 1996

Final Report. Rossen, W.R.; Kam, S.I. Pacific Northwest Lab., Richland, WA (United States). Nov 1996. 48p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051565. Source: OSTI; NTIS; INIS; GPO Dep.

Theoretical and experimental studies examine how a coating, or "armor," of partially wetted solid particles can stabilize tiny bubbles against diffusion of gas into the surrounding liquid, in spite of the high capillary pressures normally associated with such bubbles. Experiments with polymethylmethacrylate (PNMA) beads and carbonated water demonstrate that armored bubbles can persist for weeks in liquid unsaturated with respect to the gas in the bubbles. This question is of concern regarding gas discharges from waste tanks at the Hanford reservation. The stresses on the solid-solid contacts between particles in such cases is large and could drive sintering of the particles into a rigid framework. Stability analysis suggests that a slightly shrunken bubble would not expel a solid particle from its armor to relieve stress and allow the bubble to shrink further. Expulsion of particles from more stressed bubbles at zero capillary pressure is energetically favored in some cases. It is not clear, however, whether this expulsion would proceed spontaneously from a small perturbation or require a large initial disturbance of the bubble. In some cases, it appears that a bubble would expel some particles and shrink, but the bubble would approach a final, stable size rather than disappear completely. This simplified analysis leaves out several factors. For instance, only one perturbation toward expelling a solid from the armor is considered; perhaps other perturbations would be more energetically favored than that tested. Other considerations (particle deformation, surface roughness, contact-angle hysteresis, and adhesion or physical bonding between adjacent particles) would make expelling solids more difficult than indicated by this theoretical study.

632
(PNNL–11441)
Electrically switched cesium ion exchange. FY 1996 annual report. Lilga, M.A. (Pacific Northwest National Lab., Richland, WA (United States)); Orth, R.J.; Sukamto, J.P.H.; Schwartz, D.T.; Haight, S.M.; Genders, D. Pacific Northwest National Lab., Richland, WA (United States). Dec 1996. 44p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051365. Source: OSTI; NTIS; INIS; GPO Dep.

An electrochemical method for metal ion separations, called Electrically Switched Ion Exchange, is described. Direct oxidation and reduction of an electroactive film attached to an electrode surface is used to load and unload the film with alkali metal cations. The electroactive films under investigation are Ni hexacyanoferrates, which are deposited on the surface by applying an anodic potential to a Ni electrode in a solution containing the ferricyanide anion. Reported film preparation procedures were modified to produce films with improved capacity and stability. Electrochemical behavior of the derivatized electrodes were investigated using cyclic voltammetry and chronocoulometry. The films show selectivity for Cs in concentrated sodium solutions. Raman spectroscopy was used to monitor changes in oxidation state of the film and imaging experiments have demonstrated that the redox reactions are spatially homogenous across the film. Requirements for a bench scale unit were identified.

633
(PNNL–11450-Rev.1)
Composition and quantities of retained gas measured in Hanford waste tanks 241-AW-101 A-101, AN-105, AN-104, and AN-103. Shekarriz, A. (and others); Rector, D.R.; Mahoney, L.A. Pacific Northwest Lab., Richland, WA (United States). Mar 1997. 229p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052453. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides the results obtained for the first five tanks sampled with the Retained Gas Sampler (RGS): Tanks 241-AW-101, A-101, AN-105, AN-104, and AN-103. The RGS is a modified version of the core sampler used at Hanford. It is designed specifically, in concert with the gas extraction equipment in the hot cell, to capture and extrude a gas-containing waste sample in a hermetically sealed system. The retained gases are then extracted and stored in small gas canisters. The composition of the gases contained in the canisters was measured by mass spectroscopy. The total gas volume was obtained from analysis of the extraction process, as discussed in detail throughout this report. The following are the findings of this research: (1) The RGS is a viable approach for measuring retained gases in double- and single-shell waste tanks at Hanford. (2) Local measurements of void fraction with the RGS agree with the results obtained with the void fraction instrument (VFI) in most cases. (3) In the tanks sampled, more than 16% of the retained gas in the nonconvective layer was nitrogen (N_2). The fraction of nitrogen gas was approximately 60% in Tank 241-AW-101. This finding shows that not all the retained gas mixtures are flammable. (4) In the tanks sampled, the ratios of hydrogen to oxidizers were observed to be significantly higher than 1; i.e., these tanks are fuel-rich. Based on these observations, the RGS will be used to sample for retained gases in several single-shell tanks at Hanford. The remaining sections of this summary describe the RGS-findings for the first five tanks tested. The results are described in the order in which the tanks were sampled, to reflect the increasing experience on which RGS methods were based.

634
(PNNL–11451)
Efficient Separations and Processing Crosscutting Program: Develop and test sorbents. Fiscal year 1996 annual progress report, October 1, 1995–September 30, 1996. Brown, G.N. Pacific Northwest National Lab., Richland, WA (United States). Jan 1997. 120p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051515. Source: OSTI; NTIS; INIS; GPO Dep.

Ion exchange removal of Cs, Sr, Tc, TRU, etc. has been proposed for minimizing the amount of HLW at Hanford. Purpose of this project is to test sequestering agents and substrates in representative physical/chemical/radiation environments. A small pilot-scale skid system was built. 7 ion exchange materials (CS-100, R-F, SuperLig 644, IE-911, TIE-96, NaTi) were evaluated for pretreatment of actual/simulated Hanford DSSF tank waste. An onsite technology demonstration was done at Hanford 100-N Area N-Springs. A second PADU test demonstrated the 3M web technology for radioactive Cs and Sr decontamination of 105-N-Reactor

basin. Other collaborative efforts between PNNL and industry/university participants are reported.

635
(PNNL–11480)
Speciation of organic carbon in Hanford waste storage tanks: Part 1. Carlson, C.D. Pacific Northwest Lab., Richland, WA (United States). Feb 1997. 51p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052031. Source: OSTI; NTIS; INIS; GPO Dep.

This report is the first in a series to report on speciation of organic carbon in Hanford waste storage tanks. The comparison of the existing total organic carbon with oxalate and limited analyses of other organic species (acetate, formate, and normal paraffin hydrocarbons [NPH]) are reported. All of the data have been previously reported by the Grout and Characterization programs; the information includes all of the publicly available data through October 1996. Oxalate data were reported for 33 tanks, TOC data were reported for 82 tanks, and both oxalate and TOC data were available for 27 tanks. Of these 27 tanks, seven were found to have greater than 80% of the TOC identified as oxalate: 241-BY-104, 241-BY-105, 241-BY-106, 241-BY-110, 241-S-109, and 241-SX-108. Eighty percent accountability has been tentatively established as a minimum goal of the Organic Safety Program for speciation of TOC. Accountability of TOC through speciation will allow more accurate estimate of the potential energy content of the wastes as currently stored. Of the remaining 19 tanks, seven had between 40 and 80% of the TOC identified as oxalate, and eleven had less than 35% of the TOC identified. Of these, only five tanks had segment results that were greater than 1% TOC, and none was above 2%. Since the cur-rent safety criterion outlined in the Safety Analysis is 4.5% TOC, it may be determined that the further analyses of these tank wastes are not necessary. If additional analyses are deemed necessary, minimal work may be required, possibly limited to ion chromatography (IC), ion pair chromatography and capillary zone electrophoresis (CZE). Additional speciation work is planned for this fiscal year in both the Organic Tanks Safety and Characterization programs. The Characterization program reports acetate and formate data in addition to the oxalate data for all the tank cores it processes.

636
(PNNL–11486)
Tank 241-AZ-101 criticality assessment resulting from pump jet mixing: Sludge mixing simulation. Onishi, Y.; Recknagle, K. Pacific Northwest National Lab., Richland, WA (United States). Apr 1997. 77p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052908. Source: OSTI; NTIS; INIS; GPO Dep.

Tank 241-AZ-101 (AZ-101) is one of 28 double-shell tanks located in the AZ farm in the Hanford Site's 200 East Area. The tank contains a significant quantity of fissile materials, including an estimated 9.782 kg of plutonium. Before beginning jet pump mixing for mitigative purposes, the operations must be evaluated to demonstrate that they will be subcritical under both normal and credible abnormal conditions. The main objective of this study was to address a concern about whether two 300-hp pumps with four rotating 18.3-m/s (60-ft/s) jets can concentrate plutonium in their pump housings during mixer pump operation and cause a criticality. The three-dimensional simulation was performed with the time-varying TEMPEST code to determine how much the pump jet mixing of Tank AZ-101 will concentrate plutonium in the pump housing. The AZ-101 model predicted that the total amount of plutonium within the pump housing peaks at 75 g at 10 simulation seconds and decreases to less than 10 g at four minutes. The plutonium concentration in the entire pump housing peaks at 0.60 g/L at 10 simulation seconds and is reduced to below 0.1 g/L after four minutes. Since the minimum critical concentration of plutonium is 2.6 g/L, and the minimum critical plutonium mass under idealized plutonium-water conditions is 520 g, these predicted maximums in the pump housing are much lower than the minimum plutonium conditions needed to reach a criticality level. The initial plutonium maximum of 1.88 g/L still results in safety factor of 4.3 in the pump housing during the pump jet mixing operation.

637
(PNNL–11490)
Screening for organic solvents in Hanford waste tanks using total non- methane organic compound vapor concentrations. Huckaby, J.L.; Glissmeyer, J.A.; Sklarew, D.S. Pacific Northwest National Lab., Richland, WA (United States). Feb 1997. 49p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052027. Source: OSTI; NTIS; INIS; GPO Dep.

The potential ignition of organic liquids stored in the Hanford high-level radioactive waste tanks is a safety issue because expanding gases could affect tank dome integrity. This report presents results of a screening test that was applied to 75 passively ventilated waste tanks at Hanford to determine those that might contain a significant amount of organic liquid waste. The screening test is based on a simple model of tank headspace, headspace organic vapor concentrations, and certain tank physical parameters. Analyses indicate that damage to the tank dome is credible only if the organic liquid burn rate is above a threshold value, and this can occur only if the surface area of organic liquid in a tank is above a corresponding threshold value of about one square meter. Twelve tanks were identified as potentially containing at least that amount of semivolatile organic liquid based on conservative estimates. Tank head space organic vapor concentrations and physical parameters required by the screening test have been compiled and are presented for each of the tanks studied. Estimates of the ventilation rates of the waste tanks were revised to reflect recent information obtained from hydrogen monitoring data. A simple analysis of the uncertainty in the test results suggests that the largest current uncertainty in the estimation of organic liquid surface area is that associated with knowledge of the tank ventilation rate. The uncertainty analysis is applied to determine 95% confidence limits for the estimated organic waste surface area in each tank.

638
(PNNL–11492)
Functions and requirements for a waste dislodging and conveyance system for the gunite and associated tanks treatability study at Oak Ridge National Laboratory. Potter, J.D.; Mullen, O.D. Pacific Northwest National Lab.,

Richland, WA (United States). Feb 1997. [100p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98051740. Source: OSTI; NTIS; INIS; GPO Dep.

Since the mid 1940s, the Department of Defense (DOD) and the Department of Energy (DOE) have conducted research and development activities at the Oak Ridge National Laboratory (ORNL) in support of urgent national interests in the fields of nuclear weaponry and nuclear energy. Some of these activities resulted in radiologically hazardous waste being temporarily deposited at ORNL, Waste Area Grouping 1. At this location, waste is stored in several underground storage tanks, awaiting ultimate final disposal. There are tanks of two basic categories. One category is referred to as the gunite tanks, the other category is associated tanks. The ORNL Gunite and Associated Tanks Treatability Study (GAAT TS) project was initiated in FY 1994 to support a record of decision in selecting from seven different options of technologies for retrieval and remediation of these tanks. As part of this decision process, new waste retrieval technologies will be evaluated at the 25-foot diameter gunite tanks in the North tank farm. Work is currently being conducted at Hanford and the University of Missouri-Rolla to evaluate and develop some technologies having high probability of being most practical and effective for the dislodging and conveying of waste from underground storage tanks. The findings of these efforts indicate that a system comprised of a dislodging end effector employing jets of high-pressure fluids, coupled to a water-jet conveyance system, all carried above the waste by a mechanical arm or other mechanism, is a viable retrieval technology for the GAAT TS tasks.

639
(PNNL–11497)
Cross-Site Transfer System at Hanford: long-term strategy for waste acceptance. Shekarriz, A; Onishi, Y.; Smith, P.A.; Sterner, M.; Rector, D.R.; Virden, J. Pacific Northwest National Lab., Richland, WA (United States). Feb 1997. 46p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052029. Source: OSTI; NTIS; INIS; GPO Dep.

This report summarizes results of a technical panel review of the current methodology for accepting waste for transport through the Hanford Replacement Cross-Site Transfer System (RCSTS), which was constructed to replace the existing pipelines that hydraulically connect the 200 West and 200 East areas. This report is a complement to an existing document (Hudson 1996); the methodology proposed in that document was refined based on panel recommendations. The refinements were focused around predicting and preventing the 3 main modes suspected of plugging the existing CSTS: precipitation, gelation, particle dropout/settling. The proposed analysis will require integration of computer modeling and laboratory experiments to build a defensible case for transportability of a proposed slurry composition for a given tank. This will be validated by recirculating actual tank waste, in-tank and in-farm, prior to transport. The panel's recommendation was that the probability of success of waste transfer would be greatly improved by integrating the predictive analysis with real-time control during RCSTS operation. The methodology will be optimized.

640
(PNNL–11502)
Tank vapor characterization project: Tank 241-S-102 temporal study headspace gas and vapor characterization results from samples collected on September 19, 1996. Evans, J.C. (and others); Pool, K.H.; Thomas, B.L.; Sklarew, D.S. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 55p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054300. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analysis of samples taken from the headspace of waste storage tank 241-S-102 (Tank S-102) at the Hanford Site in Washington State. Tank headspace samples collected by Westinghouse Hanford Company (WHC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample volumes provided by WHC. Ammonia was determined to be above the immediate notification limit of 150 ppm as specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank S-102 headspace, determined to be present at approximately 2.948% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <3.659% of the LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Tables S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

641
(PNNL–11529)
Uncertainty and sampling issues in tank characterization. Liebetrau, A.M. (and others); Pulsipher, B.A.; Kashporenko, D.M. Pacific Northwest Lab., Richland, WA (United States). Jun 1997. 54p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053945. Source: OSTI; NTIS; INIS; GPO Dep.

A defensible characterization strategy must recognize that uncertainties are inherent in any measurement or estimate of interest and must employ statistical methods for quantifying and managing those uncertainties. Estimates of risk and therefore key decisions must incorporate knowledge about uncertainty. This report focuses statistical methods that should be employed to ensure confident decision making and appropriate management of uncertainty. Sampling is a major source of uncertainty that deserves special consideration in the tank characterization strategy. The question of whether sampling will ever provide the reliable information needed to resolve safety issues is explored. The issue of sample representativeness must be resolved before sample information is reliable. Representativeness is a relative term but can be defined in terms of bias and precision. Currently, precision can be quantified and managed through an effective sampling and statistical analysis program. Quantifying bias is more difficult and is not being addressed under the current sampling strategies. Bias could be bounded by (1)

employing new sampling methods that can obtain samples from other areas in the tanks, (2) putting in new risers on some worst case tanks and comparing the results from existing risers with new risers, or (3) sampling tanks through risers under which no disturbance or activity has previously occurred. With some bound on bias and estimates of precision, various sampling strategies could be determined and shown to be either cost-effective or infeasible.

642
(PNNL–11531)
Characterization strategy for the flammable gas safety issue. Stewart, C.W.; Brewster, M.E.; Roberts, J.S. Pacific Northwest Lab., Richland, WA (United States). Jun 1997. 68p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054078. Source: OSTI; NTIS; INIS; GPO Dep.

The characterization strategy for resolving the flammable gas safety issue for Hanford waste tanks is based on a structured logic diagram (SLD) that displays the outcomes necessary to reach the desired goal of making flammable gas risk acceptable. The diagram provides a structured path that can identify all information inputs, data as well as models, needed to achieve the goal. Tracing the path from need to outcome provides an immediate and clear justification and defense of a specific need. The diagram itself is a 'picture of a risk calculation' and forms the basis for a quantitative model of risk. The SLID, with the risk calculation, identifies options for characterization, mitigation, and controls that have the maximum effect in reducing risk. It provides quantitative input to risk-based decision making so that options are chosen for maximum impact at least cost.

643
(PNNL–11532)
Characterization strategy report for the criticality safety issue. Doherty, A.L.; Doctor, P.G.; Felmy, A.R.; Prichard, A.W.; Serne, R.J. Pacific Northwest Lab., Richland, WA (United States). Jun 1997. 27p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054079. Source: OSTI; NTIS; INIS; GPO Dep.

High-level radioactive waste from nuclear fuels processing is stored in underground waste storage tanks located in the tank farms on the Hanford Site. Waste in tank storage contains low concentrations of fissile isotopes, primarily U-235 and Pu-239. The composition and the distribution of the waste components within the storage environment is highly complex and not subject to easy investigation. An important safety concern is the preclusion of a self-sustaining neutron chain reaction, also known as a nuclear criticality. A thorough technical evaluation of processes, phenomena, and conditions is required to make sure that subcriticality will be ensured for both current and future tank operations. Subcriticality limits must be based on considerations of tank processes and take into account all chemical and geometrical phenomena that are occurring in the tanks. The important chemical and physical phenomena are those capable of influencing the mixing of fissile material and neutron absorbers such that the degree of subcriticality could be adversely impacted. This report describes a logical approach to resolving the criticality safety issues in the Hanford waste tanks. The approach uses a structured logic diagram (SLD) to identify the characterization needed to quantify risk. The scope of this section of the report is limited to those branches of logic needed to quantify the risk associated with a criticality event occurring. The process is linked to a conceptual model that depicts key modes of failure which are linked to the SLD. Data that are needed include adequate knowledge of the chemical and geometric form of the materials of interest. This information is used to determine how much energy the waste would release in the various domains of the tank, the toxicity of the region associated with a criticality event, and the probability of the initiating criticality event.

644
(PNNL–11536-Rev.1)
Gas retention and release behavior in Hanford double-shell waste tanks. Meyer, P.A. (and others); Brewster, M.E.; Bryan, S.A. Pacific Northwest Lab., Richland, WA (United States). May 1997. 134p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053275. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the current understanding of flammable gas retention and release in Hanford double-shell waste tanks AN-103, AN-104, AN-105, AW-101, SY-101, and SY-103. This knowledge is based on analyses, experimental results, and observations of tank behavior. The applicable data available from the void fraction instrument, retained gas sampler, ball rheometer, tank characterization, and field monitoring are summarized. Retained gas volumes and void fractions are updated with these new data. Using the retained gas compositions from the retained gas sampler, peak dome pressures during a gas burn are calculated as a function of the fraction of retained gas hypothetically released instantaneously into the tank head space. Models and criteria are given for gas generation, initiation of buoyant displacement, and resulting gas release; and predictions are compared with observed tank behavior.

645
(PNNL–11564)
Tank 241-B-103 headspace gas and vapor characterization: Results for homogeneity samples collected on October 16, 1996. Tank vapor characterization project. Olsen, K.B. (and others); Pool, K.H.; Evans, J.C. Pacific Northwest Lab., Richland, WA (United States). Jun 1997. 154p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054524. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results of analyses of samples taken from the headspace of waste storage tank 241-B-103 (Tank B-103) at the Hanford Site in Washington State. Samples were collected to determine the homogeneity of selected inorganic and organic headspace constituents. Two risers (Riser 2 and Riser 7) were sampled at three different elevations (Bottom, Middle, and Top) within the tank. Tank headspace samples were collected by SGN Eurisys Service Corporation (SESC) and were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL.

646
(PNNL–11567)
Electrically switched cesium ion exchange. Lilga, M.A. (Pacific Northwest National Lab., Richland, WA (United States)); Orth, R.J.; Sukamto, J.P.H.; Schwartz, D.T.; Haight, S.M.; Genders, J.D. Pacific Northwest National Lab., Richland, WA (United States). Apr 1997. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053057. Source: OSTI; NTIS; INIS; GPO Dep.

Electrically Switched Ion Exchange (ESIX) is a separation technology being developed as an alternative to conventional ion exchange for removing radionuclides from high-level waste. The ESIX technology, which combines ion exchange and electrochemistry, is geared toward producing electroactive films that are highly selective, regenerable, and long lasting. During the process, ion uptake and elution are controlled directly by modulating the potential of an ion exchange film that has been electrochemically deposited onto a high surface area electrode. This method adds little sodium to the waste stream and minimizes the secondary wastes associated with traditional ion exchange techniques. Development of the ESIX process is well underway for cesium removal using ferrocyanides as the electroactive films. Films having selectivity for perrhenate (a pertechnetate surrogate) over nitrate also have been deposited and tested. A case study for the KE Basin on the Hanford Site was conducted based on the results of the development testing. Engineering design baseline parameters for film deposition, film regeneration, cesium loading, and cesium elution were used for developing a conceptual system. Order of magnitude cost estimates were developed to compare with conventional ion exchange. This case study demonstrated that KE Basin wastewater could be processed continuously with minimal secondary waste and reduced associated disposal costs, as well as lower capital and labor expenditures.

647
(PNNL–11571)
Oxidative dissolution of chromium from Hanford tank sludges under alkaline conditions. Rapko, B.M.; Delegard, C.H.; Wagner, M.J. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 42p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054075. Source: OSTI; NTIS; INIS; GPO Dep.

Alkaline oxidative leaching has been performed on caustic leached sludges from the three following Hanford waste tanks: BY-110, S-107, and SX-108. These samples were chosen because they represent types of waste where significant amounts of Cr are located and show relatively poor dissolution of Cr during standard caustic leaching. The experiments involved tests with three chemical oxidants, permanganate, ozone and oxygen, and a blank, argon. The effects of varying the hydroxide concentration of the leachate (from 0.1 M to 3 M) and of time and temperature (from room temperature to 80°C) were also examined.

648
(PNNL–11580)
Caustic leaching of composite AZ-101/AZ-102 Hanford tank sludge. Rapko, B.M.; Wagner, M.J. Pacific Northwest National Lab., Richland, WA (United States). Jul 1997. [70p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054185. Source: OSTI; NTIS; INIS; GPO Dep.

To reduce the quantity (and hence the cost) of glass canisters needed for disposing of high-level radioactive wastes from the Hanford tank farms, pretreatment processes are needed to remove as much nonradioactive material as possible. This report describes the results of a laboratory-scale caustic leaching test performed on a composite derived from a combination of 241-AZ-101 and 241-AZ-102 Hanford Tank sludges. The goals of this FY 1996 test were to evaluate the effectiveness of caustic leaching on removing key components from the sludge and to evaluate the effectiveness of varying the free-hydroxide concentrations by incrementally increasing the free hydroxide concentration of the leach steps up to 3 M free hydroxide. Particle-size analysis of the treated and untreated sludge indicated that the size and range of the sludge particles remained essentially unchanged by the caustic leaching treatment. Both before and after caustic leaching, a particle range of 0.2 { micro} m to 50 { micro} m was observed, with mean particle diameters of 8.5 to 9 { micro} m based on the volume distribution and mean particle diameters of 0.3 to 0.4 { micro} m based on the number distribution.

649
(PNNL–11592)
Tank 241-BY-108 fourth temporal study: Headspace gas and vapor characterization results from samples collected on November 14, 1997. Tank vapor characterization project. Evans, J.C. (and others); Pool, K.H.; Olsen, K.B. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 58p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054512. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-BY-108 (Tank BY-108) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Service Corporation (SESC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected nonradioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample volumes provided by SESC. Ammonia was determined to be above the immediate notification limit of 150 ppm specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank BY-108 headspace, determined to be present at approximately 1.390% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <2.830% of the LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

650
(PNNL–11595)
Developing a model for moisture in saltcake waste tanks: Progress report. Simmons, C.S.; Aimo, N.; Fayer,

M.J.; White, M.D. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 154p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054077. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes a modeling effort to provide a computer simulation capability for estimating the distribution and movement of moisture in the saltcake-type waste contained in Hanford's single-shell radioactive waste storage tanks. This moisture model goes beyond an earlier version because it describes water vapor movement as well as the interstitial liquid held in a saltcake waste. The work was performed by Pacific Northwest National Laboratory to assist Duke Engineering and Services Hanford with the Organic Tank Safety Program. The Organic Tank Safety Program is concerned whether saltcake waste, when stabilized by jet pumping, will retain sufficient moisture near the surface to preclude any possibility of an accidental ignition and propagation of burning. The nitrate/nitrite saltcake, which might also potentially include combustible organic chemicals might not always retain enough moisture near the surface to preclude any such accident. Draining liquid from a tank by pumping, coupled with moisture evaporating into a tank's head space, may cause a dry waste surface that is not inherently safe. The moisture model was devised to help examine this safety question. The model accounts for water being continually cycled by evaporation into the head space and returned to the waste by condensation or partly lost through venting to the external atmosphere. Water evaporation occurs even in a closed tank, because it is driven by the transfer to the outside of the heat load generated by radioactivity within the waste. How dry a waste may become over time depends on the particular hydraulic properties of a saltcake, and the model uses those properties to describe the capillary flow of interstitial liquid as well as the water vapor flow caused by thermal differences within the porous waste.

651
(PNNL–11597)
Tank Vapor Characterization Project: Tank 241-C-107 fourth temporal study: Headspace gas and vapor characterization results from samples collected on December 17, 1996. Pool, K.H. (and others); Evans, J.C.; Olsen, K.B.; Hayes, J.C. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 60p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054519. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-C-107 (Tank C-107) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Service Corporation (SESC) and were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample volumes provided by SESC. No analytes were determined to be above the immediate notification limits specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank C-107 headspace, determined to be present at approximately 2.825% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <2.935% of the LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

652
(PNNL–11600)
Thermal and radiolytic gas generation from Tank 241-S-102 waste. King, C.M.; Pederson, L.R.; Bryan, S.A. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 41p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053942. Source: OSTI; NTIS; INIS; GPO Dep.

This report summarizes progress in evaluating thermal and radiolytic rate parameters for flammable gas generation in Hanford single-shell tank wastes based on the results of laboratory tests using actual waste from Tank 241-S-102 (S-102). Work described in this report was conducted at Pacific Northwest National Laboratory (PNNL) for the Flammable Gas Safety Project, whose purpose is to develop information to support Fluor Daniel Hanford (FDH) and its Project Management Hanford Contract (PHMC) subcontractors in their efforts to ensure the safe interim storage of wastes at the Hanford Site. This work is related to gas generation studies being performed at Georgia Institute of Technology (GIT) under subcontract to PNNL, using simulated wastes, and to studies being performed at Numatec Hanford Corporation (formerly Westinghouse Hanford Company) using actual wastes. The results of gas generation from Tank S-102 waste under thermal and radiolytic conditions are described in this report. The accurate measurement of gas generation rates in actual waste from highly radioactive waste tanks is needed to assess the potential for producing and storing flammable gases within the waste tanks. This report addresses the gas generation capacity of the waste from Tank S-102, a waste tank listed as high priority by the Flammable Gas Safety Program due to its potential for flammable gas accumulation above the flammability limit.

653
(PNNL–11601)
Tank Vapor Characterization Project: Tank 241-S-102 fourth temporal study: Headspace gas and vapor characterization results from samples collected on December 19, 1996. Pool, K.H. (and others); Evans, J.C.; Olsen, K.B.; Hayes, J.C. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 55p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054513. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-S-102 (Tank S-102) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Service Corporation (SESC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are

based on measured sample volumes provided by SESC. Ammonia was determined to be above the immediate notification limit of 150 ppm as specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank S-102 headspace, determined to be present at approximately 2.410% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <2.973% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <2.973% of the LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

654
(PNNL–11605)
Tank 241-BY-108 fifth temporal study: Headspace gas and vapor characterization results from samples collected on January 30, 1997. Tank vapor characterization project. Evans, J.C. (and others); Pool, K.H.; Olsen, K.B. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054509. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analyses of samples taken from tile headspace of waste storage tank 241-B-108 (Tank BY - 108) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Services Corporation (SESC) and analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample volumes provided by SESC. Ammonia was determined to be above the immediate notification limit of 150 ppm specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank BY-108 headspace, determined to be present at approximately 0.888% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <1.979% of tile LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

655
(PNNL–11606)
Tank Vapor Characterization Project: Tank 241-BX-104 second temporal study headspace gas and vapor characterization results from samples collected on December 12, 1996. Pool, K.H. (and others); Evans, J.C.; Hayes, J.C.; Olsen, K.B. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054517. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-BX-104 (Tank BX-104) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Service Corporation (SESC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample provided by SESC. Ammonia was determined to be above the immediate notification limit specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank BX-104 headspace, determined to be present at approximately 0.248% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <0.645% of the LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

656
(PNNL–11607)
Tank vapor characterization project - Tank 241-U-112 headspace gas and vapor characterization: Results for homogeneity samples collected on December 6, 1996. Sklarew, D.S. (and others); Pool, K.H.; Evans, J.C.; Hayes, J.C. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 149p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054525. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results of analyses of samples taken from the headspace of waste storage tank 241-U-112 (Tank U-112) at the Hanford Site in Washington State. Samples were collected to determine the homogeneity of selected inorganic and organic headspace constitutents. Two risers (Riser 3 and Riser 6) were sampled at three different elevations (Bottom, Middle, and Top) within the tank. Tank headspace samples were collected by SGN Eurisys Service Corporation (SESC) and were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Ammonia was determined to be above the immediate notification limit specified by the sampling and analysis plan.

657
(PNNL–11608)
Tank vapor characterization project - Tank 241-TY-103 headspace gas and vapor characterization: Results for homogeneity samples collected on November 22, 1996. Olsen, K.B. (and others); Pool, K.H.; Evans, J.C.; Hayes, J.C. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 147p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054518. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results of analyses of samples taken from the headspace of waste storage tank 241-TY-103 (Tank TY-103) at the Hanford Site in Washington State. Samples were collected to determine the homogeneity of

selected inorganic and organic headspace constituents. Two risers (Riser 8 and Riser 18) were sampled at three different elevations (Top, Middle, and Bottom) within the tank. Tank headspace samples were collected by SGN Eurisys Service Corporation (SESC) and were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. No analytes were determined to be above immediate notification limits specified by the sampling and analysis plan (SAP).

658
(PNNL–11610)
Tank 241-BX-104 fourth temporal study: Headspace gas and vapor characterization results from samples collected on April 7, 1997. Tank vapor characterization project. Mitroshkov, A.V. (and others); Hayes, J.C.; Evans, J.C. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 58p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054514. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-BX-04 (Tank BX-104) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Service Corporation (SESC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample volumes provided by SESC. Ammonia was determined to be above the immediate notification limit specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank BX-104 headspace, determined to be present at approximately 0.208% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <0.536% of the LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

659
(PNNL–11611)
Tank 241-BX-104 third temporal study: Headspace gas and vapor characterization results from samples collected on February 6, 1997. Tank vapor characterization project. Evans, J.C. (and others); Pool, K.H.; Hayes, J.C. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054511. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-BX-104 (Tank BX-104) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Service Corporation (SESC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample volumes provided by SESC. Ammonia was determined to be above the immediate notification limit specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank BX-104 headspace, determined to be present at approximately 0.178 % of its lower flammability limit (LFL). Total headspace flammability was estimated to be <0.458% of the LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

660
(PNNL–11612)
Tank 241-C-107 fifth temporal study: Headspace gas and vapor characterization results from samples collected on February 7, 1997. Tank vapor characterization project. Hayes, J.C. (and others); Pool, K.H.; Evans, J.C. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 54p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054515. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-C-107 (Tank C-107) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Services Corporation (SESC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample volumes provided by SESC. No analytes were determined to be above the immediate notification limits specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank C-107 headspace, determined to be present at approximately 3.233% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <3.342% of the LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

661
(PNNL–11613)
Tank 241-S-102 fifth temporal study: Headspace gas and vapor characterization results from samples collected on February 11, 1997. Tank vapor characterization project. Mitroshkov, A.V. (and others); Evans, J.C.; Hayes, J.C. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054516. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents tile results from analyses of samples taken from the headspace of waste storage tank 241-S-102

(Tank S-102) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurlsys Service Corporation (SESC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by tile Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based oil measured sample volumes provided by SESC. Ammonia was determined to be above tile immediate notification limit of 150 ppm as specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank S-102 headspace, determined to be present at approximately 1.150% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <1.624% of the LFL, Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of tile analytical results are provided in Section 3.0.

662
(PNNL–11616)
Crystallization of sodium nitrate from radioactive waste. Krapukhin, V.B. (Russian Academy of Sciences, Moscow (Russian Federation). Institute of Physical Chemistry); Krasavina, E.P. Pikaev, A.K. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 90p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053809. Source: OSTI; NTIS; INIS; GPO Dep.

From the 1940s to the 1980s, the Institute of Physical Chemistry of the Russian Academy of Sciences (IPC/RAS) conducted research and development on processes to separate acetate and nitrate salts and acetic acid from radioactive wastes by crystallization. The research objective was to decrease waste volumes and produce the separated decontaminated materials for recycle. This report presents an account of the IPC/RAS experience in this field. Details on operating conditions, waste and product compositions, decontamination factors, and process equipment are described. The research and development was generally related to the management of intermediate-level radioactive wastes. The waste solutions resulted from recovery and processing of uranium, plutonium, and other products from irradiated nuclear fuel, neutralization of nuclear process solutions after extractant recovery, regeneration of process nitric acid, equipment decontamination, and other radiochemical processes. Waste components include nitric acid, metal nitrate and acetate salts, organic impurities, and surfactants. Waste management operations generally consist of two stages: volume reduction and processing of the concentrates for storage, solidification, and disposal. Filtration, coprecipitation, coagulation, evaporation, and sorption were used to reduce waste volume. 28 figs., 40 tabs.

663
(PNNL–11617)
Tank vapor characterization project: Tank 241-BX-104 fifth temporal study: Headspace gas and vapor characterization results from samples collected on June 10, 1997. Hayes, J.C. (and others); Pool, K.H.; Evans, J.C.; Olsen, K.B. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054526. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from analyses of samples taken from the headspace of waste storage tank 241-BX-104 (Tank BX-104) at the Hanford Site in Washington State. Tank headspace samples collected by SGN Eurisys Service Corporation (SESC) were analyzed by Pacific Northwest National Laboratory (PNNL) to determine headspace concentrations of selected non-radioactive analytes. Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Vapor concentrations from sorbent trap samples are based on measured sample volumes provided by SESC. Ammonia was determined to be above the immediate notification limit specified by the sampling and analysis plan (SAP). Hydrogen was the principal flammable constituent of the Tank BX-104 headspace, determined to be present at approximately 0.270% of its lower flammability limit (LFL). Total headspace flammability was estimated to be <0.675% of the LFL. Average measured concentrations of targeted gases, inorganic vapors, and selected organic vapors are provided in Table S.1. A summary of experimental methods, including sampling methodology, analytical procedures, and quality assurance and control methods are presented in Section 2.0. Detailed descriptions of the analytical results are provided in Section 3.0.

664
(PNNL–11621)
Gas release during salt-well pumping: Model predictions and laboratory validation studies for soluble and insoluble gases. Peurrung, L.M.; Caley, S.M.; Gauglitz, P.A. Pacific Northwest National Lab., Richland, WA (United States). Aug 1997. [100p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054182. Source: OSTI; NTIS; INIS; GPO Dep.

The Hanford Site has 149 single-shell tanks (SSTs) containing radioactive wastes that are complex mixes of radioactive and chemical products. Of these, 67 are known or suspected to have leaked liquid from the tanks into the surrounding soil. Salt-well pumping, or interim stabilization, is a well-established operation for removing drainable interstitial liquid from SSTs. The overall objective of this ongoing study is to develop a quantitative understanding of the release rates and cumulative releases of flammable gases from SSTs as a result of salt-well pumping. The current study is an extension of the previous work reported by Peurrung et al. (1996). The first objective of this current study was to conduct laboratory experiments to quantify the release of soluble and insoluble gases. The second was to determine experimentally the role of characteristic waste heterogeneities on the gas release rates. The third objective was to evaluate and validate the computer model STOMP (Subsurface Transport over Multiple Phases) used by Peurrung et al. (1996) to predict the release of both soluble (typically ammonia) and insoluble gases (typically hydrogen) during and after salt-well pumping. The fourth and final objective of the current study was to predict the gas release behavior for a range of typical tank conditions and actual tank geometry. In these models, the authors seek to include all the pertinent salt-well pumping operational parameters and a realistic

range of physical properties of the SST wastes. For predicting actual tank behavior, two-dimensional (2-D) simulations were performed with a representative 2-D tank geometry.

665
(PNNL–11622)
TFA Tank Focus Area - multiyear program plan FY98-FY00. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 290p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050089. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE) continues to face a major radioactive waste tank remediation problem with hundreds of waste tanks containing hundreds of thousands of cubic meters of high-level waste (HLW) and transuranic (TRU) waste across the DOE complex. Approximately 80 tanks are known or assumed to have leaked. Some of the tank contents have reacted to form flammable gases, introducing additional safety risks. These tanks must be maintained in a safe condition and eventually remediated to minimize the risk of waste migration and/or exposure to workers, the public, and the environment. However, programmatic drivers are more ambitious than baseline technologies and budgets will support. Science and technology development investments are required to reduce the technical and programmatic risks associated with the tank remediation baselines. The Tanks Focus Area (TFA) was initiated in 1994 to serve as the DOE's Office of Environmental Management's (EM's) national technology development program for radioactive waste tank remediation. The national program was formed to increase integration and realize greater benefits from DOE's technology development budget. The TFA is responsible for managing, coordinating, and leveraging technology development to support DOE's four major tank sites: Hanford Site (Washington), Idaho National Engineering and Environmental Laboratory (INEEL) (Idaho), Oak Ridge Reservation (ORR) (Tennessee), and Savannah River Site (SRS) (South Carolina). Its technical scope covers the major functions that comprise a complete tank remediation system: waste retrieval, waste pretreatment, waste immobilization, tank closure, and characterization of both the waste and tank with safety integrated into all the functions. The TFA integrates program activities across organizations that fund tank technology development EM, including the Offices of Waste Management (EM-30), Environmental Restoration (EM-40), and Science and Technology (EM-50).

666
(PNNL–11623)
Investigation on application of homogeneous and heterogeneous catalysis for alkaline waste treatment. Shilov, V.P. (Russian Academy of Sciences, Moscow (Russian Federation). Institute of Physical Chemistry); Bessonov, A.A.; Garnov, A.Y.; Gelis, A.V. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 59p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054434. Source: OSTI; NTIS; INIS; GPO Dep.

The stabilization of neptunium(IV) in alkaline solution by chemical reductants under various conditions was studied. Testing showed that neptunium(V) is slowly reduced to Np(IV) by V(IV) at room temperature in alkaline solutions. Increasing temperature accelerates reduction. Complete reduction of 2×10^{-4} M Np(V) occurs in three hours at 80°C in 1 M NaOH with 0.02 M $VOSO_{4-}$. Under similar conditions, but in 5 M NaOH, only 15 to 20% of the Np(V) was reduced in 5 hours. In all cases, about 98 % of the initial neptunium was found in the precipitate. Thus V(IV) acts both as a reductant and as a precipitation carrier. Tests showed Np(V) reduction by hydrazine hydrate could be catalyzed by Pd(II). Reduction increased with temperature and catalyst concentration and decreased with hydroxide concentration. Reduction of Np(V) also takes place in 1 M NaOH solutions containing 1 M sodium formate and palladium. Increasing temperature accelerates reduction; with three hours' treatment in 5 M NaOH solution at 90°C, about 95 % of the initial 2×10^{-4} M neptunium(V) is transformed to Np(IV). Organic complexants and organic acid anions hinder the decontamination of alkaline solutions from neptunium and plutonium by coprecipitation with d-element hydroxides (the Method of Appearing Reagents). It was found that ethylenediaminetetraacetate (EDTA) and N-(2-hydroxyethyl) ethylenediaminetriacetate (HEDTA) are decomposed by H_2O_2 in alkaline solution in the presence of cobalt compounds with heating and by Na2S208 at moderate temperatures. Citrate, glycolate, and oxalate are decomposed by $Na_2S_2O_8$ with heating. Oxidant amounts must be increased when $NaNO_2$ also is present in solution. 8 refs., 25 figs., 16 tabs.

667
(PNNL–11624)
Investigation of the behavior of plutonium(V) in alkaline media. Budantseva, N.A. (Russian Academy of Sciences, Moscow (Russian Federation). Institute of Physical Chemistry); Tananaev, I.G.; Fedoseev, A.M.; Bessonov, A.A. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 55p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054433. Source: OSTI; NTIS; GPO Dep.

The stability of the plutonium(V) oxidation state in alkaline media was studied with respect to the neighboring Pu(IV) and Pu(VI) oxidation states. Tests were conducted in 1 M or higher NaOH solutions in the presence and absence of other components of Hanford Site high-level tank waste. Spectrophotometric techniques were found to be effective in studying the behavior of plutonium(V) in alkaline solution at plutonium concentrations above 10^{-3} M. To this end, plutonium(V) and plutonium(VI) in NaOH were prepared and their spectra characterized. In alkaline solutions with NaOH concentration below 8 M, plutonium(V) was found to be unstable to disproportionation occurring according to the reaction 2 Pu(V)(aq) → Pu(VI)(aq) + Pu(IV)(s). The disproportionation of Pu(V) is complicated by at least two simultaneous processes: (1) the sorption of a significant fraction of the Pu(V) onto the forming Pu(IV) hydrous oxide precipitate, and (2) partial reduction of Pu(VI) by water α-radiolysis products.

668
(PNNL–11625)
Investigation on the coprecipitation of transuranium elements from alkaline solutions by the method of appearing reagents. Study of the effects of waste components on decontamination from Np(IV) and Pu(IV). Bessonov, A.A. (Russian Academy of Sciences, Moscow

(Russian Federation). Institute of Physical Chemistry); Budantseva, N.A.; Gelis, A.V.; Nikonov, M.V.; Shilov, V.P. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 80p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054431. Source: OSTI; NTIS; GPO Dep.

The third stage of the study on the homogeneous coprecipitation of neptunium and plutonium from alkaline high-level radioactive waste solutions by the Method of Appearing Reagents has been completed. Alkaline radioactive wastes exist at the U.S. Department of Energy Hanford Site. The recent studies investigated the effects of neptunium chemical reductants, plutonium(IV) concentration, and the presence of bulk tank waste solution components on the decontamination from tetravalent neptunium and plutonium achieved by homogeneous coprecipitation. Data on neptunium reduction to its tetravalent state in alkaline solution of different NaOH concentrations are given. Eleven reductants were tested to find those most suited to remove neptunium, through chemical reduction, from alkaline solution by homogeneous coprecipitation. Hydrazine, $VOSO_4$, and $Na_2S_2O_4$ were found to be the most effective reductants. The rates of reduction with these reductants were comparable with the kinetics of carrier formation. Solution decontamination factors of about 400 were attained for 10^{-6}M neptunium. Coprecipitation of plutonium(IV) with carriers obtained as products of thermal hydrolysis, redox transformations, and catalytic decomposition of $[Co(NH_3)_6]^{3+}$, $[Fe(CN)_5NO]^{2-}$, $Cr(NO_3)_3$, $KMnO_4$, and $Li_4UO_2(O_2)_3$ was studied and results are described. Under optimum conditions, a 100-fold decrease of plutonium concentration was possible with each of these reagents.

669
(PNNL–11626)
Decontamination of alkaline solution from technetium and other fission products and from some actinides by reductive coprecipitation and sorption on metals. Peretrukhin, V.F. (Russian Academy of Sciences, Moscow (Russian Federation). Institute of Physical Chemistry); Silin, V.I.; Tananaev, I.G.; Kareta, A.V.; Trushina, V.E. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 50p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054432. Source: OSTI; NTIS; GPO Dep.

Effective decontamination of alkaline solutions and Hanford Site tank waste simulants from technetium has been accomplished by reductive coprecipitation with iron(III) hydroxide. Addition of 1 M $(NH_4)_2Fe(SO_4)_2$ to 0.5 to 4.0 M NaOH to a final concentration of 0.1 to 0.15 M coprecipitates more than 99% of the technetium. from 0.5 to 1.0 M NaOH and 98 to 96% from 2.0 to 4.0 M NaOH. Similar results were obtained by reduction of Tc(VII) with 0.1 to 0.15 M hydrazine and subsequent addition of $FeCl_3$ to a final concentration of 0.15 M. Inclusion of four complex-forming agents [0.01 M phosphate, 0.1 M EDTA (ethylenediaminetetraacetate), 0.03 M citrate, and 0.1 M glycolate ($HOCH_2CO_2^-$)] to the alkaline solution decreases technetium coprecipitation with iron hydroxide to 85% under otherwise similar conditions. Inclusion of 0.04 M Na_2CrO_4 drastically decreases reductive coprecipitation of Tc(VII) in 0.5 to 4.0 M NaOH. Iron(II) salt, added to a 0.07 M excess over that of chromate, completely reduces chromate and provides greater than 99% coprecipitation of technetium with product iron(III) and chromium(III) hydroxides. Technetium(VII) reduction by hydrazine is slow in the presence of chromate in alkaline solution, and technetium coprecipitation is incomplete in these conditions. Decontamination of an alkaline Hanford Site tank waste simulant, containing 0.04M chromate and eleven salts and complex-forming agents, by adding 1 M iron(II) salt solution was studied. Coprecipitation of 15 to 28% of the technetium and more than 99% of the plutonium occurred in the Fe/Cr(III) hydroxide precipitate produced by adding 0.05 to 0.10 M iron(II). Chromate reduction was incomplete. About 75% of the technetium was coprecipitated, and the chromate was completely reduced, after adding 0.2 M iron(II) salt.

670
(PNNL–11627)
Monitoring gas retention and slurry transport during the transfer of waste from Tank 241-C-106 to Tank 241-AY-102. Stewart, C.W. (and others); Erian, F.F.; Meyer, P.A. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 39p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053943. Source: OSTI; NTIS; INIS; GPO Dep.

The retained gas volume can be estimated by several methods. All of these methods have significant uncertainties, but together they form a preponderance of evidence that describes the gas retention behavior of the tank. The methods are (1) an increase in nonconvective layer thickness; (2) a waste surface level rise (surface level effect [SLE] model); (3) the barometric pressure effect (BPE model); (4) direct void measurement; and (5) the consequences of the transfer process. The nonconvective layer thickness can be determined with sufficient accuracy to describe the overall waste configuration by means of temperature profiles or densitometer indications. However, the presence of a nonconvective layer does not necessarily indicate significant gas retention, and small changes in layer thickness that could quantify gas retention cannot be detected reliably with the methods available. The primary value of this measurement is in establishing the actual "fluffing factor" for thermal calculations. Surface level rise is not a useful measure of gas retention in Tank 241-C-106 (C-106) since the waste level fluctuates with regular makeup water additions. In Tank 241-AY-102 (AY-102) with the existing ventilation system it should be possible to determine the gas retention rate within 30-60% uncertainty from the surface level rise, should a significant rise be observed. The planned ventilation system upgrades in AY- 102 will greatly reduce the exhaust flow and the headspace humidity, and the evaporation rate should be significantly lower when transfers begin. This could reduce the uncertainty in gas retention rate estimates to around $\pm$ 10%.

671
(PNNL–11635)
Light duty utility arm deployment in Hanford tank T-106. Kiebel, G.R. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 47p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053934. Source: OSTI; NTIS; INIS; GPO Dep.

An existing gap in the technology for the remediation of underground waste storage tanks filled by the Light Duty

Utility Arm (LDUA) System. On September 27 and 30, 1996, the LDUA System was deployed in underground storage tank T-106 at Hanford. The system performed successfully, satisfying all objectives of the in-tank operational test (hot test); performing close-up video inspection of features of tank dome, risers, and wall; and grasping and repositioning in-tank debris. The successful completion of hot testing at Hanford means that areas of tank structure and waste surface that were previously inaccessible are now within reach of remote tools for inspection, waste analysis, and small-scale retrieval. The LDUA System has become a new addition to the arsenal of technologies being applied to solve tank waste remediation challenges.

672
(PNNL–11636)
Washing and caustic leaching of Hanford tank sludge: Results of FY 1997 studies. Lumetta, G.J.; Burgeson, I.E.; Wagner, M.J.; Liu, J.; Chen, Y.L. Pacific Northwest National Lab., Richland, WA (United States). Aug 1997. [200p.] Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054183. Source: OSTI; NTIS; INIS; GPO Dep.

The current plan for remediating the Hanford tank farms consists of waste retrieval, pretreatment, treatment (immobilization), and disposal. The tank wastes will be partitioned into high-level and low-level fractions. The HLW will be immobilized in a borosilicate glass matrix; the resulting glass canisters will then be disposed of in a geologic repository. Because of the expected high cost of HLW vitrification and geologic disposal, pretreatment processes will be implemented to reduce the volume of immobilized high-level waste (IHLW). Caustic leaching (sometimes referred to as enhanced sludge washing or ESW) represents the baseline method for pretreating Hanford tank sludges. Caustic leaching is expected to remove a large fraction of the Al, which is present in large quantities in Hanford tank sludges. A significant portion of the P is also expected to be removed from the sludge by metathesis of water-insoluble metal phosphates to insoluble hydroxides and soluble Na_3PO_4. Similar metathesis reactions can occur for insoluble sulfate salts, allowing the removal of sulfate from the HLW stream. This report describes the sludge washing and caustic leaching tests performed at the Pacific Northwest National Laboratory in FY 1996. The sludges used in this study were taken from Hanford tanks AN-104, BY-108, S-101, and S-111.

673
(PNNL–11638)
Organic Tank Safety Project: Effect of water partial pressure on the equilibrium water content of waste samples from Hanford Tank 241-U-105. Scheele, R.D.; Bredt, P.R.; Sell, R.L. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 51p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98051227. Source: OSTI; NTIS; INIS; GPO Dep.

Water content plays a crucial role in the strategy developed by Webb et al. to prevent propagating or sustainable chemical reactions in the organic-bearing wastes stored in the 20 Organic Tank Watch List tanks at the U.S. Department of Energy's Hanford Site. Because of water's importance in ensuring that the organic-bearing wastes continue to be stored safely, Duke Engineering and Services Hanford commissioned the Pacific Northwest National Laboratory to investigate the effect of water partial pressure (P_{H2O}) on the water content of organic-bearing or representative wastes. Of the various interrelated controlling factors affecting the water content in wastes, P_{H2O} is the most susceptible to being controlled by the and Hanford Site's environmental conditions and, if necessary, could be managed to maintain the water content at an acceptable level or could be used to adjust the water content back to an acceptable level. Of the various waste types resulting from weapons production and waste-management operations at the Hanford Site, determined that saltcake wastes are the most likely to require active management to maintain the wastes in a Conditionally Safe condition. Webb et al. identified Tank U-105 as a Conditionally Safe saltcake tank. A Conditionally Safe waste is one that is currently safe based on waste classification criteria but could, if dried, be classified as "Unsafe." To provide information on the behavior of organic-bearing wastes, the Westinghouse Hanford Company provided us with four waste samples taken from Tank 241-U-105 (U-105) to determine the effect of P_{H2O} on their equilibrium water content.

674
(PNNL–11639)
Initial parametric study of the flammability of plume releases in Hanford waste tanks. Antoniak, Z.I.; Recknagle, K.P. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 38p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054430. Source: OSTI; NTIS; GPO Dep.

This study comprised systematic analyses of waste tank headspace flammability following a plume-type of gas release from the waste. First, critical parameters affecting plume flammability were selected, evaluated, and refined. As part of the evaluation the effect of ventilation (breathing) air inflow on the convective flow field inside the tank headspace was assessed, and the magnitude of the so-called "numerical diffusion" on numerical simulation accuracy was investigated. Both issues were concluded to be negligible influences on predicted flammable gas concentrations in the tank headspace. Previous validation of the TEMPEST code against experimental data is also discussed, with calculated results in good agreements with experimental data. Twelve plume release simulations were then run, using release volumes and flow rates that were thought to cover the range of actual release volumes and rates. The results indicate that most plume-type releases remain flammable only during the actual release ends. Only for very large releases representing a significant fraction of the volume necessary to make the entire mixed headspace flammable (many thousands of cubic feet) can flammable concentrations persist for several hours after the release ends. However, as in the smaller plumes, only a fraction of the total release volume is flammable at any one time. The transient evolution of several plume sizes is illustrated in a number of color contour plots that provide insight into plume mixing behavior.

675
(PNNL–11640)
Homogeneity of passively ventilated waste tanks. Huckaby, J.L. (and others); Jensen, L.; Cromar, R.D.; Hayes, J.C. Pacific Northwest Lab., Richland, WA (United States).

Jul 1997. 38p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054314. Source: OSTI; NTIS; GPO Dep.

Gases and vapors in the high-level radioactive waste underground storage tanks at the Hanford Site are being characterized to help resolve waste storage safety issues and estimate air emissions. Characterization is accomplished by collecting and analyzing air samples from the headspaces of the tanks. Samples are generally collected from a single central location within the headspace, and it is assumed that they are representative of the entire headspace. The validity of this assumption appears to be very good for most tanks, because thermally induced convection currents within the headspaces mix constituents continuously. In the coolest waste tanks, however, thermally induced convection may be suppressed for several months of each year because of the seasonal soil temperature cycle. To determine whether composition does vary significantly with location in a cool tank, the headspaces of three waste tanks have been sampled at different horizontal and vertical locations during that part of the year when thermally induced convection is minimized. This report describes the bases for tank selection and the sampling and analytical methods used, then analyzes and discusses the results. Headspace composition data from two risers at three elevations in Tanks 241-B-103, TY-103, and U-112 have been analyzed by standard analysis of variance (ANOVA) methods, which indicate that these tank headspaces are essentially homogeneous. No stratification of denser vapors (e.g., carbon tetrachloride, dodecane) or lighter gases (e.g., ammonia, hydrogen) was detected in any of the three tanks. A qualitative examination of all tentatively identified organic vapors in SUMMA™ and TST samples supported this conclusion.

676
(PNNL–11642)
Mechanisms of gas retention and release: Experimental results for Hanford waste tanks 241-AW-101 and 241-AN-103. Rassat, S.D.; Gauglitz, P.A.; Bredt, P.R.; Mahoney, L.A.; Forbes, S.V.; Tingey, S.M. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 92p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054436. Source: OSTI; NTIS; INIS; GPO Dep.

The 177 storage tanks at Hanford contain a vast array of radioactive waste forms resulting, primarily, from nuclear materials processing. Through radiolytic, thermal, and other decomposition reactions of waste components, gaseous species including hydrogen, ammonia, and the oxidizer nitrous oxide are generated within the waste tanks. Many of these tanks are known to retain and periodically release quantities of these flammable gas mixtures. The primary focus of the Flammable Gas Project is the safe storage of Hanford tank wastes. To this end, we strive to develop an understanding of the mechanisms of flammable gas retention and release in Hanford tanks through laboratory investigations on actual tank wastes. These results support the closure of the Flammable Gas Unreviewed Safety Question (USQ) on the safe storage of waste tanks known to retain flammable gases and support resolution of the broader Flammable Gas Safety Issue. The overall purpose of this ongoing study is to develop a comprehensive and thorough understanding of the mechanisms of flammable gas retention and release. The first objective of the current study was to classify bubble retention and release mechanisms in two previously untested waste materials from Tanks 241-AN-103 (AN-103) and 241-AW-101 (AW-101). Results were obtained for retention mechanisms, release characteristics, and the maximum gas retention. In addition, unique behavior was also documented and compared with previously studied waste samples. The second objective was to lengthen the duration of the experiments to evaluate the role of slowing bubble growth on the retention and release behavior. Results were obtained for experiments lasting from a few hours to a few days.

677
(PNNL–11652)
Bench-scale crossflow filtration of Hanford tank C-106, C-107, B-110, and U-110 sludge slurries. Geeting, J.G.H.; Reynolds, B.A. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 113p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054577. Source: OSTI; NTIS; INIS; GPO Dep.

Pacific Northwest National Laboratory has a bench-scale crossflow filter installed in a shielded hot cell for testing radioactive feeds. During FY97 experiments were conducted on slurries from radioactive Hanford waste from tanks C-106, C-107, B-110, and U-110. Each tank was tested at three slurry concentrations (8, 1.5, and 0.05 wt% solids). A two-parameter central composite design which tested transmembrane pressure from 5 to 40 psig and axial velocity from 3 to 9 ft/s was used for all feeds. Crossflow filtration was found to remove solids effectively, as judged by filtrate clarity and radiochemical analysis. If the filtrates from these tests were immobilized in a glass matrix, the resulting transuranic and (^{90}Sr) activity would not breach low activity waste glass limits of 100nCi/g (TRU) and 20 μCi/ml (^{90}Sr). Two exceptions were the transuranic activity in filtrates from processing 1.5 and 8 wt% C-106 tank waste. Subsequent analyses indicated that the source of the TRU activity in the filtrate was most likely due to soluble activity, but obviously proved ineffective at removing the soluble plutonium species. Re-testing of the C-106 supported this hypothesis. These data suggest the need to control carbonate and pH when processing tank wastes for immobilization.

678
(PNNL–11667)
Seasonal changes in the composition of passively ventilated waste tank headspaces. Huckaby, J.L.; Hayes, J.C.; Buckley, L.L.; Jensen, L.; Pennington, L.D.; Wilmarth, S.R. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 68p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054334. Source: OSTI; NTIS; INIS; GPO Dep.

The headspaces of four passively ventilated high-level radioactive waste tanks were sampled five times over a one-year period to evaluate seasonal changes in composition. Tanks BX-104, BY-108, C-107, and SX-102 were selected for the study on the bases of their widely varying headspace compositions, waste types, and physical headspace conditions. Samples were collected and analyzed for inorganic vapors, permanent gases, and organic vapors. Data from the 20 sampling events were compiled and reviewed. Raw

mass spectral data for organic vapors were reprocessed by a single analyst. Measurement precision for results within individual sampling events, which includes both sampling and analytical random errors, was generally within the requirement of a 25% relative standard deviation. Data were fit to an analysis of variance (ANOVA) model and tested for correlation with headspace temperature. The ANOVA results indicate that the majority of headspace constituents studied were at relatively constant levels during the year-long study. The percent relative standard deviation (RSD_{TIME}) of analyte means obtained for the five sampling events were generally low; only 15 of the 152 analytes had RSD_{TIME} values above 60%. These highest RSD_{TIME} values were obtained for 13 organic vapors in Tank BX-104 and two permanent gases in Tank C-107.

679
(PNNL–11668)
Earthquake-induced response and potential for gas mobilization in Hanford waste tanks. Reid, H.C.; Deibler, J.E. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 71p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054520. Source: OSTI; NTIS; INIS; GPO Dep.

Seismic events postulated to occur at Hanford are predicted to cause yielding of the various waste materials in double- and single-shell tanks such that some or most of the waste is driven to completely plastic behavior. The seismic analyses documented in this report evaluated waste response to a 1,000-year design basis earthquake (DBE) event. The three-dimensional finite element computational structural analysis models were used with an assumed nonlinear elastic-plastic material definition.

680
(PNNL–11674)
Ammonia concentration modeling based on retained gas sampler data. Terrones, G.; Palmer, B.J.; Cuta, J.M. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054532. Source: OSTI; NTIS; INIS; GPO Dep.

The vertical ammonia concentration distributions determined by the retained gas sampler (RGS) apparatus were modeled for double-shell tanks (DSTs) AW-101, AN-103, AN-104, and AN-105 and single-shell tanks (SSTs) A-101, S-106, and U-103. One the vertical transport of ammonia in the tanks were used for the modeling. Transport in the non-convective settled solids and floating solids layers is assumed to occur primarily via some type of diffusion process, while transport in the convective liquid layers is incorporated into the model via mass transfer coefficients based on empirical correlations. Mass transfer between the top of the waste and the tank headspace and the effects of ventilation of the headspace are also included in the models. The resulting models contain a large number of parameters, but many of them can be determined from known properties of the waste configuration or can be estimated within reasonable bounds from data on the waste samples themselves. The models are used to extract effective diffusion coefficients for transport in the nonconvective layers based on the measured values of ammonia from the RGS apparatus. The modeling indicates that the higher concentrations of ammonia seen in bubbles trapped inside the waste relative to the ammonia concentrations in the tank headspace can be explained by a combination of slow transport of ammonia via diffusion in the nonconvective layers and ventilation of the tank headspace by either passive or active means. Slow transport by diffusion causes a higher concentration of ammonia to build up deep within the waste until the concentration gradients between the interior and top of the waste are sufficient to allow ammonia to escape at the same rate at which it is being generated in the waste.

681
(PNNL–11678)
Nuclear magnetic resonance measurement of ammonia diffusion in dense solid-liquid slurries. Bobroff, S. (Univ. of California, Davis, CA (United States). Dept. of Chemical Engineering); Phillips, R.J.; Shekarriz, A. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 23p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054331. Source: OSTI; NTIS; GPO Dep.

The diffusion of ammonium ions in aqueous solutions was measured by nuclear magnetic resonance (NMR) using the pulsed field gradient (PFG) method. The ammonium ions were obtained from aqueous solutions of ammonium chloride, ammonium sulfate, ammonium bicarbonate, and ammonium hydroxide. The translation diffusion of the ammonium ions was determined by measuring the diffusion of nitrogen nuclei (^{14}N and ^{15}N) in solution. Our results showed that the ammonium diffusion coefficient can be measured in aqueous solutions with concentrations as low as 20×10^{-3} M. Typical values measured for the diffusion coefficient of the ammonium ion are 2×10^{-5} $cm^{2/s}$ ($\pm 10\%$), similar to the values found for pure water. Due to the effect of the solution pH upon the NMR relaxation parameters for ^{14}N, measurements are constrained to pH values below 8.5. However, ^{15}N labeled ammonium is less sensitive to the solution pH, extending the measurement range to pH of 9.5. Diffusion measurements were conducted with solutions of varying viscosity and porosity. The results show that the solution viscosity has a measureable impact on the diffusion coefficient. The diffusion coefficient is almost inversely proportional to the relative viscosity of the solution, irrespective of how the viscosity is increased. Further, a randomly-packed porous bed of 200 mm PMMA resulted in a reduction of ~30% in the diffusion coefficient as a result of hindered diffusion.

682
(PNNL–11682)
Liaison activities with the Institute of Physical Chemistry, Russian Academy of Sciences: FY 1997. Delegard, C.H.; Elovich, R.J. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 46p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054576. Source: OSTI; NTIS; INIS; GPO Dep.

The Institute of Physical Chemistry of the Russian Academy of Sciences is conducting a program of fundamental and applied research into the chemistry of the actinides and technetium in alkaline media such as are present in the Hanford Site underground waste storage tanks. This work is

being coordinated and the results disseminated through a technical liaison maintained at the Pacific Northwest National Laboratory. The technical liaison is performing laboratory studies on plutonium chemistry in alkaline media. The activities at the Institute of Physical Chemistry and through the liaison are pursued to improve understanding of the chemical behavior of key long-lived radioactive elements under current operating and proposed tank waste processing conditions. Both activities are supported by the Efficient Separations and Processing Crosscutting Program under the Office of Science and Technology of the U.S. Department of Energy.

683
(PNNL–11683)
Measurements of waste tank passive ventilation rates using tracer gases. Huckaby, J.L.; Olsen, K.B.; Sklarew, D.S.; Evans, J.C.; Remund, K.M. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 38p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054573. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results of ventilation rate studies of eight passively ventilated high-level radioactive waste tanks using tracer gases. Head space ventilation rates were determined for Tanks A-101, AX-102, AX-103, BY-105, C-107, S-102, U-103, and U-105 using sulfur hexafluoride (SF_6) and/or helium (He) as tracer gases. Passive ventilation rates are needed for the resolution of several key safety issues. These safety issues are associated with the rates of flammable gas production and ventilation, the rates at which organic salt-nitrate salt mixtures dry out, and the estimation of organic solvent waste surface areas. This tracer gas study involves injecting a tracer gas into the tank headspace and measuring its concentration at different times to establish the rate at which the tracer is removed by ventilation. Tracer gas injection and sample collection were performed by SGN Eurisys Service Corporation and/or Lockheed Martin Hanford Corporation, Characterization Project Operations. Headspace samples were analyzed for He and SF_6 by Pacific Northwest National Laboratory (PNNL). The tracer gas method was first demonstrated on Tank S-102. Tests were conducted on Tank S-102 to verify that the tracer gas was uniformly distributed throughout the tank headspace before baseline samples were collected, and that mixing was sufficiently vigorous to maintain an approximately uniform distribution of tracer gas in the headspace during the course of the study. Headspace samples, collected from a location about 4 in away from the injection point and 15, 30, and 60 minutes after the injection of He and SF_6, indicated that both tracer gases were rapidly mixed. The samples were found to have the same concentration of tracer gases after 1 hour as after 24 hours, suggesting that mixing of the tracer gas was essentially complete within 1 hour.

684
(PNNL–11685)
Retrieval process development and enhancements waste simulant compositions and defensibility. Powell, M.R.; Golcar, G.R.; Geeting, J.G.H. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 127p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. DE-AC06-76RL01830. Order Number DE98050509. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the physical waste simulant development efforts of the EM-50 Tanks Focus Area at the Hanford Site. Waste simulants are used in the testing and development of waste treatment and handling processes because performing such tests using actual tank waste is hazardous and prohibitively expensive. This document addresses the simulant development work that supports the testing of waste retrieval processes using simulants that mimic certain key physical properties of the tank waste. Development and testing of chemical simulants are described elsewhere. This work was funded through the EM-50 Tanks Focus Area as part of the Retrieval Process Development and Enhancements (RPD&E) Project at the Pacific Northwest National Laboratory (PNNL). The mission of RPD&E is to understand retrieval processes, including emerging and existing processes, gather performance data on those processes, and relate the data to specific tank problems to provide end users with the requisite technical bases to make retrieval and closure decisions. Physical simulants are prepared using relatively nonhazardous and inexpensive materials rather than the chemicals known to be in tank waste. Consequently, only some of the waste properties are matched by the simulant. Deciding which properties need to be matched and which do not requires a detailed knowledge of the physics of the process to be tested using the simulant. Developing this knowledge requires reviews of available literature, consultation with experts, and parametric tests. Once the relevant properties are identified, waste characterization data are reviewed to establish the target ranges for each property. Simulants are then developed that possess the desired ranges of properties.

685
(PNNL–11686)
Research on jet mixing of settled sludges in nuclear waste tanks at Hanford and other DOE sites: A historical perspective. Powell, M.R.; Onishi, Y.; Shekarriz, R. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 90p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050093. Source: OSTI; NTIS; INIS; GPO Dep.

Jet mixer pumps will be used in the Hanford Site double-shell tanks to mobilize and mix the settled solids layer (sludge) with the tank supernatant liquid. Predicting the performance of the jet mixer pumps has been the subject of analysis and testing at Hanford and other U.S. Department of Energy (DOE) waste sites. One important aspect of mixer pump performance is sludge mobilization. The research that correlates mixer pump design and operation with the extent of sludge mobilization is the subject of this report. Sludge mobilization tests have been conducted in tanks ranging from 1/25-scale (3 ft-diameter) to full scale have been conducted at Hanford and other DOE sites over the past 20 years. These tests are described in Sections 3.0 and 4.0 of this report. The computational modeling of sludge mobilization and mixing that has been performed at Hanford is discussed in Section 5.0.

686
(PNNL–11688)
Field performance of the waste retrieval end effectors in

the Oak Ridge gunite tanks. Mullen, O.D. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 29p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054587. Source: OSTI; NTIS; INIS; GPO Dep.

Waterjet-based tank waste retrieval end effectors have been developed by Retrieval Process Development and Enhancements through several generations of test articles targeted at deployment in Hanford underground storage tanks with a large robotic arm. The basic technology has demonstrated effectiveness for retrieval of simulants bounding a wide range of waste properties and compatibility with foreseen deployment systems. The Oak Ridge National Laboratory (ORNL) selected the waterjet scarifying end effector, the jet pump conveyance system, and the Modified Light Duty Utility Arm and Houdini Remotely Operated Vehicle deployment and manipulator systems for evaluation in the Gunite and Associated Tanks Treatability Study (GAAT-TS). The Retrieval Process Development and Enhancements (RPD&E) team was tasked with developing a version of the retrieval end effector tailored to the Oak Ridge tanks, waste, and deployment platforms. The conceptual design was done by the University of Missouri-Rolla in FY 1995-96. The university researchers conducted separate effects tests of the component concepts, scaled the basic design features, and constructed a full-scale test article incorporating their findings in early FY 1996. The test article was extensively evaluated in the Hanford Hydraulic Testbed and the design features were further refined. Detail design of the prototype item was started at Waterjet Technology, Inc. before the development testing was finished, and two of the three main subassemblies were substantially complete before final design of the waterjet manifold was determined from the Hanford hydraulic testbed (HTB) testing. The manifold on the first prototype was optimized for sludge retrieval; assembled with that manifold, the end effector is termed the Sludge Retrieval End Effector (SREE).

687
(PNNL–11691)
Self-Assembled Mercaptan on Mesoporous Silica (SAMMS) technology of mercury removal and stabilization. Feng, Xiangdong (and others); Liu, Jun; Fryxell, G.E. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 65p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050092. Source: OSTI; NTIS; INIS; GPO Dep.

This paper explains the technology developed to produce Self-Assembled Mercaptan on Mesoporous Silica (SAMMS) for mercury removal from aqueous wastewater and from organic wastes. The characteristics of SAMMS materials, including physical characteristics and mercury loading, and its application for mercury removal and stabilization are discussed. Binding kinetics and binding speciations are reported. Preliminary cost estimates are provided for producing SAMMS materials and for mercury removal from wastewater. The characteristics of SAMMS in mercury separation were studied at PNNL using simulated aqueous tank wastes and actual tritiated pump oil wastes from Savannah River Site; preliminary results are outlined. 47 refs., 16 figs., 16 tabs.

688
(PNNL–11693)
Estimating retained gas volumes in the Hanford tanks using waste level measurements. Whitney, P.D.; Chen, G.; Gauglitz, P.A.; Meyer, P.A.; Miller, N.E. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 79p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054574. Source: OSTI; NTIS; INIS; GPO Dep.

The Hanford site is home to 177 large, underground nuclear waste storage tanks. Safety and environmental concerns surround these tanks and their contents. One such concern is the propensity for the waste in these tanks to generate and trap flammable gases. This report focuses on understanding and improving the quality of retained gas volume estimates derived from tank waste level measurements. While direct measurements of gas volume are available for a small number of the Hanford tanks, the increasingly wide availability of tank waste level measurements provides an opportunity for less expensive (than direct gas volume measurement) assessment of gas hazard for the Hanford tanks. Retained gas in the tank waste is inferred from level measurements – either long-term increase in the tank waste level, or fluctuations in tank waste level with atmospheric pressure changes. This report concentrates on the latter phenomena. As atmospheric pressure increases, the pressure on the gas in the tank waste increases, resulting in a level decrease (as long as the tank waste is "soft" enough). Tanks with waste levels exhibiting fluctuations inversely correlated with atmospheric pressure fluctuations were catalogued in an earlier study. Additionally, models incorporating ideal-gas law behavior and waste material properties have been proposed. These models explicitly relate the retained gas volume in the tank with the magnitude of the waste level fluctuations, dL/dP. This report describes how these models compare with the tank waste level measurements.

689
(PNNL–11698)
Screening for organic solvents in Hanford waste tanks using organic vapor concentrations. Huckaby, J.L.; Sklarew, D.S. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 48p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054528. Source: OSTI; NTIS; INIS; GPO Dep.

The potential ignition of organic liquids stored in the Hanford Site high-level radioactive waste tanks has been identified as a safety issue because expanding gases could potentially affect tank dome integrity. Organic liquid waste has been found in some of the waste tanks, but most are thought to contain only trace amounts. Due to the inhomogeneity of the waste, direct sampling of the tank waste to locate organic liquids may not conclusively demonstrate that a given tank is free of risk. However, organic vapors present above the organic liquid waste can be detected with a high degree of confidence and can be used to identify problem tanks. This report presents the results of a screening test that has been applied to 82 passively ventilated high-level radioactive waste tanks at the Hanford Site to identify those that might contain a significant amount of organic liquid waste. It includes seven tanks not addressed in the previous version of this report, Screening for Organic Solvents in

Hanford Waste Tanks Using Total Non-Methane Organic Compound Vapor Concentrations. The screening test is based on a simple model of the tank headspace that estimates the effective surface area of semivolatile organic liquid waste in a tank. Analyses indicate that damage to the tank dome is credible only if the organic liquid burn rate is above a threshold value, and this can occur only if the surface area of organic liquid in a tank is above a corresponding threshold value of about one square meter. Thirteen tanks were identified as potentially containing at least that amount of semivolatile organic liquid based on conservative estimates. Most of the tanks identified as containing potentially significant quantities of organic liquid waste are in the 241-BY and 241-C tank farms, which agrees qualitatively with the fact that these tank farms received the majority of the PUREX process organic wash waste and waste organic liquids.

690
(PNNL–11702)
Chemical pathways for the formation of ammonia in Hanford wastes. Stock, L.M.; Pederson, L.R. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 38p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054536. Source: OSTI; NTIS; INIS; GPO Dep.

This report reviews chemical reactions leading to the formation of ammonia in Hanford wastes. The general features of the chemistry of the organic compounds in the Hanford wastes are briefly outlined. The radiolytic and thermal free radical reactions that are responsible for the initiation and propagation of the oxidative degradation reactions of the nitrogen-containing complexants, trisodium HEDTA and tetrasodium EDTA, are outlined. In addition, the roles played by three different ionic reaction pathways for the oxidation of the same compounds and their degradation products are described as a prelude to the discussion of the formation of ammonia. The reaction pathways postulated for its formation are based on tank observations, laboratory studies with simulated and actual wastes, and the review of the scientific literature. Ammonia derives from the reduction of nitrite ion (most important), from the conversion of organic nitrogen in the complexants and their degradation products, and from radiolytic reactions of nitrous oxide and nitrogen (least important). Reduction of nitrite ions is believed to be the most important source of ammonia. Whether by radiolytic or thermal routes, nitrite reduction reactions proceed through nitrogen dioxide, nitric oxide, the nitrosyl anion, and the hyponitrite anion. Nitrite ion is also converted into hydroxylamine, another important intermediate on the pathway to form ammonia. These reaction pathways additionally result in the formation of nitrous oxide and molecular nitrogen, whereas hydrogen formation is produced in a separate reaction sequence.

691
(PNNL–11711)
Performance evaluation of 24 ion exchange materials for removing cesium and strontium from actual and simulated N-Reactor storage basin water. Brown, G.N.; Carson, K.J.; DesChane, J.R.; Elovich, R.J. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 58p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054510. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the evaluation of 24 organic and inorganic ion exchange materials for removing cesium and strontium from actual and simulated waters from the 100 Area 105 N-Reactor fuel storage basin. The data described in this report can be applied for developing and evaluating ion exchange pre-treatment process flowsheets. Cesium and strontium batch distribution ratios (K_d's), decontamination factors (DF), and material loadings (mmol g^{-1}) are compared as a function of ion exchange material and initial cesium concentration. The actual and simulated N-Basin waters contain relatively low levels of aluminum, barium, calcium, potassium, and magnesium (ranging from 8.33E-04 to 6.40E-05 M), with slightly higher levels of boron (6.63E-03 M) and sodium (1.62E-03 M). The ^{137}Cs level is 1.74E-06 Ci L^{-1} which corresponds to approximately 4.87E-10 M Cs. The initial Na/Cs ratio was 3.33E+06. The concentration of total strontium is 4.45E-06 M, while the ^{90}Sr radioactive component was measured to be 6.13E-06 Ci L^{-1}. Simulant tests were conducted by contacting 0.067 g or each ion exchange material with approximately 100 mL of either the actual or simulated N-Basin water. The simulants contained variable initial cesium concentrations ranging from 1.00E-04 to 2.57E- 10 M Cs while all other components were held constant. For all materials, the average cesium K_d was independent of cesium concentration below approximately 1.0E-06 M. Above this level, the average cesium K_d values decreased significantly. Cesium K_d values exceeding 1.0E+07 mL g^{-1} were measured in the simulated N-Basin water. However, when measured in the actual N-Basin water the values were several orders of magnitude lower, with a maximum of 1.24E+05 mL g^{-1} observed.

692
(PNNL–11718)
Decision analysis for mobilizing and retrieving sludge from double-shell tanks. Brothers, A.J. (and others); Williams, N.C.; Dukelow, J.S.; Hansen, R.I. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 148p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050515. Source: OSTI; NTIS; INIS; GPO Dep.

This decision analysis evaluates alternative technologies for the initial mobilization and retrieval of sludges in double-shell tanks (DSTs). The analysis is from the perspective of the need to move sludges from one DST to another for interim retrieval. It supports the more general decision of which technologies to use to retreive various types of DST waste. The initial analysis is from the perspective of a typical DST with 2 ft of sludge to mobilize. During the course of the analysis, it became clear that it was important to also consider sludge mobilization in support of the high-level waste (HLW) vitrification demonstration plant, and in particular the risks associated with failing to meeting the minimum order requirements for the vendor, as well as the cost of mobilization and retrieval from the HLW vitrification source tanks.

693
(PNNL–11725)
Industrial mixing techniques for Hanford double-shell tanks. Daymo, E.A. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 46p. Sponsored by USDOE Office of Environmental Restoration and Waste Management,

Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054527. Source: OSTI; NTIS; INIS; GPO Dep.

Jet mixer pumps are currently the baseline technology for sludge mobilization and mixing in one-million gallon double-shell tanks at the Hanford and Savannah River Sites. Improvements to the baseline jet mixer pump technology are sought because jet mixer pumps have moving parts that may fail or require maintenance. Moreover, jet mixers are relatively expensive, they heat the waste, and, in some cases, may not mobilize enough of the sludge. This report documents a thorough literature search for commercially available applicable mixing technologies that could be used for double-shell tank sludge mobilization and mixing. Textbooks, research articles, conference proceedings, mixing experts, and the Thomas Register were consulted to identify applicable technologies. While there are many commercial methods that could be used to mobilize sludge or mix the contents of a one-million gallon tank, few will work given the geometrical constraints (e.g., the mixer must fit through a 1.07-m-diameter riser) or the tank waste properties (e.g., the sludge has such a high yield stress that it generally does not flow under its own weight). Pulsed fluid jets and submersible Flygt mixers have already been identified at Hanford and Savannah River Sites for double-shell tank mixing applications. While these mixing technologies may not be applicable for double-shell tanks that have a thick sludge layer at the bottom (since too many of these mixers would need to be installed to mobilize most of the sludge), they may have applications in tanks that do not have a settled solids layer. Retrieval projects at Hanford and other U.S. Department of Energy sites are currently evaluating the effectiveness of these mixing techniques for tank waste applications. The literature search did not reveal any previously unknown technologies that should be considered for sludge mobilization and mixing in one-million gallon double-shell tanks.

694
(PNNL–11735)
Interim report: Study of benzene release from Savannah River in-tank precipitation process slurry simulant. Rappe, K.G.; Gauglitz, P.A. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 34p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050512. Source: OSTI; NTIS; INIS; GPO Dep.

At the Savannah River Site, the in-tank precipitation (ITP) process uses sodium tetraphenylborate (NaTPB) to precipitate radioactive cesium from alkaline wastes. During this process, potassium is also precipitated to form a 4-wt% KTPB/CsTPB slurry. Residual NaTPB decomposes to form benzene, which is retained by the waste slurry. The retained benzene is also readily released from the waste during subsequent waste processing. While the release of benzene certainly poses both flammability and toxicological safety concerns, the magnitude of the hazard depends on the rate of release. Currently, the mechanisms controlling the benzene release rates are not well understood, and predictive models for estimating benzene release rates are not available. The overall purpose of this study is to obtain quantitative measurements of benzene release rates from a series of ITP slurry stimulants. This information will become a basis for developing a quantitative mechanistic model of benzene release rates. The transient benzene release rate was measured from the surface of various ITP slurry (solution) samples mixed with benzene. The benzene release rate was determined by continuously purging the headspace of a sealed sample vessel with an inert gas (nitrogen) and analyzing that purged headspace vapor for benzene every 3 minutes. The following 75-mL samples were measured for release rates: KTPB slurry with 15,000 ppm freshly added benzene that was gently mixed with the slurry, KTPB slurry homogenized (energetically mixed) with 15,000 ppm and 5,000 ppm benzene, clear and filtered KTPB salt solution saturated with benzene (with and without a pure benzene layer on top of the solution), and a slurry sample from a large demonstration experiment (DEMO slurry) containing-benzene generated in situ.

695
(PNNL–11736)
Engineering development of a lightweight high-pressure scarifier for tank waste retrieval. Hatchell, B.K. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 59p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050510. Source: OSTI; NTIS; INIS; GPO Dep.

The Retrieval Process Development and Enhancements Program (RPD&E) is sponsored by the U.S. Department of Energy Tanks Focus Area to investigate existing and emerging retrieval processes suitable for the retrieval of high-level radioactive waste inside underground storage tanks. This program, represented by industry, national laboratories, and academia, seeks to provide a technical and cost basis to support site-remediation decisions. Part of this program has involved the development of a high-pressure waterjet dislodging system and pneumatic conveyance integrated as a scarifier. Industry has used high-pressure waterjet technology for many years to mine, cut, clean, and scarify materials with a broad range of properties. The scarifier was developed as an alternate means of retrieving waste inside Hanford single-shell tanks, particularly hard, stubborn waste. Testing of the scarifier has verified its ability to retrieve a wide range of tank waste ranging from extremely hard waste that is resistant to other dislodging means to soft sludge and even supernatant fluid. Since the scarifier expends water at a low rate and recovers most of the water as it is used, the scarifier is well suited for retrieval of tanks that leak and cannot be safely sluiced or applications where significant waste dilution is not acceptable. Although the original scarifier was effective, it became evident that a lighter, more compact version that would be compatible with light weight deployment systems under development, such as the Light Duty Utility Arm, was needed. At the end of FY 95, the Light Weight Scarifier (LWS) was designed to incorporate the features of the original scarifier in a smaller, lighter end effector. During FY 96, the detailed design of the LWS was completed and two prototypes were fabricated.

696
(PNNL–11737)
Evaluation of scaling correlations for mobilization of double-shell tank waste. Shekarriz, A.; Hammad, K.J.; Powell, M.R. Pacific Northwest Lab., Richland, WA (United States). Sep 1997. 78p. Sponsored by USDOE Office of Environmental Restoration and Waste Management,

Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE98050085. Source: OSTI; NTIS; INIS; GPO Dep.

In this report, we have examined some of the fundamental mechanisms expected to be at work during mobilization of the waste within the double-shell tanks at Hanford. The motivation stems from the idea that in order to properly apply correlations derived from scaled tests, one would have to ensure that appropriate scaling laws are utilized. Further, in the process of delineating the controlling mechanisms during mobilization, the currently used computational codes are being validated and strengthened based on these findings. Experiments were performed at 1/50-scale, different from what had been performed in the previous fiscal years (i.e., 1/12- and 1/25-scale). It was anticipated that if the current empirical correlations are to work, they should be scale invariant. The current results showed that linear scaling between the 1/25-scale and 1/50-scale correlations do not work well. Several mechanisms were examined in the scaled tests which might have contributed to the discrepancies between the results at these two scales. No deficiencies in the experimental approach and the data were found. Cognizant of these results, it was concluded that the use of the current empirical correlations for ECR should be done cautiously taking into account the appropriate properties of the material for yielding.

697
(WSRC-MS–97-0363)
In-tank precipitation with tetraphenylborate: recent process and research results. Walker, D.D.; Barnes, M.J.; Crawford, C.L.; Peterson, R.A.; Swingle, R.F.; Fink, S.D. Westinghouse Savannah River Co., Aiken, SC (United States). Sep 1997. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. (CONF-970962–: 214. American Chemical Society meeting, Las Vegas, NV (United States), 7-13 Sep 1997). Order Number DE98050011. Source: OSTI; NTIS; INIS; GPO Dep.

At the Savannah River Site, the In-Tank Precipitation process uses sodium tetraphenylborate to decontaminate soluble waste by precipitating cesium-137.

698
(WSRC-RP–97-75)
F/H area high level waste tank status report. Hayes, C.R. Jr.; Wells, M.N. Westinghouse Savannah River Co., Aiken, SC (United States). Mar 1997. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98051773. Source: OSTI; NTIS; INIS; GPO Dep.

Section IX.E.3 of the SRS Federal Facility Agreement requires the DOE to submit to EPA and SCDHEC, an annual report on the status of tanks being removed from service. Tanks that are slated for removal from service either do not meet secondary containment standards or have leak sites. The attached document is intended to meet this annual report requirement. An updated status of relevant portions of the Waste Removal Plan and Schedule is also included.

699
(WSRC-TR–96-0371)
Americium/curium extraction from a lanthanide borosilciate glass. Rudisill, T.S.; Pareizs, J.M.; Ramsey, W.G. Westinghouse Savannah River Co., Aiken, SC (United States). 1996. 8p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-961202–12: 1996 Fall meeting of the Materials Research Society (MRS), Boston, MA (United States), 2-6 Dec 1996). Order Number DE97060057. Source: OSTI; NTIS; INIS; GPO Dep.

A solution containing kilogram quantities of highly radioactive isotopes of americium and curium (Am/Cm) and lanthanide fission products is currently stored in a process tank at the Department of Energy's Savannah River Site (SRS). This tank and its vital support systems are old, subject to deterioration, and prone to possible leakage. For this reason, a program has been initiated to immobilize this material as a lanthanide borosilicate glass for safe long-term storage. The Am/Cm has commercial value and is desired for use by the heavy isotope programs at the Oak Ridge National Laboratory (ORNL). Therefore, a flowsheet was demonstrated using a curium-containing glass to extract these elements from the glass matrix. The method involved grinding the glass to less than 200 mesh and dissolving in concentrated nitric acid at 110°C. Under these conditions, the dissolution was essentially 100% after 2 hours except for silicon which remained mostly insoluble. Since the actual process conditions at ORNL could not be exactly simulated, the dissolution rate of a surrogate glass was measured using static and agitated conditions to bracket the expected rate. The measured rates, 0.040 to 0.0082 grams/hour-centimeter, were constant which allowed development of a predictive model for the time required to dissolve a glass particle of spherical geometry in terms of the glass density, particle size, and experimentally measured rate. The calculated time required to dissolve an idealized curium glass particle was in agreement with the experimental observation that dissolution was complete in less than 2 hours.

700
(WSRC-TR–97-0101)
Sludge displacement verification for reducing grout report. Caldwell, T.B.; Langton, C.A. Westinghouse Savannah River Co., Aiken, SC (United States). 10 Apr 1997. 39p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98051499. Source: OSTI; NTIS; INIS; GPO Dep.

Document contains SRT-WPT–97-0166 and HLW-HLE–97-0077-Rev.1.

To support the closure of HLW tanks at SRS, a reducing grout was developed that is formulated to reduce the mobility of radionuclides left in each tank. During non-radioactive flow tests of the grout, it was discovered that, in addition to its desired properties, the grout has the ability to move residual waste a considerable distance across the tank floor.

701
(WSRC-TR–97-0102)
Tank closure reducing grout. Caldwell, T.B. Westinghouse Savannah River Co., Aiken, SC (United States). 18 Apr 1997. 236p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC

(United States). DOE Contract AC09-96SR18500. Order Number DE98051500. Source: OSTI; NTIS; INIS; GPO Dep.

A reducing grout has been developed for closing high level waste tanks at the Savannah River Site in Aiken, South Carolina. The grout has a low redox potential, which minimizes the mobility of Sr^{90}, the radionuclide with the highest dose potential after closure. The grout also has a high pH which reduces the solubility of the plutonium isotopes. The grout has a high compressive strength and low permeability, which enhances its ability to limit the migration of contaminants after closure. The grout was designed and tested by Construction Technology Laboratories, Inc. Placement methods were developed by the Savannah River Site personnel.

PLUTONIUM

Refer also to citation(s) 3, 186, 187

702
(ANL/TD/CP–92456)
Integrated monitoring and surveillance system demonstration project. Aumeier, S.E. (Argonne National Lab., Idaho Falls, ID (United States)); Walters, G.; Kotter, D.; Walrath, W.M.; Zamecnik, R.J. Argonne National Lab., IL (United States). Jul 1997. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31-109-ENG-38. (CONF-970744–: 38. annual meeting of the Institute of Nuclear Materials management, Phoenix, AZ (United States), 20-24 Jul 1997). Order Number DE97053747. Source: OSTI; NTIS; INIS; GPO Dep.

We present a summary of efforts associated with the installation of an integrated system for the surveillance and monitoring of stabilized plutonium metals and oxides in long-term storage. The product of this effort will include a Pu storage requirements document, baseline integrated monitoring and surveillance system (IMSS) prototype and test bed that will be installed in the Fuel Manufacturing Facility (FMF) nuclear material vault at Argonne National Laboratory - West (ANL-W), and a Pu tracking database including data analysis capabilities. The prototype will be based on a minimal set of vault and package monitoring requirements as derived from applicable DOE documentation and guidelines, detailed in the requirements document, including DOE-STD-3013-96. The use of standardized requirements will aid individual sites in the selection of sensors that best suit their needs while the prototype IMSS, located at ANL-W, will be used as a test bed to compare and contrast sensor performance against a baseline integrated system (the IMSS), demonstrate system capabilities, evaluate potential technology gaps, and test new hardware and software designs using various storage configurations. With efforts currently underway to repackage and store a substantial quantity of plutonium and plutonium-bearing material within the DOE complex, this is an opportune time to undertake such a project. 4 refs.

703
(DOE/EM–0337)
Plutonium focus area. Technology summary. USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Sep 1997. 45p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE98000900. Source: OSTI; NTIS; INIS; GPO Dep.

The Assistant Secretary for the Office of Environmental Management (EM) at the U.S. Department of Energy (DOE) chartered the Plutonium Focus Area (PFA) in October 1995. The PFA "...provides for peer and technical reviews of research and development in plutonium stabilization activities..." In addition, the PFA identifies and develops relevant research and technology. The purpose of this document is to focus attention on the requirements used to develop research and technology for stabilization, storage, and preparation for disposition of nuclear materials. The PFA Technology Summary presents the approach the PFA uses to identify, recommend, and review research. It lists research requirements, research being conducted, and gaps where research is needed. It also summarizes research performed by the PFA in the traditional research summary format. This document encourages researchers and commercial enterprises to do business with PFA by submitting research proposals or "white papers." In addition, it suggests ways to increase the likelihood that PFA will recommend proposed research to the Nuclear Materials Stabilization Task Group (NMSTG) of DOE.

704
(LA–13309-SR)
94-1 Research and development project lead laboratory support. Status report, January 1–March 31, 1997. Rink, N.A. (comp.). Los Alamos National Lab., NM (United States). Aug 1997. 67p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE98000032. Source: OSTI; NTIS; INIS; GPO Dep.

This status report is published for Los Alamos National Laboratory 94-1 Research and Development Project Support. The Department of Energy Office of Environmental Management funds these projects in order to support the storage or disposal of legacy plutonium and plutonium-bearing materials that resulted from weapons production throughout the DOE complex. This report summarizes status and technical progress for Los Alamos 94-1 projects during the second quarter of fiscal year 1997.

DEACTIVATION & DECOMMISSIONING

Refer also to citation(s) 13

705
(ANL–97/5)
Surveillance of Site A and Plot M. Report for 1996. Golchert, N.W. Argonne National Lab., IL (United States). May 1997. 100p. Sponsored by USDOE Assistant Secretary for Nuclear Energy, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97006289. Source: OSTI; NTIS; INIS; GPO Dep.

The results of the environmental surveillance program conducted at Site A/Plot M in the Palos Forest Preserve area for 1996 are presented. The surveillance program is the ongoing remedial action that resulted from the 1976-1978 radiological characterization of the site. That study determined that very low levels of hydrogen-3 (as tritiated

water) had migrated from the burial ground and were present in two nearby hand-pumped picnic wells. The current program consists of sample collection and analysis of air, surface and subsurface water, and bottom sediment. The results of the analyses are used to (1) monitor the migration pathway of water from the burial ground (Plot M) to the hand-pumped picnic wells, (2) establish if buried radionuclides other than hydrogen-3 have migrated, and (3) generally characterize the radiological environment of the area. Hydrogen-3 in the Red Gate Woods picnic wells was still detected this year, but the average and maximum concentrations were significantly less than found earlier. Tritiated water continues to be detected in a number of wells, boreholes, dolomite holes, and a surface stream. For many years it was the only radionuclide found to have migrated in measurable quantities. Analyses since 1984 have indicated the presence of low levels of strontium-90 in water from a number of boreholes next to Plot M. The available data does not allow a firm conclusion as to whether the presence of this nuclide represents recent migration or movement that may have occurred before Plot M was capped. The results of the surveillance program continue to indicate that the radioactivity remaining at Site A/Plot M does not endanger the health or safety of the public visiting the site, using the picnic area, or living in the vicinity.

706
(ANL–97/19)
A survey of decontamination processes applicable to DOE nuclear facilities. Chen, L.; Chamberlain, D.B.; Conner, C.; Vandegrift, G.F. Argonne National Lab., IL (United States). May 1997. 91p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31-109-ENG-38. Order Number DE98002712. Source: OSTI; NTIS; INIS; GPO Dep.

The objective of this survey was to select an appropriate technology for in situ decontamination of equipment interiors as part of the decommissioning of U.S. Department of Energy nuclear facilities. This selection depends on knowledge of existing chemical decontamination methods. This report provides an up-to-date review of chemical decontamination methods. According to available information, aqueous systems are probably the most universally used method for decontaminating and cleaning metal surfaces. We have subdivided the technologies, on the basis of the types of chemical solvents, into acid, alkaline permanganate, highly oxidizing, peroxide, and miscellaneous systems. Two miscellaneous chemical decontamination methods (electrochemical processes and foam and gel systems) are also described. A concise technical description of various processes is given, and the report also outlines technical considerations in the choice of technologies, including decontamination effectiveness, waste handing, fields of application, and the advantages and limitations in application. On the basis of this survey, six processes were identified for further evaluation. 144 refs., 2 tabs.

707
(ANL/D-D/TM–96/4)
Decontamination and decommissioning of the Experimental Boiling Water Reactor (EBWR): Project final report, Argonne National Laboratory. Fellhauer, C.R. (Argonne National Lab., IL (United States)); Boing, L.E.; Aldana, J. Argonne National Lab., IL (United States). Mar 1997. 122p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97007391. Source: OSTI; NTIS; INIS; GPO Dep.

The Final Report for the Decontamination and Decommissioning (D&D) of the Argonne National Laboratory - East (ANL-E) Experimental Boiling Water Reactor (EBWR) facility contains the descriptions and evaluations of the activities and the results of the EBWR D&D project. It provides the following information: (1) An overall description of the ANL-E site and EBWR facility. (2) The history of the EBWR facility. (3) A description of the D&D activities conducted during the EBWR project. (4) A summary of the final status of the facility, including the final and confirmation surveys. (5) A summary of the final cost, schedule, and personnel exposure associated with the project, including a summary of the total waste generated. This project report covers the entire EBWR D&D project, from the initiation of Phase I activities to final project closeout. After the confirmation survey, the EBWR facility was released as a "Radiologically Controlled Area," noting residual elevated activity remains in inaccessible areas. However, exposure levels in accessible areas are at background levels. Personnel working in accessible areas do not need Radiation Work Permits, radiation monitors, or other radiological controls. Planned use for the containment structure is as an interim transuranic waste storage facility (after conversion).

708
(ANL/D&D/TM–96/5)
Fiscal year 1996 decontamination and decommissioning activities photobriefing book for the Argonne National Laboratory-East Site, Technology Development Division, Waste Management Program, Decontamination and Decommissioning Projects Department. Argonne National Lab., IL (United States). [1996]. 65p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000446. Source: OSTI; NTIS; INIS; GPO Dep.

The Photobriefing Book describes the Decontamination and Decommissioning (D and D) Program at the Argonne National Laboratory-East Site (ANL-E) near Lemont, Illinois. This book summarizes current D and D projects, reviews fiscal year (FY) 1996 accomplishments, and outlines FY 1997 goals. A section on D and D Technology Development provides insight on new technologies for D and D developed or demonstrated at ANL-E. Past projects are recapped and upcoming projects are described as Argonne works to accomplish its commitment to, "Close the Circle on the Splitting of the Atom." Finally, a comprehensive review of the status and goals of the D and D Program is provided to give a snap-shot view of the program and the direction it's taking as it moves into FY 1997. The D and D projects completed to date include: Plutonium Fuel Fabrication Facility; East Area Surplus Facilities; Experimental Boiling Water Reactor; M-Wing Hot Cell Facilities; Plutonium Gloveboxes; and Fast Neutron Generator.

709
(ANL/DIS/CP–87709)
Unit decontamination and dismantlement (D&D) costs. Folga, S. (Argonne National Lab., IL (United States)); Swanston, R.; Davis, M.; Janke, R.J. Argonne National Lab., IL (United States). 1996. 10p. Sponsored by USDOE,

Washington, DC (United States). DOE Contract W-31-109-ENG-38. (CONF-960212–16: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96006904. Source: OSTI; NTIS; INIS; GPO Dep.

A series of relationships have been developed for estimating unit decontamination and dismantlement (D&D) costs for a number of building types which may be applied in the absence of other data to obtain rough order-of-magnitude (ROM) cost estimates for D&D activities. The relationships were developed using unit D&D costs for a number of building structure types at the Department of Energy Fernald site. These unit costs into account the level of radioactive contamination as well as the, building size.

710
(ANL/EA/CP–88311)
Estimating D and D costs for structures at DOE facilities: Some considerations. Davis, M.J. (Argonne National Lab., IL (United States)); Folga, S.; Swanston, R.; Janke, R.J. Argonne National Lab., IL (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960443–7: American Nuclear Society (ANS) topical meeting on decontamination and decommissioning, Chicago, IL (United States), 14-17 Apr 1996). Order Number DE96008445. Source: OSTI; NTIS; INIS; GPO Dep.

A number of issues are examined related to estimating decontamination and decommissioning costs for structures at US Department of Energy facilities. The ability to develop detailed estimates for such facilities is generally well established and the general range of costs for such activity is well understood. However, current ability to quickly develop credible planning estimates is more limited. A need exists for a continuing synthesis of experience to allow for an improved ability to develop both detailed and planning estimates.

711
(ANL/EMO/CP–90483)
Minimizing waste in environmental restoration. Moos, L.; Thuot, J.R. Argonne National Lab., IL (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960741–11: Pollution prevention conference, Chicago, IL (United States), 9-11 Jul 1996). Order Number DE96012757. Source: OSTI; NTIS; INIS; GPO Dep.

Environmental restoration, decontamination and decommissioning and facility dismantelment projects are not typically known for their waste minimization and pollution prevention efforts. Typical projects are driven by schedules and milestones with little attention given to cost or waste minimization. Conventional wisdom in these projects is that the waste already exists and cannot be reduced or minimized. In fact, however, there are three significant areas where waste and cost can be reduced. Waste reduction can occur in three ways: beneficial reuse or recycling; segregation of waste types; and reducing generation of secondary waste. This paper will discuss several examples of reuse, recycle, segregation, and secondary waste reduction at ANL restoration programs.

712
(ANL/TD/CP–88550)
Aerosol measurements from plasma torch cuts on stainless steel, carbon steel, and aluminum. Novick, V.J.; Brodrick, C.J.; Crawford, S.; Nasiatka, J.; Pierucci, K.; Reyes, V.; Sambrook, J.; Wrobel, S.; Yeary, J. Argonne National Lab., IL (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31-109-ENG-38. (CONF-960443–1: American Nuclear Society (ANS) topical meeting on decontamination and decommissioning, Chicago, IL (United States), 14-17 Apr 1996). Order Number DE96004296. Source: OSTI; NTIS; INIS; GPO Dep.

The main purpose of this project is to quantify aerosol particle size and generation rates produced by a plasma torch whencutting stainless steel, carbon steel and aluminum. the plasma torch is a common cutting tool used in the dismantling of nuclear facilities. Eventually, other cutting tools will be characterized and the information will be compiled in a user guide to aid in theplanning of both D&D and other cutting operations. The data will be taken from controlled laboratory experiments on uncontaminated metals and field samples taken during D&D operations at ANL nuclear facilities. The plasma torch data was collected from laboratory cutting tests conducted inside of a closed, filtered chamber. The particle size distributions were determined by isokinetically sampling the exhaust duct using a cascade impactor. Cuts on different thicknesses showed there was no observable dependence of the aerosol quantity produced as a function of material thickness for carbon steel. However, data for both stainless steel and aluminum revealed that the aerosol mass produced for these materials appear to have some dependance on thickness, with thinner materials producing tmore aerosols. The results of the laboratory cutting tests show that most measured particle size distributions are bimodal with one mode at about 0.2 μm and the other at about 10 μm. The average Mass Median Aerodynamic Diameters (MMAD's) for these tests are 0.36 $\pm$0.08 μm for stainless steel, 0.48 $\pm$0.17μm for aluminum and 0.52$\pm$0.12 μm for carbon steel.

713
(ANL/TD/CP–89321)
The D&D of the Experimental Boiling Water Reactor (EBWR). Fellhauer, C.R.; Boling, L.E.; Yule, T.J.; Bhattacharyya, S.K. Argonne National Lab., IL (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960306–8: ICONE 4: ASME/JSME international conference on nuclear engineering, New Orleans, LA (United States), 10-13 Mar 1996). Order Number DE96007055. Source: OSTI; NTIS; INIS; GPO Dep.

Argonne National Laboratory has completed the D&D of the Experimental Boiling Water Reactor. The Project consisted of decontaminating and for packaging as radioactive waste the reactor vessel and internals, contaminated piping systems, miscellaneous tanks, pumps, and associated equipment. The D&D work involved dismantling process equipment and associated plumbing, ductwork drain lines, etc., performing size reduction of reactor vessel internals in the fuel pool, packaging and manifesting all radioactive and mixed waste, and performing a thorough survey of the facility after the removal of activated and contaminated material. Non-radioactive waste was disposed of in the ANL-E landfill or recycled. In January 1996 the EBWR facility was formally decommissioned and transferred from EM-40 to EM-30. This paper will discuss the details of this ten year effort.

714
(ANL/TD/CP–89380)
Waste minimization and pollution prevention in D&D operations at the Argonne National Laboratory-East site. Boing, L.E.; Coffey, M.J.; Ditch, R.W.; Fellhauer, C.R.; Rose, R.W. Argonne National Lab., IL (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960741–6: Pollution prevention conference, Chicago, IL (United States), 9-11 Jul 1996). Order Number DE96012690. Source: OSTI; NTIS; INIS; GPO Dep.

Argonne National Laboratory (ANL) is implementing waste minimization and pollution prevention activities into its conduct of decontamination and decommissioning (D&D) projects. Many of these activities are rather straight forward and simple approaches, yet they are often overlooked and not implemented as often as they should or could be. Specific activities involving recycling and reuse of materials and structures, which have proven useful in lowering decommissioning and disposal costs on D&D projects at ANL are presented.

715
(ANL/TD/CP–92635)
Decontamination and decommissioning of the JANUS reactor at the Argonne National Laboratory-East site. Fellhauer, C.R. (Argonne National Lab., IL (United States)); Garlock, G.A. Argonne National Lab., IL (United States). May 1997. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970952–: Decontamination, decommissioning and reutilization of commercial and government facilities, Knoxville, TN (United States), 7-12 Sep 1997). Order Number DE97053259. Source: OSTI; NTIS; INIS; GPO Dep.

Argonne National Laboratory has begun the decontamination and decommissioning (D&D) of the JANUS Reactor Facility. The project is managed by the Technology Development Division's D&D Program personnel. D&D procedures are performed by sub-contractor personnel. Specific activities involving the removal, size reduction, and packaging of radioactive components and facilities are discussed.

716
(ANL/TD/CP–92636)
Deploying innovative technologies to improve DOE D&D project baselines. Rose, R.W. Argonne National Lab., IL (United States). May 1997. 7p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970952–10: Decontamination, decommissioning and reutilization of commercial and government facilities, Knoxville, TN (United States), 7-12 Sep 1997). Order Number DE97053257. Source: OSTI; NTIS; INIS; GPO Dep.

The insertion of innovative technologies to replace baseline technologies used in cost estimation and planning of DOE D&D projects is considered a high risk endeavor by project and programmatic decision makers. It is almost always considered safer to go with the "devil you know" than use a new or untried technology, methodology or system. The decision on the specific technology to be utilized to remediate a problem is often made months or years in advance of execution, and the highly proscriptive documentation of agreements necessary to obtain stakeholder and regulator approval of remedial plans is often counterproductive to considering improved technologies.

717
(ANL/TD/VU–91602)
Status of decommissioning activities at the Fernald Environmental Management Project (FEMP) site. Argonne National Lab., IL (United States). [1996]. 56p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9611122–Summ.Vugraphs: Fernald Environmental Management Project (FEMP) advisory group meeting, Madrid (Spain), 4-8 Nov 1996). Order Number DE97000972. Source: OSTI; NTIS; INIS; GPO Dep.

The Fernald Environmental Management Project (FEMP) was formally closed and the mission of the facility was officially redirected toward environmental restoration in August 1991. Many of the production facilities and equipment still contained quantities of raw, intermediate, and *finished* production-related materials. The safe Shutdown program was initiated to remove and properly disposition all nuclear product and in process residue materials, supplies, chemicals, and associated process equipment that was abandoned in place when FEMP stopped production in 1989. As part of the remedial design of the interim remedial action, a schedule for building dismantlement was submitted in June 1995. A 31-year schedule was developed, based on anticipation of reduced funding levels. However, recent cleanup successes at Fernald led to DOE endorsement of greater funding for the final cleanup, accelerating the schedule for Operable Unit 3 dismantlement, reducing the schedule to ten years. Under the accelerated schedule, several plants will be dismantled, starting in 1996.

718
(BHI–00767)
Isolation plan for the southern end of the 313 Metal Fabrication Building. Smith, D.S. Bechtel Hanford, Inc., Richland, WA (United States). Feb 1997. 105p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97053217. Source: OSTI; NTIS; INIS; GPO Dep.

The 313 Metal Fabrication Building was originally constructed as part of the Manhattan Project and underwent major remodeling and expansion in 1954. The building is divided into two sections that were separated by a fire wall. The first characterization of the 313(S) Building was conducted in 1995 to identify radiological, chemical, and other hazardous substances that may be encountered during the isolation activities. The intent of the isolation plan is to identify all known issues and reasonable solutions to these issues. Some issues will be solved during the building isolation activity, and other issues will remain unsolved until the actual demolition activity occurs.

719
(BHI–01003)
Final report for the 103-B Unirradiated Fuel Storage, 1701-BA Building Exclusion Area Badge House, and 1714-C Solvent Storage House. Snider, P.M. Bechtel Hanford, Inc., Richland, WA (United States). Apr 1997. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States).

DOE Contract AC06-93RL12367. Order Number DE97052821. Source: OSTI; NTIS; INIS; GPO Dep.

The 103-B Unirradiated Fuel Storage Building, 1701-BA Building Exclusion Area Badge House, and 1714-C Solvent Storage House were used as support facilities in performing the mission of irradiation of nuclear materials at the Hanford Reservation. The purpose of this project was the decontamination and demolition of these buildings and the effective disposition of the demolition debris.

720
(BHI–01005)
Final decommissioning report for the 183-C Filter Building/Pumproom facility. Marske, S.G. Bechtel Hanford, Inc., Richland, WA (United States). Apr 1997. 65p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97053218. Source: OSTI; NTIS; INIS; GPO Dep.

This report documents the decommissioning and demolition (D&D) of the 183-C Filter Building/Pumproom facility (located at the Hanford Site in Richland, Washington). The 183-C Facility D&D involved the performance of characterization to support the development of a project plan and final hazard classification.

721
(BHI–01007)
Final report for the 104-B-1 tritium vault and 104-B-2 tritium laboratory. Snider, P.M. Bechtel Hanford, Inc., Richland, WA (United States). 28 Apr 1997. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052822. Source: OSTI; NTIS; INIS; GPO Dep.

The 104-B-1 Tritium Vault and 104-B-2 Tritium Laboratory were used as support facilities in performing the mission of irradiation of nuclear materials at the Hanford Reservation. The purpose of this project was decontamination of the 104-B-2 Tritium Laboratory; demolition of both buildings; and effective disposition of the demolition debris.

722
(CONF-960804–6)
Methodology for development of treatment and disposal options for compressed gas cylinders contaminated with radionuclides. Conley, T.B. (Oak Ridge National Lab., TN (United States)); Czor, K.R.; Wright, W.T. Oak Ridge National Lab., TN (United States). 1996. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From SPECTRUM '96: international conference on nuclear and hazardous waste management; Seattle, WA (United States); 18-23 Aug 1996. Order Number DE96009625. Source: OSTI; NTIS; INIS; GPO Dep.

Compressed gas cylinders contaminated with radionuclides are a unique waste item that may become a Resource Conservation and Recovery Act (RCRA) hazardous waste through two mechanisms: either the contents of the compressed gas cylinder are regulated under RCRA or the internal pressure of the compressed gas cylinder gives it the characteristic of reactivity. The characteristic of reactivity is defined by RCRA in 40 Code of Federal Regulations (CFR) 261.23(a)(6) as a waste that is capable of detonation or explosive reaction if it is subjected to a strong initiating source or heated under confinement. In a letter dated September 1, 1989, the U.S. Environmental Protection Agency (EPA) Office of Solid Waste referred the interpretation of the definition of reactivity to the EPA Regional Office and/or the state (if the state has primacy). The Tennessee Department of Environment and Conservation (TDEC) has made the interpretation that to meet the definition of reactive as specified in 40 CFR 261.23(a)(6) there must be a chemical reaction that causes the explosion or detonation. This interpretation limits the compressed gas cylinders that have to be treated as RCRA hazardous waste to those that have other RCRA characteristic codes or contain listed wastes. The difficulty in treating compressed gas cylinders is heightened in the case of radiologically contaminated compressed gas cylinders because the internal pressure and possible hazardous constituents must be treated in most cases before decontamination of the cylinder is possible. Special procedures must be followed to ensure that radiological contamination is not transferred to clean gas cylinders or released into the environment.

723
(CONF-960804–13)
A concept of a nonfissile uranium hexafluoride overpack for storage, transport, and processing of corroded cylinders. Pope, R.B. (Oak Ridge National Lab., TN (United States)); Cash, J.M.; Singletary, B.H. Oak Ridge National Lab., TN (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From SPECTRUM '96: international conference on nuclear and hazardous waste management; Seattle, WA (United States); 18-23 Aug 1996. Order Number DE96009408. Source: OSTI; NTIS; INIS; GPO Dep.

There is a need to develop a means of safely transporting breached 48-in. cylinders containing depleted uranium hexafluoride (UF_6) from current storage locations to locations where the contents can be safely removed. There is also a need to provide a method of safely and easily transporting degraded cylinders that no longer meet the US Department of Transportation (DOT) and American National Standards Institute, Inc., (ANSI) requirements for shipments of depleted UF_6. A study has shown that an overpack can be designed and fabricated to satisfy these needs. The envisioned overpack will handle cylinder models 48G, 48X, and 48Y and will also comply with the ANSI N14.1 and the American Society of Mechanical Engineers (ASME) Sect. 8 requirements.

724
(DOE/EM–0305)
Uranium enrichment decontamination and decommissioning fund, 1995 report. USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). [1996]. 29p. Sponsored by USDOE, Washington, DC (United States). Order Number DE97000761. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes strategies for the decontamination and decommissioning of gaseous diffusion plants. Progress in remedial action activities are discussed.

725
(DOE/EW/40017–T6)
Apollo decommissioning project, Apollo, Pennsylvania. Final technical report. B and W Nuclear Environmental Services, Inc., Vandergrift, PA (United States). 30 Apr 1997. 39p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC

(United States). DOE Contract FG01-91EW40017. Order Number DE97007503. Source: OSTI; NTIS; INIS; GPO Dep.

In November, 1991 Babcock and Wilcox (B and W) received a grant to partially fund the decommissioning of the former Apollo Nuclear Fuel Facility. The decommissioning was performed in accordance with a Nuclear Regulatory Commission (NRC) approved decommissioning plan. This report summarizes the decommissioning of the Apollo Nuclear Fuel Facility and the radiological surveying of the site to demonstrate that these decommissioning activities were effective in reducing residual activity well below NRC's criteria for release for unrestricted use. The Apollo Nuclear Fuel Facility was utilized by the Nuclear Materials and Equipment Corporation (NUMEC) and B and W for nuclear research and production under Atomic Energy Commission and Department of Energy (DOE) contracts during 20 plus years of nuclear fuel manufacturing operations.

726
(DOE/MC/30162–97/C0804)
Electrokinetic decontamination of concrete. Lomasney, H.L.; SenGupta, A.K.; Yachmenev, V. Isotron Corp., New Orleans, LA (United States). [1996]. 18p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-93MC30162. (CONF-9610231–4: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052244. Source: OSTI; NTIS; INIS; GPO Dep.

ELECTROSORB Electrokinetic Extraction Technology, developed by ISOTRON Corp., offers a cost-effective approach to treating contaminated concrete. Heavy metals/ radionuclides trapped in concrete can be extracted using this process if they are chemically solubilized; solubilizers used are citric acid alone and a mixture of citric and nitric acids. A DC electric field is applied across the contaminated concrete to electrokinetically transport the solubilized contaminants from the concrete pores to a collector on the concrete surface. The collector is an extraction pad laid on the surface. The pad provides confinement for a planar electrode and solubilizer solution; it is operated under a vacuum to hold the pad against the concrete surface. Operation requires little attendance, reducing the workers' health hazards. The process incorporates a mechanism for recycling the solubilizer solution. A field demonstration of the process took place in Building 21 of DOE's Mound facility in Miamisburg, OH, over 12 days in June 1996. The thorium species present in this building's concrete floors included ThO_2 and thorium oxalate. The nitric acid was found to facilitate Th extraction.

727
(DOE/MC/30165–97/C0807)
The ROVCO2 surface decontamination system. Resnick, A.M. (Oceaneering Technologies, Upper Marlboro, MD (United States)); Reed, M.; Lopez-Yanes, O. Oceaneering Technologies, Upper Marlboro, MD (United States). [1996]. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-93MC30165. (CONF-9610231–7: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052247. Source: OSTI; NTIS; INIS; GPO Dep.

DOE needs to decontaminated over one million square feet of nuclear contaminated concrete surfaces. The 1000 lb ROVCO2 system, which automates blasting functions and eliminates secondary blasting waste, integrates a remotely operated vehicle and an enhanced commercial CO_2 blasting system with an Oceaneering-developed work arm and control system. The remote operation protects the operation from contamination and supports functional automation of tedious tasks. The blasting system shoots pellets of dry ice propelled by pressurized gas at the surface to be cleaned. Impact of the pellets fractures and scales off a layer of the contaminated surface. At impact, the pellets return to a gaseous state which is vacuumed up with the debris. The CO_2 gas and debris are passed through the vacuum filter, leaving only the removed material for waste disposal. Phase 2 testing achieved nearly all of the success criteria, with the exception of the commercial workhead's performance.

728
(DOE/MC/33207–97/C0802)
Rosie: remote work system for decontamination and dismantlement. Bares, L.C.; Conley, L.S.; Thompson, B.R. Redzone Robotics, Inc., Pittsburgh, PA (United States). [1996]. 13p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-96MC33207. (CONF-9610231–27: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052242. Source: OSTI; NTIS; INIS; GPO Dep.

The Rosie worksystem includes a locomotor, heavy manipulator,operator console, and control system for remote operations. The locomotor is a highly mobile platform with tether management and hydraulic power onboard. The heavy manipulator is a high-payload, long-reach boom used to deploy a wide variety of tools and/or sensors into the work area. Rosie's advanced control system, broad work capabibilites, and hardening/reliability for hazardous duty make it a new and unique capability that facilitates completion of significant cleanup projects throughout DOE and the private sector. Endurance testing of Rosie during last year has proven its capabilities and appropriateness for D&D applications. Design enhancements are being implemented to improve and add features necessary for deployment at an upcoming DOE facility decommissioning. A second Rosie unit is being fabricated fro use in the decommissioning of ANL's CP-5 reactor facility starting late 1996. This paper overviews the Rosie system, testing results, design enhancements, and plans for use of this technology at CP-5.

729
(DOE/RL–97-11)
Phase I feasibility study for the Canyon disposition initiative (221-U facility). Bechtel Hanford, Inc., Richland, WA (United States). Aug 1997. 210p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97054273. Source: OSTI; NTIS; INIS; GPO Dep.

The objective of the Phase I Feasibility Study (FS) presented in this document is to provide decision makers sufficient information on the remedial alternatives specific to the disposition of the 221-U Canyon Building (221-U Facility) located at the Hanford Site, and to determine which alternatives are viable for further detailed analysis.

730
(DOE/RL–97-20)
105-C Building characterization survey data report. Miller, R.L. USDOE Richland Operations Office, WA (United States). 25 Feb 1997. 493p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97052370. Source: OSTI; NTIS; INIS; GPO Dep.

This report is a compilation of the 105-C Facility Characterization Survey data collected during the period of July 1, 1994, through September 30, 1994. The scope of the report is limited to the characterization of the 105-C Facility and surrounding site. Conclusions and recommendations regarding courses of future action are beyond the scope of this report. The survey data in this report reflects the current conditions and status of the 105-C Building, and is intended to be used in support of future decontamination and decommissioning activities. The survey was organized and implemented to evaluate the four parameters relating to the current condition of the facility. These parameters concern the physical conditions of the 105-C Building from a personnel safety standpoint; the radiological status throughout the building; identification of the hazardous materials located in the building; and identification of subsurface obstacles left in the path of proposed excavations.

731
(GJO–97-15-FOS)
Final report of the radiological release survey of Building 11 at the Grand Junction Office Facility. Johnson, R.K.; Corle, S.G. USDOE Grand Junction Area Office, CO (United States). Sep 1997. 45p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87460. Order Number DE98000632. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE) Grand Junction Office (GJO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore concentrates and mill tailings during vanadium refining activities of the Manhattan Engineer District, and during sampling, assaying, pilot milling, storage, and brokerage activities conducted for the U.S. Atomic Energy Commission's domestic uranium procurement program. The DOE Defense Decontamination and Decommissioning Program established the GJO Remedial Action Project (GJORAP) to clean up and restore the facility lands, improvements, and underlying aquifer. WASTREN-Grand Junction is the site contractor for the facility and the remedial action contractor for GJORAP. Building 11 and the underlying soil were found not to be radiologically contaminated; therefore, the building can be released for unrestricted use. Placards have been placed at the building entrances indicating the completion of the radiological release survey and prohibiting the introduction of any radioactive materials within the building without written approvals from the GJO Facilities Operations Manager. This document was prepared in response to a DOE-GJO request for an individual final release report for each GJO building.

732
(GJO–97-16-FOS)
Final report of the radiological release survey of Building 19 at the Grand Junction Office Facility. Johnson, R.K.; Corle, S.G. USDOE Grand Junction Area Office, CO (United States). Sep 1997. 45p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87460. Order Number DE98000633. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE) Grand Junction Office (GJO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore concentrates and mill tailings during vanadium refining activities of the Manhattan Engineer District, and during sampling, assaying, pilot milling, storage, and brokerage activities conducted for the U.S. Atomic Energy Commission's domestic uranium procurement program. The DOE Defense Decontamination and Decommissioning Program established the GJO Remedial Action Project (GJORAP) to clean up and restore the facility lands, improvements, and underlying aquifer. WASTREN-Grand Junction is the site contractor for the facility and the remedial action contractor for GJORAP. Building 19 and the underlying soil were found not to be radiologically contaminated; therefore, the building can be released for unrestricted use. Placards have been placed at the building entrances indicating the completion of the radiological release survey and prohibiting the introduction of any radioactive materials within the building without written approvals from the GJO Facilities Operations Manager. This document was prepared in response to a DOE-GJO request for an individual final release report for each GJO building.

733
(GJO–97-17-FOS)
Final report of the radiological release survey of Building 29 at the Grand Junction Office Facility. Johnson, R.K.; Corle, S.G. USDOE Grand Junction Area Office, CO (United States). Sep 1997. 45p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87460. Order Number DE98000634. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE) Grand Junction Office (GJO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore concentrates and mill tailing during vanadium refining activities of the Manhattan Engineer District, and during sampling, assaying, pilot milling, storage, and brokerage activities conducted for the U.S. Atomic Energy Commission's domestic uranium procurement program. The DOE Defense Decontamination and Decommissioning Program established the GJO Remedial Action Project (GJORAP) to clean up and restore the facility lands, improvements, and underlying aquifer. WASTREN-Grand Junction is the site contractor for the facility and the remedial action contractor for GJORAP. Building 29 and the underlying soil were found not to be radiologically contaminated; therefore, the building can be released for unrestricted use. Placards have been placed at the building entrances indicating the completion of the radiological release survey and prohibiting the introduction of any radioactive materials within the building without written approvals from the GJO Facilities Operations Manager. This document was prepared in response to a DOE-GJO request for an individual final release report for each GJO building.

734
(GJO–97-19-FOS)
Final report of the radiological release survey of Building 54 at the Grand Junction Office Facility. Johnson, R.K.; Corle, S.G. USDOE Grand Junction Area Office, CO (United States). Sep 1997. 73p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87460. Order Number DE98000636. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE) Grand Junction Office (GJO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore concentrates and mill tailings during vanadium refining activities of the Manhattan Engineer District, and during sampling, assaying, pilot milling, storage, and brokerage activities conducted for the U.S. Atomic Energy Commission's domestic uranium procurement program. The DOE Defense Decontamination and Decommissioning Program established the GJO Remedial Action Project (GJORAP) to clean up and restore the facility lands, improvements, and underlying aquifer. WASTREN-Grand Junction is the site contractor for the facility and the remedial action contractor for GJORAP. Building 54 and the underlying soil were found not to be radiologically contaminated, and can be released for unrestricted use. Placards have been placed at the building entrances indicating the completion of the radiological release survey and prohibiting the introduction of any radioactive materials within the building without written approvals from the GJO Facilities Operations Manager. This document was prepared in response to a DOE-GJO request for an individual release report for each GJO building.

735
(GJO–97-20-FOS)
Final report of the radiological release survey of Building 30B at the Grand Junction Office Facility. Krauland, P.A.; Corle, S.G. USDOE Grand Junction Area Office, CO (United States). Sep 1997. 41p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87460. Order Number DE98000637. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE) Grand Junction Office (GJO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore concentrates and mill tailings during vanadium refining activities of the Manhattan Engineer District, and during sampling, assaying, pilot milling, storage, and brokerage activities conducted for the U.S. Atomic Energy Commission's domestic uranium procurement program. The DOE Defense Decontamination and Decommissioning Program established the GJO Remedial Action Project (GJORAP) to clean up and restore the facility lands, improvements, and underlying aquifer. WASTREN-Grand Junction is the site contractor for the facility and the remedial action contractor for GJORAP. Building 30B and the underlying soil were found not to be radiologically contaminated; therefore, the building can be released for unrestricted use. Placards have been placed at the building entrances indicating the completion of the radiological release survey and prohibiting the introduction of any radioactive materials within the building without written approvals from the GJO Facilities Operations Manager. This document was prepared in response to a DOE-GJO request for an individual final release report for each GJO building.

736
(LA-UR–96-91)
Decontamination and demolition of a former plutonium processing facility's process exhaust system, firescreen, and filter plenum buildings. LaFrate, P.J. Jr.; Stout, D.S.; Elliott, J.W. Los Alamos National Lab., NM (United States). [1996]. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960443–2: American Nuclear Society (ANS) topical meeting on decontamination and decommissioning, Chicago, IL (United States), 14-17 Apr 1996). Order Number DE96007177. Source: OSTI; NTIS; INIS; GPO Dep.

The Los Alamos National Laboratory (LANL) Decommissioning Project has decontaminated, demolished, and decommissioned a process exhaust system, two filter plenum buildings, and a firescreen plenum structure at Technical Area 21 (TA-2 1). The project began in August 1995 and was completed in January 1996. These high-efficiency particulate air (HEPA) filter plenums and associated ventilation ductwork provided process exhaust to fume hoods and glove boxes in TA-21 Buildings 2 through 5 when these buildings were active plutonium and uranium processing and research facilities. This paper summarizes the history of TA-21 plutonium and uranium processing and research activities and provides a detailed discussion of integrated work process controls, characterize-as-you-go methodology, unique engineering controls, decontamination techniques, demolition methodology, waste minimization, and volume reduction. Also presented in detail are the challenges facing the LANL Decommissioning Project to safely and economically decontaminate and demolish surplus facilities and the unique solutions to tough problems. This paper also shows the effectiveness of the integrated work package concept to control work through all phases.

737
(LA-UR–96-170)
Dynamic quality assurance/quality control (QA/QC) program to maximize the use of on-site measurement. Kelly, L.A.; Roberts, J.B.; Swanson, A.L.; Canavan, H.E. Los Alamos National Lab., NM (United States). [1996]. 12p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960175–3: 4. international on-site analysis meeting, Orlando, FL (United States), 21-24 Jan 1996). Order Number DE96007169. Source: OSTI; NTIS; INIS; GPO Dep.

The use of on-site mobile laboratories at Los Alamos National Laboratory (LANL) has increased within the last year to accommodate the diverse analytical requirements of demands for the Environmental Restoration Project (ERP). The purpose of the mobile laboratory is to provide sample results with the appropriate QC components within a near real time (i.e. < 8 hours) to aid in a real time decision process such as determining the extent of contamination and/or where to focus the sampling efforts. To meet the data quality objectives (DQOS) of ERP, a flexible QA/QC program needs to exist. By developing a QA/QC program containing the capability to measure extraction efficiency and instrument sensitivity and by participating in the DQO process, the appropriate QC can easily be tailored to provide quick and inexpensive analytical data while still meeting the project requirements. An QA/QC

program, consisting of both static and dynamic elements, can be tailored to meet the ERP objectives.

738
(LA-UR–96-0421)
Decontamination and demolition of a former plutonium processing facility's process exhaust system, firescreen, and filter plenum buildings. LaFrate, P.J. Jr.; Stout, D.S.; Elliott, J.W. Los Alamos National Lab., NM (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960212–68: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96008123. Source: OSTI; NTIS; INIS; GPO Dep.

The Los Alamos National Laboratory (LANL) Decommissioning Project has decontaminated, demolished, and decommissioned a process exhaust system, two filter plenum buildings, and a firescreen plenum structure at Technical Area 21 (TA-21). The project began in August 1995 and was completed in January 1996. These high-efficiency particulate air (HEPA) filter plenums and associated ventilation ductwork provided process exhaust to fume hoods and glove boxes in TA-21 Buildings 2 through 5 when these buildings were active plutonium and uranium processing and research facilities. This paper summarizes the history of TA-21 plutonium and uranium processing and research activities and provides a detailed discussion of integrated work process controls, characterize-as-you-go methodology, unique engineering controls, decontamination techniques, demolition methodology, waste minimization, and volume reduction. Also presented in detail are the challenges facing the LANL Decommissioning Project to safely and economically decontaminate and demolish surplus facilities and the unique solutions to tough problems. This paper also shows the effectiveness of the integrated work package concept to control work through all phases.

739
(ORNL/ER–399)
Final Deactivation Project report on the Alpha Powder Facility, Building 3028, at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Apr 1997. 125p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97005324. Source: OSTI; NTIS; INIS; GPO Dep.

This report documents the condition of the Alpha Powder Facility (APF), Building 3028, after completion of deactivation activities. Activities conducted to place the facility in a safe and environmentally sound condition for transfer to the U.S. Department of Energy (DOE) Office of Environmental Restoration (EM-40) program are outlined. A history and profile of the facility prior to commencing deactivation activities and a profile of the building after completion of deactivation activities are provided. Turnover items, such as the post-deactivation surveillance and maintenance (S&M) plan, remaining hazardous materials, radiological controls, safeguards and security, quality assurance, facility operations, and supporting documentation provided for in the DOE Nuclear Materials and Facility Stabilization Program (EM-60) turnover package are discussed.

740
(ORNL/ER–400)
Final deactivation project report on the Source Development Laboratory, building 3029, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). May 1997. 98p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97006087. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the condition of Building 3029 after completion of deactivation activities as outlined by the DOE Nuclear Materials and Facility Stabilization Program (EM-60) guidance documentation. This report outlines the activities conducted to place the facility in a safe and environmentally sound condition for transfer to the DOE Office of Environmental Restoration (EM-40). This report provides a history and profile of the facility prior to commencing deactivation activities and a profile of the building after completion of deactivation activities. Turnover items, such as the post-deactivation surveillance and maintenance (S&M) plan, remaining hazardous materials, radiological controls, safeguards and security, quality assurance, facility operations, and supporting documentation provided in the EM-60 turnover package are discussed. Building 3029 will require access to facilitate required S&M activities to maintain the building safety envelope. building 3029 was stabilized during deactivation so that when transferred to the EM-40 program, only a minimal S&M effort would be required to maintain the building safety envelope. Other than the minimal S&M activities, the building will be unoccupied and the exterior doors locked to prevent unauthorized access. The building will be entered only to perform the required S&M. 5 refs., 7 figs., 3 tabs.

741
(ORNL/ER–406)
Final deactivation report on the tritium target facility, Building 7025, at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Aug 1997. 102p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97007146. Source: OSTI; NTIS; INIS; GPO Dep.

This report includes a history and profile of Bldg. 7025 before and after completion of deactivation. It also discusses turnover items, such as the Postdeactivation Surveillance & Maintenance Plan, remaining hazardous materials, radiological controls, Safeguards and Security, quality assurance, facility operations, and supporting documentation in the EM-60 Turnover package. Other than minimal S&M activities, the building will be unoccupied and the exterior doors locked (access only for the required S&M).

742
(ORNL/ER–407)
Final deactivation report on the radioisotope production Lab-H, Building 3118, at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Aug 1997. 76p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97008158. Source: OSTI; NTIS; INIS; GPO Dep.

This report outlines the activities conducted to place the facility in a safe and environmentally sound condition for transfer to the DOE Office of Environmental Restoration Program (EM-40). This report provides a history and profile of Bldg. 3118 prior to and after deactivation. Turnover items (e.g. Surveillance & Maintenance Plant, remaining materials, etc.) are discussed. Building 3118 was stabilized during deactivation so that when transferred to the EM-40 program, only minimal S&M is required (other than that, the building will be unoccupied and the exterior doors locked).

743
(ORNL/ER–408)
Final deactivation report on the radioisotope production Lab-C, Building 3030, at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Aug 1997. 70p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97008703. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the condition of Bldg. 3030 completion of deactivation activities as outlined by the Department of Energy (DOE) Office of Nuclear Materials and Facility Stabilization Program (EM-60) guidance documentation. This report outlines the activities conducted to place the facility in a safe and environmentally sound condition for transfer to DOE's Office of Environmental Restoration Program (EM-40). This report provides profile of Bldg. 3030 before and after deactivation activities. Turnover items, such as the Postdeactivation Surveillance & Maintenance Plan, remaining hazardous materials, radiological controls, Safeguards and Security, QA, facility operations, and supporting documentation provided in the Office of Nuclear Materials and Facility Stabilization Program (EM-60) Turnover package are discussed. Building 3030 will require access to facilitate required S&M activities to maintain the building safety envelope. Building 3030 was stabilized during deactivation so that when transferred to the EM-40 program, only a minimal S&M effort would be required to maintain the building's safety envelope. Other than the minimal S&M activities, the building will be unoccupied and the exterior doors locked to prevent unauthorized access. The building will be entered only for required S&M. All materials have been removed from the building and the hot cell, and all utility systems, piping, and alarms have been deactivated.

744
(ORNL/ER–409)
Final deactivation report on the radioisotope production Lab-D, Building 3031, at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Aug 1997. 65p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97008704. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the condition of Bldg. 3031 after completion of deactivation activities as outlined by the Department of Energy Office of Nuclear Materials and Facility Stabilization Program (EM-60) guidance documentation. This report outlines the activities conducted to place the facility in a safe and environmentally sound condition for transfer to the Department of Energy Office of Environmental Restoration (EM-40) Program. This report provides a profile of Bldg. 3031 before and after deactivation activities. Turnover items, such as the Postdeactivation Surveillance & Maintenance Plan, remaining hazardous materials, radiological controls, Safeguards and Security, quality assurance, facility operations, and supporting documentation provided in the Office of Nuclear Materials and Facility Stabilization Program (EM-60) Turnover package, are discussed. Building 3031 will require access to facilitate required surveillance and maintenance activities to maintain the building safety envelope. Building 3031 was stabilized during deactivation so that when transferred to the EM-40 program, only a minimal surveillance and maintenance effort would be required to maintain the building safety envelope. Other than the minimal surveillance and maintenance activities, the building will be unoccupied and the exterior doors locked to prevent unauthorized access. The building will be entered only to perform the required surveillance and maintenance. All materials have been removed from the building and the hot cell, and all utility systems, piping, and alarms have been deactivated.

745
(ORNL/ER–414)
Final deactivation report on the Radioisotope Production Lab-E, Building 3032, at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Sep 1997. 121p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE98000096. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the condition of Bldg. 3032, after completion of deactivation activities as outlined by the Department of Energy (DOE) Office of Nuclear Materials and Facility Stabilization Program (EM-60) guidance documentation. This report outlines the activities conducted to place the facility in a safe and environmentally sound condition for transfer to the DOE Office of Environmental Restoration Program (EM-40). This report provides a history and profile of Bldg. 3032 prior to commencing deactivation activities and a profile of the building after completion of deactivation activities. Turnover items, such as the Postdeactivation Surveillance & Maintenance Plan, remaining hazardous materials, radiological controls, Safeguards and Security, quality assurance, facility operations, and supporting documentation provided in the EM-60 turnover package are discussed. Building 3032 will be used as the Health Physics Office for the Isotopes Facilities Deactivation Program area and will require access for these offices and to facilitate required surveillance and maintenance (S&M) activities to maintain the building safety envelope. Bldg. 3032 was stabilized during deactivation so that when transferred to the EM-40 program, only a minimal S&M effort would be required to maintain the building safety envelope. All materials have been removed from the building, and all utility systems, piping, and alarms have been deactivated except electricity and steam needed for the office areas.

746
(ORNL/ER–415)
Final deactivation report on the radioisotope area services, Building 3034, at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Sep 1997. 103p. Sponsored by USDOE Office of Environmental Restoration and Waste Management,

Washington, DC (United States). DOE Contract AC05-84OR21400 ; AC05-96OR22464. Order Number DE98000097. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the condition of Bldg. 3034, after completion of deactivation activities as outlined by the Department of Energy Office of Nuclear Materials and Facility Stabilization Program (EM-60) guidance documentation. This report outlines the activities conducted to place the facility in a safe and environmentally sound condition for transfer to the Department of Energy Office of Environmental Restoration (EM-40) Program. This report provides a history and profile of Bldg. 3034 before commencement of deactivation activities and a profile of the building after completion of deactivation activities. Turnover, items, such as the Postdeactivation Surveillance & Maintenance Plan, remaining hazardous materials, radiological controls, Safeguards and Security, quality assurance, facility operations, an supporting documentation provided in the Office of Nuclear Materials and Facility Stabilization Program (EM-60) Turnover Package, are discussed. Building 3034 will require access to facilitate required surveillance and maintenance (S&M) activities to maintain the building safety envelope. Building 3034 was stabilized during deactivation so that when transferred to the EM-40 program, only a minimal S&M effort would be required to maintain the building safety envelope. In addition to the minimal S&M activities, the building will be occupied by the maintenance coordinator and the S&M supervisor for the Isotopes Facilities Deactivation Project. The exterior doors are locked when unoccupied to prevent unauthorized access. All materials have been removed from the building. Piping and alarms have been deactivated.

747
(ORNL/ER–418)
Final deactivation project report on the Integrated Process Demonstration Facility, Building 7602 Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Sep 1997. 104p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE98000095. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the condition of the Integrated Process Demonstration Facility (Building 7602) at Oak Ridge National Laboratory (ORNL) after completion of deactivation activities by the High Ranking Facilities Deactivation Project (HRFDP). This report identifies the activities conducted to place the facility in a safe and environmentally sound condition prior to transfer to the U.S. Department of Energy (DOE) Environmental Restoration EM-40 Program. This report provides a history and description of the facility prior to commencing deactivation activities and documents the condition of the building after completion of all deactivation activities. Turnover items, such as the Post-Deactivation Surveillance and Maintenance (S&M) Plan, remaining hazardous and radioactive materials inventory, radiological controls, Safeguards and Security, and supporting documentation provided in the Office of Nuclear Material and Facility Stabilization Program (EM-60) Turnover package are discussed.

748
(ORNL/ER–419)
Final deactivation report on the Radioactive Gas Processing Facility, Building 3033, and the Actinide Fabrication Facility, Building 3033A, at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Sep 1997. 73p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE98000443. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the condition of Buildings 3033 and 3033A, after completion of deactivation activities as outlined by the Department of Energy Office of Nuclear Materials and Facility Stabilization Program (EM-60) guidance documentation. This report outlines the activities conducted to place the facility in a safe and environmentally sound condition for transfer to the Department of Energy Office of Environmental Restoration Program (EM-40). This report provides a history and profile of Buildings 3033 and 3033A prior to commencing deactivation activities and a profile of the building after completion of deactivation activities. Turnover items, such as the Post-Deactivation Surveillance and Maintenance Plan, remaining hazardous materials, radiological controls, Safeguards and Security, quality assurance, facility operations, and supporting documentation provided in the Office of Nuclear Materials and Facility Stabilization Program (EM-60) Turnover package are discussed. Buildings 3033 and 3033A will require access to facilitate required S and M activities to maintain the building safety envelope. Buildings 3033 and 3033A were stabilized during deactivation so that when transferred to the EM-40 program, only a minimal S and M effort would be required to maintain the building safety envelope. Other than the minimal S and M activities the building will be unoccupied and the exterior doors locked to prevent unauthorized access. The building will be entered only to perform the required S and M. All materials have been removed from the building, and all utility systems, piping, and alarms have been deactivated.

749
(ORNL/ER–420)
Final deactivation project report on the High Radiation Level Analytical Facility, Building 3019B at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Sep 1997. 82p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE98000094. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the condition of the High Radiation Level Analytical Facility (Building 3019B) at Oak Ridge National Laboratory (ORNL) after completion of deactivation activities. This report identifies the activities conducted to place the facility in a safe and environmentally sound condition prior to transfer to the Environmental Restoration EM-40 Program. This document provides a history and description of the facility prior to the commencement of deactivation activities and documents the condition of the building after completion of all deactivation activities. Turnover items, such as the Post-Deactivation Surveillance and Maintenance (S&M) Plan, remaining hazardous materials inventory, radiological controls, safeguards and security, quality assurance, facility operations, and supporting documentation provided in the Nuclear Material and Facility

Stabilization (EM-60) Turnover package are discussed. Building 3019B will require access to perform required S&M activities to maintain the building safety envelope. Building 3019B was stabilized during deactivation so that when transferred to the EM-40 Program, only a minimal S&M effort would be required to maintain the building safety envelope. Other than the minimal S&M activities the building will be unoccupied and the exterior doors locked to prevent unauthorized access. The building will be entered only to perform the required S&M until decommissioning activities begin.

750
(PNNL–11510)
US graphite reactor D&D experience. Garrett, S.M.K.; Williams, N.C. Pacific Northwest Lab., Richland, WA (United States). Feb 1997. 62p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052456. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the results of the U.S. Graphite Reactor Experience Task for the Decommissioning Strategy Plan for the Leningrad Nuclear Power Plant (NPP) Unit 1 Study. The work described in this report was performed by the Pacific Northwest National Laboratory (PNNL) for the Department of Energy (DOE).

751
(SAND–96-2993C)
Capacitive tool standoff sensor for dismantlement tasks. Schmitt, D.J. (Sandia National Labs., Albuquerque, NM (United States)); Weber, T.M.; Liu, J.C. Sandia National Labs., Albuquerque, NM (United States). [1996]. 8p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-970464–2: 7. American Nuclear Society topical meeting on robotics and remote systems, Augusta, GA (United States), 27 Apr - 1 May 1997). Order Number DE97001881. Source: OSTI; NTIS; INIS; GPO Dep.

A capacitive sensing technology has been applied to develop a Standoff Sensor System for control of robotically deployed tools utilized in Decontamination and Dismantlement (D and D) activities. The system combines four individual sensor elements to provide non-contact, multiple degree-of-freedom control of tools at distances up to five inches from a surface. The Standoff Sensor has been successfully integrated to a metal cutting router and a pyrometer, and utilized for real-time control of each of these tools. Experiments demonstrate that the system can locate stationary surfaces with a repeatability of 0.034 millimeters.

752
(WSRC-TR–96-0268-Rev.1)
Analysis of removal alternatives for the Heavy Water Components Test Reactor at the Savannah River Site. Revision 1. Owen, M.B. Westinghouse Savannah River Co., Aiken, SC (United States). Apr 1997. 168p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-89SR18035. Order Number DE97009010. Source: OSTI; NTIS; INIS; GPO Dep.

This engineering study evaluates different alternatives for decontamination and decommissioning of the Heavy Water Components Test Reactor (HWCTR). Cooled and moderated with pressurized heavy water, this uranium-fueled nuclear reactor was designed to test fuel assemblies for heavy water power reactors. It was operated for this purpose from march of 1962 until December of 1964. Four alternatives studied in detail include: (1) dismantlement, in which all radioactive and hazardous contaminants would be removed, the containment dome dismantled and the property restored to a condition similar to its original preconstruction state; (2) partial dismantlement and interim safe storage, where radioactive equipment except for the reactor vessel and steam generators would be removed, along with hazardous materials, and the building sealed with remote monitoring equipment in place to permit limited inspections at five-year intervals; (3) conversion for beneficial reuse, in which most radioactive equipment and hazardous materials would be removed and the containment building converted to another use such as a storage facility for radioactive materials, and (4) entombment, which involves removing hazardous materials, filling the below-ground structure with concrete, removing the containment dome and pouring a concrete cap on the tomb. Also considered was safe storage, but this approach, which has, in effect, been followed for the past 30 years, did not warrant detailed evaluation. The four other alternatives were evaluate, taking into account factors such as potential effects on the environment, risks, effectiveness, ease of implementation and cost. The preferred alternative was determined to be dismantlement. This approach is recommended because it ranks highest in the comparative analysis, would serve as the best prototype for the site reactor decommissioning program and would be most compatible with site property reuse plans for the future.

ROBOTICS

Refer also to citation(s) 555

753
(CONF-9510307–1)
Long range position and Orientation Tracking System. Armstrong, G.A. (and others); Jansen, J.F.; Burks, B.L. Oak Ridge National Lab., TN (United States). 1996. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From 6. topical meeting on robotics and remote systems; San Francisco, CA (United States); 29 Oct - 2 Nov 1995. Order Number DE96005986. Source: OSTI; NTIS; INIS; GPO Dep.

The long range Position and Orientation Tracking System is an active triangulation-based system that is being developed to track a target to a resolution of 6.35 mm (0.25 in.) and 0.009°(32.4 arcseconds) over a range of 13.72 m (45 ft.). The system update rate is currently set at 20 Hz but can be increased to 100 Hz or more. The tracking is accomplished by sweeping two pairs of orthogonal line lasers over infrared (IR) sensors spaced with known geometry with respect to one another on the target (the target being a rigid body attached to either a remote vehicle or a remote manipulator arm). The synchronization and data acquisition electronics correlates the time that an IR sensor has been hit by one of the four lasers and the angle of the respective mirror at the time of the hit. This information is combined with the known geometry of the IR sensors on the target to

determine position and orientation of the target. This method has the advantage of allowing the target to be momentarily lost due to occlusions and then reacquired without having to return the target to a known reference point. The system also contains a camera with operator controlled lighting in each pod that allows the target to be continuously viewed from either pod, assuming their are no occlusions.

754
(CONF-960448–13)
Hydraulically powered dissimilar teleoperated system controller design. Jansen, J.F.; Kress, R.L. Oak Ridge National Lab., TN (United States). 1996. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-96OR22464. From IEEE international conference on robotics and automation; Minneapolis, MN (United States); 22-28 Apr 1996. Order Number DE96008644. Source: OSTI; NTIS; INIS; GPO Dep.

This paper will address two issues associated with the implementation of a hydraulically powered dissimilar master-slave teleoperated system. These issues are the overall system control architecture and the design of robust hydraulic servo controllers for the position control problem. Finally, a discussion of overall system performance on an actual teleoperated system will be presented.

755
(CONF-960448–14)
Workload, flow, and telepresence during teleoperation. Draper, J.V. (Oak Ridge National Lab., TN (United States)); Blair, L.M. Oak Ridge National Lab., TN (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From IEEE international conference on robotics and automation; Minneapolis, MN (United States); 22-28 Apr 1996. Order Number DE96008805. Source: OSTI; NTIS; INIS; GPO Dep.

There is much speculation about the relations among workload, flow, telepresence, and performance during teleoperation, but few data that provide evidence concerning them. This paper presents results an investigation conducted during completion of a pipe cutting task using a teleoperator at ORNL. Results show support for the hypothesis that telepresence is related to expenditure of attentional resources, and some support for the hypothesis that telepresence is related to flow. The discussion examines the results from an attentional resources perspective on teleoperation.

756
(DOE/MC/29104–96/C0698)
Rosie: A mobile worksystem for decontamination and dismantlement operations. Thompson, B.R.; Conley, L. Redzone Robotics, Inc., Pittsburgh, PA (United States). [1996]. 12p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC21-92MC29104. (CONF-960443–8: American Nuclear Society (ANS) topical meeting on decontamination and decommissioning, Chicago, IL (United States), 14-17 Apr 1996). Order Number DE96010171. Source: OSTI; NTIS; INIS; GPO Dep.

RedZone Robotics, Inc. and Carnegie Mellon University's Field Robotics Center have undertaken a contract to develop a next-generation worksystem for decommissioning and dismantlement tasks in Department of Energy (DOE) facilities. Currently, the authors are closing the second phase of this three phase effort and have completed the design and fabrication of the worksystem: Rosie. Rosie includes a locomotor, heavy manipulator, control center, and control system for robot operation. The locomotor is an omni-directional platform with tether management and hydraulic power capabilities. The heavy manipulator is a high-payload, long-reach system intended to deploy tools into the work area. The heavy manipulator is capable of deploying systems such as the Dual-Arm Work Module–a five degree-of-freedom platform supporting two highly dexterous manipulators–or a single manipulator for performing simpler, less dexterous tasks. Rosie is telerobotic to the point of having servo-controlled motions which can be operated and coordinated through the control center.

757
(DOE/MC/29115–96/C0686)
Development of a K3A robot for deployment in radioactive environments. Sias, F.R. Jr. South Carolina Universities Research and Education Foundation, Clemson, SC (United States). 1996. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC21-92MC29115. (CONF-9605145–6: ISRAM '96: 6. international symposium on robotics and manufacturing, Montpellier (France), 27-30 May 1996). Order Number DE96010025. Source: OSTI; NTIS; INIS; GPO Dep.

Radioactive materials make up a significant part of the hazardous-material inventory of the United States Department of Energy. Much of the radioactive material will be inspected or handled by robotic systems that contain electronic circuits that may be damaged by gamma radiation and other particles emitted from radioactive material. To use a mobile robot in the vicinity of high-level gamma radiation requires a special design. Since materials and electronic circuits can withstand some radiation without failure, the simplest approach would be simply to use an unmodified commercial mobile robot in the radioactive environment but remove it before failure occurs. Unpowered backup is another method of extending system lifetime in an ionizing radiation environment. When the primary system fails or degrades sufficiently, the backup system can be switched in to maintain system operation. By careful design and production-lot testing, systems can be designed to meet moderate doses of radiation; however, randomly-selected off- the-shelf commercial parts cannot be guaranteed to meet a specified total-dose tolerance. We can define the Basic Radiation-Hardened System to be a teleoperated K3A transport capable of deploying a radiation-hardened video camera for initial entry and inspection applications. The electronics in the K3A mobile base has three essential modules: MA-2 Motor Amplifier Circuit, DC-I Drive Control Computer, and DC/DC Converter for powering the electronics. Design of the system will be discussed.

758
(DOE/MC/30363–97/C0796)
A fly-by robotic tank inspection end effector. Girtleman, M.M. (Oceaneering Technologies, Houston, TX (United States)); Robertson, B.; Gascor, T.; Wightman, B.; Hughes, G. Oceaneering Space Systems, Houston, TX (United States). [1996]. 9p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-93MC30363. (CONF-9610231–36: Conference on industry partnerships to deploy environmental technology, Morgantown, WV

(United States), 22-24 Oct 1996). Order Number DE97052238. Source: OSTI; NTIS; INIS; GPO Dep.

A robotic end effector has been developed that is capable of performing fly-by-fly, electromagnetic non-destructive evaluation (NDE) and visual inspection of the inside of the U.S. Department of Energy's waste storage tanks. Furthermore, the system is also capable of sizing defects through its unique NDE technique, Alternating Current Field Measurement (ACFM). The NDE data is recorded and logged electronically and is tagged with position data from the deploying manipulator, allowing a complete mapping of the tank walls and future return to defect sites.

759
(DOE/MC/32093–97/C0819)
Diagnostics and data fusion of robotic sensors. Dhar, M.; Bardsley, S; Cowper, L.; Hamm, R.; Jammu, V.; Wagner, J. Mechanical Technology, Inc., Latham, NY (United States). [1996]. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-95MC32093. (CONF-9610231–25: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052259. Source: OSTI; NTIS; INIS; GPO Dep.

Robotic systems for remediation of hazardous waste sites must be highly reliable to avoid equipment failures and subsequent possible exposure of personnel to hazardous environments. Safe, efficient cleanup operations also require accurate, complete knowledge of the task space. This paper presents progress made on a 18 month program to meet these needs. To enhance robot reliability, a conceptual design of a monitoring and diagnostic system is being developed to predict the onset of mechanical failure modes, provide maximum lead time to make operational changes or repairs, and minimize the occurrence of on-site breakdowns. To ensure safe operation, a comprehensive software package is being developed that will fuse data from multiple surface mapping sensors and poses so as to reduce the error effects in individual data points and provide accurate 3-D maps of a work space.

760
(DOE/MC/33078–97/C0824)
RoboCon: Operator interface for robotic applications. Schempf, H.; Warwick, J.; Fung, M.; Chemel, B.; Blackwell, M. Carnegie-Mellon Univ., Pittsburgh, PA (United States). Robotics Inst. [1996]. 6p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-96MC33078. (CONF-9610231–24: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052264. Source: OSTI; NTIS; INIS; GPO Dep.

Carnegie Mellon U. and ORNL's Robotics and Process Systems Division are developing a state-of-the-art robot operator control station (RoboCon) with standardized hardware and software control interfaces to be adaptable to a variety of remote and robotic equipment currently funded by DOE's Office of Science & Technology Robotics Technology Development Program. The human operation and telerobotic and supervisory control of sophisticated and remote and robotic systems is a complex, tiring, and non-intuitive activity. Since decontamination & decommissioning, selective equipment removal, mixed waste operations, and in-tank cleanup are going to be a major future activity in DOE environmental restoration and waste management cleanup agenda, it seems necessary to utilize an operator control station and interface which maximizes operator comfort and productivity.

761
(DOE/SR/18544–2)
Robotic tooling for DOE environmental management. Annual report, September 29, 1995–September 28, 1996. Wang, S.L. North Carolina Agricultural and Technical State Univ., Greensboro, NC (United States). 18 Dec 1996. 49p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG09-95SR18544. Order Number DE97004828. Source: OSTI; NTIS; INIS; GPO Dep.

The Department of Energy (DOE) has created nuclear weapons for defense for over forty years. During this time, hazardous and nuclear wastes have accumulated, and contamination of soils and groundwater have occurred throughout the US, as environmental stewardship was not fully appreciated until recent times. Thousands of sites require clean up, and hundreds of facilities require decontamination and decommissioning. The Office of Technology Development (OTD) assists this mission by developing new technology that is safer, more efficient, and less expensive than current processes. The OTD has focused upon five primary areas where robotics technology can help. These five areas are: Tank Waste Retrieval, Contaminant analysis Automation, Decontamination and Dismantlement, Mixed Waste Operations, and the Plutonium Focus Area. This report details work on the robotic opening of waste drums and end-effector design for non-destructive drum opening.

762
(SAND–96-0485C)
System design for safe robotic handling of nuclear materials. Drotning, W.; Wapman, W.; Fahrenholtz, J.; Kimberly, H.; Kuhlmann, J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9606123–1: Robotics for challenging environments, Albuquerque, NM (United States), 1-6 Jun 1996). Order Number DE96006399. Source: OSTI; NTIS; INIS; GPO Dep.

Robotic systems are being developed by the Intelligent Systems and Robotics Center at Sandia National Laboratories to perform automated handling tasks with radioactive nuclear materials. These systems will reduce the occupational radiation exposure to workers by automating operations which are currently performed manually. Because the robotic systems will handle material that is both hazardous and valuable, the safety of the operations is of utmost importance; assurance must be given that personnel will not be harmed and that the materials and environment will be protected. These safety requirements are met by designing safety features into the system using a layered approach. Several levels of mechanical, electrical and software safety prevent unsafe conditions from generating a hazard, and bring the system to a safe state should an unexpected situation arise. The system safety features include the use of industrial robot standards, commercial robot systems, commercial and custom tooling, mechanical safety interlocks, advanced sensor systems, control and configuration checks, and redundant control schemes. The effectiveness of the safety features *in satisfying the* safety

requirements is verified using a Failure Modes and Effects Analysis. This technique can point out areas of weakness in the safety design as well as areas where unnecessary redundancy may reduce the system reliability.

763
(SAND–96-0881C)
Rapid world modelling for robotics. Littile, C.Q. (Sandia National Labs., Albuquerque, NM (United States)); Wilson, C.W. Sandia National Labs., Albuquerque, NM (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9603143–1: International symposium on robotics and manufacturing (ISRM), Montpellier (France), 27-30 Mar 1996). Order Number DE96008906. Source: OSTI; NTIS; INIS; GPO Dep.

The ability to use an interactive world model, whether it is for robotics simulation or most other virtual graphical environments, relies on the users ability to create an accurate world model. Typically this is a tedious process, requiring many hours to create 3-D CAD models of the surfaces within a workspace. The goal of this ongoing project is to develop usable methods to rapidly build world models of real world workspaces. This brings structure to an unstructured environment and allows graphical based robotics control to be accomplished in a reasonable time frame when traditional CAD modelling is not enough. To accomplish this, 3D range sensors are deployed to capture surface data within the workspace. This data is then transformed into surface maps, or models. A 3D world model of the workspace is built quickly and accurately, without ever having to put people in the environment.

764
(SAND–96-2419C)
Graphical programming of telerobotic tasks. Small, D.E.; McDonald, M.J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9610197–1: 1996 Deneb User Group conference, Troy, MI (United States), 9 Oct 1996). Order Number DE97000738. Source: OSTI; NTIS; INIS; GPO Dep.

With a goal of producing faster, safer, and cheaper technologies for nuclear waste cleanup, Sandia is actively developing and extending intelligent systems technologies through the US Department of Energy Office of Technology Development (DOE OTD) Robotic Technology Development Program (RTDP). Graphical programming is a key technology for robotic waste cleanup that Sandia is developing for this goal. Graphical programming uses simulation such as TELEGRIP 'on-line' to program and control robots. Characterized by its model-based control architecture, integrated simulation, 'point-and-click' graphical user interfaces, task and path planning software, and network communications, Sandia's Graphical Programming systems allow operators to focus on high-level robotic tasks rather than the low-level details. Use of scripted tasks, rather than customized programs minimizes the necessity of recompiling supervisory control systems and enhances flexibility. Rapid world-modelling technologies allow Graphical Programming to be used in dynamic and unpredictable environments including digging and pipe-cutting. This paper describes Sancho, Sandia's most advanced graphical programming supervisory software. Sancho, now operational on several robot systems, incorporates all of Sandia's recent advances in supervisory control. Graphical programming uses 3-D graphics models as intuitive operator interfaces to program and control complex robotic systems. The goal of the paper is to help the reader understand how Sandia implements graphical programming systems and which key features in Sancho have proven to be most effective.

765
(SAND–96-2934C)
Miniaturized robotically deployed sensor systems for in-situ characterization of hazardous waste. Fischer, G.J. Sandia National Labs., Albuquerque, NM (United States). [1996]. 7p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-970464–3: 7. American Nuclear Society topical meeting on robotics and remote systems, Augusta, GA (United States), 27 Apr - 1 May 1997). Order Number DE97001880. Source: OSTI; NTIS; INIS; GPO Dep.

A series of "MiniLab" end effectors are currently being designed for robotic deployment in hazardous areas such as waste storage tanks at Idaho National Engineering Laboratories (INEL) and Oak Ridge National Laboratory (ORNL). These MiniLabs will be the first ever multichannel hazardous waste characterization end effectors deployed in underground high level waste storage tanks. They consist of a suite of chemical, radiological, and physical properties sensors integrated into a compact package mounted on the end of a robotic arm and/or vehicle. Most of the sensors are commercially available thus reducing the overall cost of design and maintenance. Sensor configurations can be customized depending on site/customer needs. This paper will address issues regarding the cost of field sampling verses MiniLab in-situ measurements and a brief background of the Light Duty utility Arm (LDUA) program. Topics receiving in depth attention will include package size parameters/ constraints, design specifications, and investigations of currently available sensor technology. Sensors include radiological, gas, chemical, electrolytic, visual, temperature, and ranging. The effects of radiation on the life of the systems/ sensors will also be discussed. Signal processing, control, display, and data acquisition methods will be described. The paper will conclude with an examination of possible applications for MiniLabs.

766
(SAND–97-0884)
Automatic planning and programming for robotic construction of planetary/lunar structures. Boissiere, P.T. (BEAR, Inc., Albuquerque, NM (United States)). Sandia National Labs., Albuquerque, NM (United States). Apr 1997. 17p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97004916. Source: OSTI; NTIS; GPO Dep.

Many difficult material handling needs exist in remote unstructured environments. Currently these operations are accomplished using personnel in direct contact with the hazards. A safe and cost-effective alternative to this approach is the use of intelligent robotic systems for the excavation, handling, transport and manipulation of materials during remote construction operations. A robotic system designed for these tasks has been developed at Sandia National Laboratories which successfully integrates computer controlled

manipulation and mobility to deliver these needed robotic capabilities in remote applications such as planetary operations. The mobile robot, RETRVIR, incorporates advanced developments in the integration of sensors, advanced computing environments, and graphical user interfaces. The addition of these elements in the control of remotely operated equipment have shown great promise for reducing the cost of remote construction while providing faster and safer operations.

767
(WSRC-MS–95-0299)
Robotics and remote systems applications. Rabold, D.E. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 27p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. Order Number DE96009338. Source: OSTI; NTIS; INIS; GPO Dep.

This article is a review of numerous remote inspection techniques in use at the Savannah River (and other) facilities. These include: (1) reactor tank inspection robot, (2) californium waste removal robot, (3) fuel rod lubrication robot, (4) cesium source manipulation robot, (5) tank 13 survey and decontamination robots, (6) hot gang valve corridor decontamination and junction box removal robots, (7) lead removal from deionizer vessels robot, (8) HB line cleanup robot, (9) remote operation of a front end loader at WIPP, (10) remote overhead video extendible robot, (11) semi-intelligent mobile observing navigator, (12) remote camera systems in the SRS canyons, (13) cameras and borescope for the DWPF, (14) Hanford waste tank camera system, (15) in-tank precipitation camera system, (16) F-area retention basin pipe crawler, (17) waste tank wall crawler and annulus camera, (18) duct inspection, and (19) deionizer resin sampling.

768
(WSRC-MS–96-0720)
Remote Viewing End Effectors for Light Duty Utility Arm Robot (U). Heckendorn, F.M. (Westinghouse Savannah River Company, AIKEN, SC (United States)); Robinson, C.W.; Haynes, H.B.; Anderosn, E.K.; Pardini, A.F. Westinghouse Savannah River Co.; Aiken, SC (United States). 4 Nov 1996. 15p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. (CONF-970462–5: 7. American Nuclear Society topical meeting on robotics and remote handling, Savannah, GA (United States), 27 Apr - 1 May 1997). Order Number DE97060062. Source: OSTI; NTIS; INIS; GPO Dep.

The Robotics Development Groups at the Savannah River Site (SRS) and at the Hanford site have developed remote video and photography systems for deployment in underground radioactive-waste storage tanks at the Department of Energy (DOE) sites as a part of the Office of Science and Technology (OST) program within DOE. Viewing and documenting the tank interiors and their associated annular spaces is an extremely valuable tool in characterizing their condition and contents and in controlling their remediation. Several specialized video/photography systems and robotic End Effectors have been fabricated that provide remote viewing and lighting. All are remotely deployable into and out of the tank, with all viewing functions remotely operated. Positioning all control components away from the facility prevents the potential for personnel exposure to radiation and contamination. Only the remote video systems are discussed in this paper.

769
(WSRC-MS–96-0755)
Equipment and techniques for remote sampling of stored radioactive waste. Nance, T.A. (Westinghouse Savannah River Company, AIKEN, SC (United States)). Westinghouse Savannah River Co., Aiken, SC (United States). 20 Nov 1996. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-970462–4: 7. American Nuclear Society topical meeting on robotics and remote handling, Savannah, GA (United States), 27 Apr - 1 May 1997). Order Number DE97060059. Source: OSTI; NTIS; INIS; GPO Dep.

Several tools have been developed at the Savannah River Site (SRS) to remotely sample stored radioactive waste. These sampling tools have been developed to determine the chemical characteristics of the waste prior to processing. The processing of waste material varies according to the chemical characteristics of the waste, which change due to additions, settling, mixing, and chemical reactions during storage. Once the waste has been sampled to identify its characteristics, the chemical composition of the waste can then be altered if needed to prepare for processing. Various types of waste material in several types of containment must be sampled at SRS. Stored waste materials consist of liquids, floating organics, sludge, salt and solids. Waste is stored in four basic types of tanks with different means of access and interior obstructions. The waste tanks can only be accessed by small openings: access ports, risers and downcomers. Requirements for sampling depend on the type of tank being accessed, the waste within the tank, and the particular location in the tank desired for taking the sample. Sampling devices have been developed to sample all of the waste material forms found in the SRS tank farms. The fluid type samplers are capable of sampling surface liquid, subsurface liquid at varying depth, surface sludge, subsurface sludge, and floating organics. The solid type samplers are capable of sampling salt, sampling a solid layer on the bottom of the tank, and capturing a small solid mass on the tank bottom. The sampling devices are all designed to access the tanks through small access ports. The samplers are reusable and are designed to allow quick transfer of the samples to shielded packaging for transport, reducing the amount of radiation exposure to sampling personnel. The samplers weigh less than 100 lb. and are designed in sections to allow easy disassembly for storage and transport by personnel. (Abstract Truncated)

770
(WSRC-RP–96-536-Rev.1)
Robotics and remote systems developments and applications, FY96. Revision 1. Lewis, W.I. III; Teese, G.D. Westinghouse Savannah River Co., Aiken, SC (United States). Oct 1996. 31p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-89SR18035 ; AC09-96SR18500. Order Number DE97003351. Source: OSTI; NTIS; INIS; GPO Dep.

The purpose of this report is to document the contributions that the Savannah River Technology Center (SRTC) has made during Fiscal Year 1996 in the Robotics and

Remote Systems Technology arena. The contributions originated from the Applied Science and Engineering Technology (ASET) Department's Equipment Engineering Section (EES). Activities and deliverables for the Savannah River Site's (SRS) main operating divisions as well as contributions to new mission activities, other Department of Energy (DOE) sites and programs, intellectual property development and professional societies are described.

CHARACTERIZATION, MONITORING AND SENSOR TECHNOLOGY

Refer also to citation(s) 731, 732, 733, 734, 735

771
(ANL/CMT/CP–85955)
Metal separations using aqueous biphasic partitioning systems. Chaiko, D.J. (Argonne National Lab., IL (United States). Chemical Technology Div.); Zaslavsky, B.; Rollins, A.N.; Vojta, Y.; Gartelmann, J.; Mego, W. Argonne National Lab., IL (United States). [1996]. 16p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960631–2: Engineering Foundation conference on emerging separation technologies, Kona, HI (United States), 16-21 Jun 1996). Order Number DE96010815. Source: OSTI; NTIS; INIS; GPO Dep.

Aqueous biphasic extraction (ABE) processes offer the potential for low-cost, highly selective separations. This countercurrent extraction technique involves selective partitioning of either dissolved solutes or ultrafine particulates between two immiscible aqueous phases. The extraction systems that the authors have studied are generated by combining an aqueous salt solution with an aqueous polymer solution. They have examined a wide range of applications for ABE, including the treatment of solid and liquid nuclear wastes, decontamination of soils, and processing of mineral ores. They have also conducted fundamental studies of solution microstructure using small angle neutron scattering (SANS). In this report they review the physicochemical fundamentals of aqueous biphase formation and discuss the development and scaleup of ABE processes for environmental remediation.

772
(ANL/CMT/CP–89924)
Colloid formation during waste glass corrosion. Mertz, C.J.; Buck, E.C.; Fortner, J.A.; Bates, J.K. Argonne National Lab., IL (United States). 1996. 3p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-9605162–3: National Academy of Sciences (NAS) on glass as a waste form and vitrification technology: an international workshop, Washington, DC (United States), 13 May 1996). Order Number DE96009460. Source: OSTI; NTIS; INIS; GPO Dep.

The long-term behavior of nuclear waste glass in a geologic repository may require a technical consideration of the role of colloids in the release and transport of radionuclides. The neglect of colloidal properties in assessing the near- and far-field migration behavior of actinides may lead to significant underestimates and poor predictions of biosphere exposure from high-level waste (HLW) disposal. Existing data on colloid-facilitated transport suggests that radionuclide migration may be enhanced, but the importance of colloids is not adequately assessed. Indeed, the occurrence of radionuclide transport, attributed to colloidal species, has been reported at Mortandad Canyon, Los Alamos and at the Nevada Test Site; both unsaturated regions are similar to the proposed HLW repository at Yucca Mountain. Although some developments have been made on understanding the transport characteristics of colloids, the characterization of colloids generated from the corrosion of the waste form has been limited. Colloids are known to incorporate radionuclides either from hydrolysis of dissolved species (real colloids) or from adsorption of dissolved species onto existing groundwater colloids (pseudocolloids); however, these colloids may be considered secondary and solubility limited when compared to the colloids generated during glass alteration.

773
(ANL/CMT/CP–90406)
Solution-borne colloids from drip tests using actinide-doped and fully-radioactive waste glasses. Fortner, J.A.; Wolf, S.F.; Buck, E.C.; Mertz, C.J.; Bates, J.K. Argonne National Lab., IL (United States). [1996]. 9p. Sponsored by USDOE Office of Civilian Radioactive Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-961202–75: 1996 Fall meeting of the Materials Research Society (MRS), Boston, MA (United States), 2-6 Dec 1996). Order Number DE97003245. Source: OSTI; NTIS; INIS; GPO Dep.

Drip tests designed to replicate the synergistic interactions between waste glass, repository groundwater, water vapor, and sensitized 304L stainless steel in the potential Yucca Mountain Repository have been ongoing in our laboratory for over ten years. Results will be presented from three sets of these drip tests: two with actinide-doped glasses, and one with a fully-radioactive glass. Periodic sampling of these tests have revealed trends in actinide release behavior that are consistent with their entrainment in colloidal material when as-cast glass is reacted. Results from vapor hydrated glass show that initially the actinides are completely dissolved in solution, but as the reaction proceeds, the actinides become suspended in solution. Sequential filtering and alpha spectroscopy of colloid-bearing leachate solutions indicate that more than 80 percent of the plutonium and americium are bound to particles that are captured by a 0. 1 gm filter, while less than 10 percent of the neptunium is stopped by a 0. 1 gm filter. Analytical transmission electron microscopy has been used to examine particles from leachate solutions and to identify several actinide-bearing phases which are responsible for the majority of actinide release during glass corrosion.

774
(ANL/CMT/CP–90412)
Simulation of natural corrosion by vapor hydration test: seven-year results. Luo, J.S.; Ebert, W.L.; Mazer, J.J.; Bates, J.K. Argonne National Lab., IL (United States). [1996]. 7p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-961202–85: 1996 Fall meeting of the Materials Research Society (MRS), Boston, MA (United States), 2-6 Dec 1996). Order Number DE97003158. Source: OSTI; NTIS; INIS; GPO Dep.

We have investigated the alteration behavior of synthetic basalt and SRL 165 borosilicate waste glasses that had been reacted in water vapor at 70 °C for time periods up to seven years. The nature and extent of corrosion of glasses have been determined by characterizing the reacted glass surface with optical microscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM), and energy dispersive x-ray spectroscopy (EDS). Alteration in 70 °C laboratory tests was compared to that which occurs at 150-200 °C and also with Hawaiian basaltic glasses of 480 to 750 year old subaerially altered in nature. Synthetic basalt and waste glasses, both containing about 50 percent wt SiO_2 were found to react with water vapor to form an amorphous hydrated gel that contained small amounts of clay, nearly identical to palagonite layers formed on naturally altered basaltic glass. This result implies that the corrosion reaction in nature can be simulated with a vapor hydration test. These tests also provide a means for measuring the corrosion kinetics, which are difficult to determine by studying natural samples because alteration layers have often spelled off the samples and we have only limited knowledge of the conditions under which alteration occurred.

775
(ANL/CMT/CP–93030)
Corrosion mechanisms of spent fuel under oxidizing conditions. Finn, P.A.; Finch, R.; Buck, E.; Bates, J. Argonne National Lab., IL (United States). 27 Sep 1997. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970902–: 21. symposium on the scientific basis for nuclear waste management, Davos (Switzerland), 28 Sep - 3 Oct 1997). Order Number DE98000644. Source: OSTI; NTIS; INIS; GPO Dep.

The release of ^{99}Tc can be used as a reliable marker for the extent of spent oxide fuel reaction under unsaturated high-drip-rate conditions at 90°C. Evidence from leachate data and from scanning and transmission electron microscopy (SEM and TEM) examination of reacted fuel samples is presented for radionuclide release, potential reaction pathways, and the formation of alteration products. In the ATM-103 fuel, 0.03 of the total inventory of ^{99}Tc is released in 3.7 years under unsaturated and oxidizing conditions. Two reaction pathways that have been identified from SEM are (1) through-grain dissolution with subsequent formation of uranyl alteration products, and (2) grain-boundary dissolution. The major alteration product identified by x-ray diffraction (XRD) and SEM, is Na-boltwoodite, $Na[(UO_2)(SiO_3OH)]\bullet H_2O$, which is formed from sodium and silicon in the water leachant.

776
(ANL/EA/CP–87307)
Application of a computationally efficient geostatistical approach to characterizing variably spaced water-table data. Quinn, J.J. Argonne National Lab., IL (United States). [1996]. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-950868–44: ER '95: environmental remediation conference: committed to results, Denver, CO (United States), 13-18 Aug 1995). Order Number DE96007241. Source: OSTI; NTIS; INIS; GPO Dep.

Geostatistical analysis of hydraulic head data is useful in producing unbiased contour plots of head estimates and relative errors. However, at most sites being characterized, monitoring wells are generally present at different densities, with clusters of wells in some areas and few wells elsewhere. The problem that arises when kriging data at different densities is in achieving adequate resolution of the grid while maintaining computational efficiency and working within software limitations. For the site considered, 113 data points were available over a 14-mi^2 study area, including 57 monitoring wells within an area of concern of 1.5 mi^2. Variogram analyses of the data indicate a linear model with a negligible nugget effect. The geostatistical package used in the study allows a maximum grid of 100 by 100 cells. Two-dimensional kriging was performed for the entire study area with a 500-ft grid spacing, while the smaller zone was modeled separately with a 100-ft spacing. In this manner, grid cells for the dense area and the sparse area remained small relative to the well separation distances, and the maximum dimensions of the program were not exceeded. The spatial head results for the detailed zone were then nested into the regional output by use of a graphical, object-oriented database that performed the contouring of the geostatistical output. This study benefitted from the two-scale approach and from very fine geostatistical grid spacings relative to typical data separation distances. The combining of the sparse, regional results with those from the finer-resolution area of concern yielded contours that honored the actual data at every measurement location. The method applied in this study can also be used to generate reproducible, unbiased representations of other types of spatial data.

777
(ANL/EA/CP–88217)
Cost savings associated with landfilling wastes containing very low levels of uranium. Boggs, C.J. (Argonne National Lab., Germantown, MD (United States)); Shaddoan, W.T. Argonne National Lab., IL (United States). 1996. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-960110–3: 29. midyear topical meeting of the Health Physics Society: naturally occuring and accelerator produced radioactive material - regulation and risk assessment, Scottsdale, AZ (United States), 7-10 Jan 1996). Order Number DE96006692. Source: OSTI; NTIS; INIS; GPO Dep.

The Paducah Gaseous Diffusion Plant (PGDP) has operated captive landfills (both residential and construction/demolition debris) in accordance with the Commonwealth of Kentucky regulations since the early 1980s. Typical waste streams allowed in these landfills include nonhazardous industrial and municipal solid waste (such as paper, plastic, cardboard, cafeteria waste, clothing, wood, asbestos, fly ash, metals, and construction debris). In July 1992, the U.S. Environmental Protection Agency issued new requirements for the disposal of sanitary wastes in a "contained landfill." These requirements were promulgated in the 401 Kentucky Administrative Record Chapters 47 and 48 that became effective 30 June 1995. The requirements for a new contained landfill include a synthetic liner made of high-density polyethylene in addition to the traditional 1-meter (3-foot) clay liner and a leachate collection system. A new landfill at Paducah would accept waste streams similar to those that have been accepted in the past. The permit for the previously existing landfills did not include radioactivity limits; instead, these levels were administratively controlled. Typically, if radioactivity was detected above background levels, the waste was classified as low-level waste (LLW), which would be sent off-site for disposal.

778
(ANL/EAD/TM–22)
Transuranic waste inventory, characteristics, generation, and facility assessment for treatment, storage, and disposal alternatives considered in the U.S. Department of Energy Waste Management Programmatic Environmental Impact Statement. Hong, K.; Kotek, T.; Folga, S.; Koebnick, B.; Wang, Y.; Kaicher, C. Argonne National Lab., IL (United States). Dec 1996. 113p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98000250. Source: OSTI; NTIS; INIS; GPO Dep.

Transuranic waste (TRUW) loads and potential contaminant releases at and en route to treatment, storage, and disposal sites in the US Department of Energy (DOE) complex are important considerations in DOE's Waste Management Programmatic Environmental Impact Statement (WM PEIS). Waste loads are determined in part by the level of treatment the waste has undergone and the complex-wide configuration of origination, treatment, storage, and disposal sites selected for TRUW management. Other elements that impact waste loads are treatment volumes, waste characteristics, and the unit operation parameters of the treatment technologies. Treatment levels and site configurations have been combined into six TRUW management alternatives for study in the WM PEIS. This supplemental report to the WM PEIS gives the projected waste loads and contaminant release profiles for DOE treatment sites under each of the six TRUW management alternatives. It gives TRUW characteristics and inventories for current DOE generation and storage sites, describes the treatment technologies for three proposed levels of TRUW treatment, and presents the representative unit operation parameters of the treatment technologies. The data presented are primary inputs to developing the costs, health risks, and socioeconomic and environmental impacts of treating, packaging, and shipping TRUW for disposal.

779
(ANL/EAD/TM–27)
Supplemental information related to risk assessment for the off-site transportation of transuranic waste for the U.S. Department of Energy waste management programmatic environmental impact statement. Monette, F.A. (Argonne National Lab., IL (United States). Environmental Assessment Div.); Biwer, B.M.; LePoire, D.J.; Chen, S.Y. Argonne National Lab., IL (United States). Dec 1996. 113p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE98001961. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents supplemental information to support the human health risk assessment conducted for the transportation of transuranic waste (TRUW) in support of the US Department of Energy Waste Management Programmatic Environmental Impact Statement (WM PEIS). Detailed descriptions of the transportation health risk assessment method and results of the assessment are presented in Appendix E of the WM PEIS and are not repeated in this report. This report presents additional information that is not presented in Appendix E but is necessary to conduct the transportation risk assessment for Waste Management (WM) contact- and remote-handed (CH and RH) TRUW. Included are definitions of the TRUW alternatives considered in the WM PEIS, data related to the inventory and to the physical and radiological characteristics of CH and RH TRUW, and detailed results of the assessment for each WM TRUW case considered.

780
(ANL/ESH-HP–96/04)
Building 310 retention tanks characterization report. Sholeen, C.M.; Geraghty, D.C. Argonne National Lab., IL (United States). Dec 1996. 215p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. Order Number DE97002742. Source: OSTI; NTIS; INIS; GPO Dep.

The Health Physics Section of ANL performed a characterization of the Building 310 Service Floor Retention Tank Facility during the months of July and August, 1996. The characterization included measurements for radioactivity, air sampling for airborne particles and sampling to determine the presence and quantity of hazardous materials requiring remediation. Copies of previous lead and asbestos sampling information was obtained from ESH-IH. The facility consists of ten retention tanks located in rooms, A-062A, A-050A, A-038A, A-026A, and an entry room A-068A which contained miscellaneous pumps and other scrap material. Significant contamination was found in each room except room A-068A which had two contaminated spots on the floor and a discarded contaminated pump. Room A-062A: This room had the highest radiation background. Therefore, beta readings reflected the background readings. The floor, west wall, and the exterior of tank No. 1 had areas of alpha contamination. The piping leading from the tank had elevated gamma readings. There were low levels of smearable contamination on the west wall-Room A-050A: Alpha and Beta contamination is wide spread on the floor, west wall and the lower portion of the north wall. An area near the electrical box on the west wall had alpha and beta loose contamination. The exterior of tank No. 4 also had contaminated areas. The grate in front of tank No. 4 was contaminated. The piping leading from tanks No. 2, 3, and 4 had elevated gamma readings. There were low levels of smearable contamination on tank No. 4 and on the tar paper that is glued to the floor.

781
(BHI–00922)
1995 Phase 1 concrete sampling at the decontaminated 183-H basins. Kramer, C.D. Bechtel Hanford, Inc., Richland, WA (United States). 3 Oct 1996. 764p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050653. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides a consolidated reference for 1995 concrete sampling data associated with the Hanford Site's 183-H Solar Evaporation Basins (located at the Hanford Site in Richland, Washington). In 1995, the basins were decontaminated and dismantled. Sampling efforts began after completion of concrete decontamination efforts. Soil and water samples were collected and are described in chronological order in this report.

782
(BHI–00949)
Fiscal year 1996 groundwater sampling for the Horn Rapids Landfill. Kemp, C.J.; Ford, B.H. Bechtel Hanford,

Inc., Richland, WA (United States). Oct 1996. 38p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97050645. Source: OSTI; NTIS; INIS; GPO Dep.

The Horn Rapids Landfill is contained within the 1100-EM-1 Operable Unit immediately north of Richland, Washington. The landfill is a 20 hectare size area and was placed on the National Priorities List in July 1989. The landfill was used primarily to dispose of office and construction waste, asbestos, sewage sludge, and fly ash. The remedial investigation/feasibility study for the operable unit identified some polychlorinated biphenol-contaminated soil in the landfill. The operable unit record of decision included excavation of the PCB-contaminated soil and placing a soil cap over the landfill in April 1995.

783
(BHI–01055)
Characterization report for Buildings 3706 and 37006A. Smith, D.S. Bechtel Hanford, Inc., Richland, WA (United States). Jun 1997. 1016p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE97053960. Source: OSTI; NTIS; INIS; GPO Dep.

The 3706 and 3706A Buildings were originally constructed to perform small-scale experiments in support of all Hanford Engineering Works production activities. The primary focus was to perform radiochemical trials aimed at improving the bismuth phosphate process. The facility housed 19 offices, 2 shops, a dark room, 2 storerooms, a lunchroom, locker room, ventilating equipment room, sanitary restrooms, and 57 laboratories, including a special laboratory with 0.6-m-(2-ft) thick concrete walls reserved for the hottest analytical work. The 3706 Building was decontaminated and remodeled in 1954 and 1955, and many of the laboratories were converted to offices at that time. By 1964, the facility was called the General Services Building, and although it still contained some analytical laboratories, the majority of the space was devoted to mail, duplicating, photographic, and drafting services; a first aid station, and the 300 Area Hanford Patrol headquarters. All laboratory work was eventually phased out by the end of the 1980's. The primary objective of the characterization activities described in this report is to properly designate the building debris waste in preparation for demolition of the building and disposal at the Environmental Restoration Disposal Facility Waste. The scope of services for this characterization project included the following tasks: historical records review; facility inspection; radiological surveys; data quality objective; sampling and analysis instruction; field sampling and laboratory analysis; preparation of this characterization report.

784
(CONF-960212–80)
Underground radioactive waste tank remote inspection and sampling. Bzorgi, F.M.; Kelsey, A.P.; Van Hoesen, S.D.; Wiles, C.O. Oak Ridge National Lab., TN (United States). 1996. 4p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment; Tucson, AZ (United States); 25-29 Feb 1996. Order Number DE96008803. Source: OSTI; NTIS; INIS; GPO Dep.

Characterization is a critical step in the remediation of contaminated materials and facilities. Severe physical- and radiological-access restrictions made the task of characterizing the World War II-era underground radioactive storage tanks at the Oak Ridge National Laboratory (ORNL) particularly challenging. The innovative and inexpensive tank characterization system (TCS) developed to meet this challenge at ORNL is worthy of consideration for use in similar remediation projects. The TCS is a floating system that uses the existing water in the tank as a platform that supports instruments and samplers mounted on a floating boom. TCS operators feed the unit into an existing port of the tank to be characterized. Once inserted, the system's position is controlled by rotation and by insertion and withdrawal of the boom. The major components of the TCS system include the following: (1) boom support system that consists of a boom support structure and a floating boom, (2) video camera and lights, (3) sludge grab sampler, (4) wall chip sampler, and (5) sonar depth finder. This simple design allows access to all parts of a tank. Moreover, the use of off-the-shelf components keeps the system inexpensive and minimizes maintenance costs. The TCS proved invaluable in negotiating the hazards of ORNL's Gunite and Associated Tanks, which typically contain a layer of radioactive sludge, have only one to three access ports that are usually only 12- or 24-in. in diameter, and range from 12 to 50 ft in diameter. This paper reviews both the successes and the difficulties encountered in using the TCS for treatability studies at ORNL and discusses the prospects for its wider application in remediation activities.

785
(CONF-960477–1)
Clean enough for industry? An airborne geophysical case study. Nyquist, J.E.; Beard, L.P. Oak Ridge National Lab., TN (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From 9. annual symposium on the application of geophysics to engineering and environmental problems; Denver, CO (United States); 15 Apr - 1 May 1996. Order Number DE96005483. Source: OSTI; NTIS; INIS; GPO Dep.

Data from two airborne geophysical surveys of the Department of Energy's Oak Ridge Reservation (ORR) were extremely valuable in deciding whether a 1000-acre (400 hectare) parcel of the ORR should be released to the City of Oak Ridge for industrial development. Our findings, based on electromagnetic and magnetic data, were incorporated in the federally mandated Environmental Assessment Statement (EAS), and in general supported claims that this land was never used as a hazardous waste disposal site. We estimated the amount of iron required to produce each anomaly using a simple dipole model. All anomalies with equivalent sources greater than approximately 1000 kg of iron were checked in the field, and the source of all but one identified as either a bridge, reinforced concrete debris, or a similarly benign object. Additionally, some smaller anomalies (equivalent sources of roughly 500 kg) have been checked; thus far, these also have innocuous sources. Airborne video proved invaluable in identifying logging equipment as the source of some of these anomalies. Geologic noise may account for some of the remaining anomalies. Naturally occurring accumulations of magnetic

minerals in the soil on the ORR have been shown to produce anomalies which, at a sensor height of 30 m, are comparable to the anomaly produced by about 500 kg of iron. By comparison, the electronic noise of the magnetic gradiometer, 0.01–0.02 nT/m, is equivalent to only about 50–100 kg of iron at a 30 m sensor height. The electromagnetic data, combined with field mapping of karst structures, provided evidence of a northeast-southwest striking conduit spanning the parcel. The possible existence of a karst conduit led the EAS authors to conclude that this is a "sensitive hydrologic setting." We conclude that aerial geophysics is an extremely cost-effective, and efficient technique for screening large tracts of land for environmental characterization.

786
(CONF-9606116–7)
Characterization of the molten salt reactor experiment fuel and flush salts. Williams, D.F.; Peretz, F.J. Oak Ridge National Lab., TN (United States). 1996. 9p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC05-84OR21400. From Annual meeting of the American Nuclear Society (ANS); Reno, NV (United States); 16-20 Jun 1996. Order Number DE96008657. Source: OSTI; NTIS; INIS; GPO Dep.

Wise decisions about the handling and disposition of spent fuel from the Molten Salt Reactor Experiment (MSRE) must be based upon an understanding of the physical, chemical, and radiological properties of the frozen fuel and flush salts. These "static" properties can be inferred from the extensive documentation of process history maintained during reactor operation and the knowledge gained in laboratory development studies. Just as important as the description of the salt itself is an understanding of the dynamic processes which continue to transform the salt composition and govern its present and potential physicochemical behavior. A complete characterization must include a phenomenological characterization in addition to the typical summary of properties. This paper reports on the current state of characterization of the fuel and flush salts needed to support waste management decisions.

787
(DOE/AL/62350–24F-REV.1-ATTACH.3)
Ground water hydrology report: Revision 1, Attachment 3. Final. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Dec 1996. 55p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97002320. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents ground water hydrogeologic activities for the Maybell, Colorado, Uranium Mill Tailings Remedial Action Project site. The Department of Energy has characterized the hydrogeology, water quality, and water resources at the site and determined that the proposed remedial action would comply with the requirements of the EPA ground water protection standards.

788
(DOE/AL/62350–207-Rev.2)
Long-term surveillance plan for the Mexican Hat disposal site Mexican Hat, Utah. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). May 1997. 53p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97007526. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Mexican Hat, Utah, disposal site. The U.S. Nuclear Regulatory Commission (NRC) has developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites will be cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the Mexican Hat disposal site. The general license becomes effective when the NRC concurs with the DOE's determination of completion of remedial action for the disposal site and the NRC formally accepts this LTSP. This LTSP describes the long-term surveillance program the DOE will implement to ensure that the Mexican Hat disposal site performs as designed. The program is based on two distinct types of activities: (1) site inspections to identify potential threats to disposal cell integrity, and (2) monitoring of selected seeps to observe changes in flow rates and water quality. The LTSP is based on the UMTRA Project long-term surveillance program guidance and meets the requirements of 10 CFR §40.27(b) and 40 CFR §192.03. 18 refs., 6 figs., 1 tab.

789
(DOE/AL/62350–222-Rev.2(2/97))
Long-term surveillance plan for the Gunnison, Colorado disposal site. Revision 2. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Feb 1997. 75p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97007690. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the US Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Gunnison disposal site in Gunnison County, Colorado. The US Nuclear Regulatory Commission (NRC) has developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites will be cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed, the NRC requires the DOE to submit a site-specific LTSP. This LTSP describes the long-term surveillance program the DOE will implement to ensure that the Gunnison disposal site performs as designed. The program is based on two distinct activities: (1) site inspections to identify threats to disposal cell integrity, and (2) ground water monitoring to demonstrate disposal cell performance.

790
(DOE/AL/62350–235(7/97))
Long-term surveillance plan for the Estes Gulch disposal site near Rifle, Colorado. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Jul 1997. 85p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC

(United States). DOE Contract AC04-91AL62350. Order Number DE98000105. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Estes Gulch disposal site near Rifle, Colorado. This LSTP describes the long-term surveillance program the DOE will implement to ensure the Estes Gulch disposal site performs as designed and is cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed for custody and long-term care, the Nuclear Regulatory Commission (NRC) requires the DOE to submit such a site-specific LTSP.

791
(DOE/AL/62350–243)
Long-term surveillance plan for the Cheney disposal site near Grand Junction, Colorado. Jacobs Engineering Group, Inc., Albuquerque, NM (United States). Apr 1997. 59p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-91AL62350. Order Number DE97007530. Source: OSTI; NTIS; INIS; GPO Dep.

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Cheney disposal site. The site is in Mesa County near Grand Junction, Colorado. The U.S. Nuclear Regulatory Commission (NRC) has developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites are cared for in a manner that protects public health and safety and the environment. Before each disposal site may be licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the Cheney disposal site. The general license becomes effective when the NRC concurs with the DOE's determination that remedial action is complete and the NRC formally accepts this plan. This document describes the long-term surveillance program the DOE will implement to ensure that the Cheney disposal site performs as designed. The program is based on site inspections to identify potential threats to disposal cell integrity. The LTSP is based on the UMTRA Project long-term surveillance program guidance and meets the requirements of 10 CFR §40.27(b) and 40 CFR §192.03.

792
(DOE/EA–1206)
Environmental assessment of no remedial action at the inactive uraniferous lignite ashing sites at Belfield and Bowman, North Dakota. USDOE Albuquerque Operations Office, NM (United States). Uranium Mill Tailings Remedial Action Project Office. Jun 1997. 57p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97008065. Source: OSTI; NTIS; INIS; GPO Dep.

The Belfield and Bowman sites were not included on the original congressional list of processing sites to be designated by the Secretary of Energy. Instead, the sites were nominated for designation by the Dakota Resource Council in a letter to the DOE (September 7, 1979). In a letter to the DOE (September 12, 1979), the state of North Dakota said that it did not believe the sites would qualify as processing sites under the Uranium Mill Tailings Radiation Control Act (UMTRCA) because the activities at the sites involved only the ashing of uraniferous lignite coal and the ash was shipped out of state for actual processing. Nevertheless, on October 11, 1979, the state of North Dakota agreed to the designation of the sites because they met the spirit of the law (reduce public exposure to radiation resulting from past uranium operations). Therefore, these sites were designated by the Secretary of Energy for remedial action. Because of the relatively low health impacts determined for these sites, they were ranked as low priority and scheduled to be included in the final group of sites to be remediated.

793
(DOE/ID/13042–53)
Basalt features observed in outcrops, cores, borehole video imagery and geophysical logs, and basalt hydrogeologic study at the Idaho National Engineering Laboratory, Eastern Idaho. Bennecke, W.M. Idaho National Engineering Lab., Idaho Falls, ID (United States). Oct 1996. 198p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract FG07-91ID13042. Order Number DE97007533. Source: OSTI; NTIS; INIS; GPO Dep.

A study was undertaken to examine permeable zones identified in boreholes open to the underlying basalt and to describe the vertical cross flows present in the boreholes. To understand the permeable zones in the boreholes detailed descriptions and measurements of three outcrops in the Snake River Plain, three cores at the Idaho Chemical Processing Plant (ICPP) at the INEL, and over fifty borehole TV logs from the INEL were carried out. Based on the observations made on the three outcrops an idealized basalt lava flow model was generated that used a set of nomenclature that would be standard for the basalt lava flows studied. An upper vesicular zone, a sometimes absent columnar zone, central zone, and lower vesicular zone make up the basalt lava flow model. The overall distinction between the different zones are based on the vesicle shape size, vesicularity, and fractures present. The results of the studies also indicated that the basalt lava flows at the INEL are distal to medial facies pahoehoe lava flows with close fitting contacts. The most permeable zones identified in these basalts are fractured vesiculated portions of the top of the lava flow, the columnar areas, and basalt-flow contacts in order of importance. This was determined from impeller flowmeter logging at the INEL. Having this information a detailed stratigraphy of individual basalt lava flows and the corresponding permeable units were generated. From this it was concluded that groundwater flow at the ICPP prefers to travel along thin basalt lava flows or flow-units. Flow direction and velocity of intrawell flows detected by flowmeter is controlled by a nearby pumping well.

794
(DOE/ID/13042–54)
Depth and temporal variations in water quality of the Snake River Plain aquifer in well USGS-59 near the Idaho Chemical Processing Plant at the Idaho National Engineering and Environmental Laboratory. Frederick, D.B. (Idaho INEL Oversight Program, Boise, ID (United States)); Johnson, G.S. Idaho Univ., Moscow, ID (United States). Water Resources Research Inst. Mar 1997. 64p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States).

DOE Contract FG07-91ID13042. Order Number DE97006429. Source: OSTI; NTIS; INIS; GPO Dep.

In-situ measurements of the specific conductance and temperature of ground water in the Snake River Plain aquifer were collected in observation well USGS-59 near the Idaho Chemical Processing Plant at the Idaho National Engineering and Environmental Laboratory. These parameters were monitored at various depths in the aquifer from October 1994 to August 1995. The specific conductance of ground water in well USGS-59, as measured in the borehole, ranged from about 450 to 900 { micro} S/cm at standard temperature (25 C). The pumping cycle of the production wells at the Idaho Chemical Processing Plant causes changes in borehole circulation patterns, and as a result the specific conductance of ground water at some depths in the well varies by up to 50% over a period of about 14 hours. However, these variations were not observed at all depths, or during each pumping cycle. The temperature of ground water in the well was typically between 12.8 and 13.8 C. The results of this study indicate that temporal variations in specific conductance of the ground water at this location are caused by an external stress on the aquifer–pumping of a production well approximately 4,000 feet away. These variations are believed to result from vertical stratification of water quality in the aquifer and a subsequent change in intrawell flow related to pumping. When sampling techniques that do not induce a stress on the aquifer (i.e., thief sampling) are used, knowledge of external stresses on the system at the time of sampling may aid in the interpretation of geochemical data.

795
(DOE/LLW–241)
Environmental monitoring report for commercial low-level radioactive waste disposal sites (1960's through 1990's). Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Nov 1996. 190p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97053018. Source: OSTI; NTIS; INIS; GPO Dep.

During the time period covered in this report (1960's through early 1990's), six commercial low-level radioactive waste (LLRW) disposal facilities have been operated in the US. This report provides environmental monitoring data collected at each site. The report summarizes: (1) each site's general design, (2) each site's inventory, (3) the environmental monitoring program for each site and the data obtained as the program has evolved, and (4) what the program has indicated about releases to off-site areas, if any, including a statement of the actual health and safety significance of any release. A summary with conclusions is provided at the end of each site's chapter. The six commercial LLRW disposal sites discussed are located near: Sheffield, Illinois; Maxey Flats, Kentucky; Beatty, Nevada; West Valley, New York; Barnwell, South Carolina; Richland, Washington.

796
(DOE/MC/29101–97/C0814)
The LASI high-frequency electromagnetic subsurface-imaging system: System description and demonstration site-characterization survey at the Idaho National Engineering Laboratory. Sternberg, B.K.; Poulton, M.M. Arizona Univ., Tucson, AZ (United States). Lab. for Advanced Subsurface Imaging. [1996]. 17p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-92MC29101. (CONF-9610231–12: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052254. Source: OSTI; NTIS; INIS; GPO Dep.

A high-frequency, high-resolution, electromagnetic imaging system has been developed for environmental geophysics surveys. Some key features include: (1) rapid surveying to allow dense spatial sampling over a large area, (2) high-accuracy measurements which are used to produce a high-resolution image of the subsurface, (3) measurements which have excellent signal-to-noise ratio over a wide bandwidth (31 kHz to 32 MHz), (4) large-scale physical modeling to produce accurate theoretical responses over targets of interest in environmental geophysics surveys, (5) rapid neural network interpretation at the field site, and (6) visualization of complex structures during the survey. A field survey was conducted at INEL, Nov. 28-Dec. 1, 1995, over the Cold Test Pit, which simulates waste pits at INEL and other DOE sites.

797
(DOE/MC/29109–97/C0793)
Road transportable analytical laboratory (RTAL) system. Finger, S.M. Engineering Computer Optecnomics, Inc., Annapolis, MD (United States). [1996]. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-92MC29109. (CONF-9610231–33: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052235. Source: OSTI; NTIS; INIS; GPO Dep.

Remediation of DOE contaminated areas requires extensive sampling and analysis. Reliable, road transportable, fully independent laboratory systems that could perform on-site a full range of analyses meeting high levels of quality assurance and control, would accelerate and thereby reduce the cost of cleanup and remediation efforts by (1) providing critical analytical data more rapidly, and (2) eliminating the handling, shipping, and manpower associated with sample shipments. Goals of RTAL are to meet the needs of DOE for rapid, accurate analysis of a wide variety of hazardous and radioactive contaminants in soil, groundwater, and surface waters. The system consists of a set of individual laboratory modules deployable independently or together, to meet specific site needs: radioanalytical lab, organic chemical analysis lab, inorganic chemical analysis lab, aquatic biomonitoring lab, field analytical lab, robotics base station, decontamination/sample screening module, and operations control center. Goal of this integrated system is a sample throughput of 20 samples/day, providing a full range of accurate analyses on each sample within 16 h (after sample preparation), compared with the 45- day turnaround time in commercial laboratories. A prototype RTAL consisting of 5 modules was built and demonstrated at Fernald(FEMP)'s OU-1 Waste Pits, during the 1st-3rd quarters of FY96 (including the '96 Blizzard). All performance and operational goals were met or exceeded: as many as 50 sample analyses/day were achieved, depending on the procedure, sample turnaround times were 50-67% less than FEMP's best times, and RTAL costs were projected to be 30% less than FEMP costs for large volume analyses in fixed laboratories.

798
(DOE/MC/29118–97/C0794)
Field-usable portable analyzer for chlorinated organic compounds. Buttner, W.J.; Penrose, W.R.; Stetter, J.R.; Williams, R.D. Transducer Research, Inc., Aurora, IL (United States). [1996]. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-92MC29118. (CONF-9610231–34: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052236. Source: OSTI; NTIS; INIS; GPO Dep.

In 1992, a chemical sensor was developed which showed almost perfect selectivity to vapors of chlorinated solvents. When interfaced to an instrument, a chemical analyzer will be produced that has near- absolute selectivity to vapors of volatile chlorinated organic compounds. TRI has just completed the second of a 2-phase program to develop this new instrument system, which is called the RCL MONITOR. In Phase II, this instrument was deployed in 5 EM40 operations. Phase II applications covered clean-up process monitoring, environmental modeling, routine monitoring, health and safety, and technology validation. Vapor levels between 0 and 100 ppM can be determined in 90 s with a lower detection limit of 0.5 ppM using the hand-portable instrument. Based on the favorable performance of the RCL MONITOR, the commercial instrument was released for commercial sales on Sept. 20, 1996.

799
(DOE/MC/30176–97/C0823)
Three dimensional characterization and archiving system. Clark, R.; Gallman, P.; Gaudreault, J.; Mosehauer, R.; Slotwinski, A.; Jarvis, G.; Griffiths, P. Coleman Research Corp., Springfield, VA (United States). [1996]. 52p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-93MC30176. (CONF-9610231–20: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052263. Source: OSTI; NTIS; INIS; GPO Dep.

This system (3D-ICAS) is being developed as a remote system to perform rapid in situ analysis of hazardous organics and radionuclide contamination on structural materials. It is in the final phase of a 3-phase program to support Decontamination and Decommissioning (D&D) operations. Accurate physical characterization of surfaces and radioactive and organic contamination is a critical D&D task. Surface characterization includes identification of dangerous inorganic materials such as asbestos and transite. 3D-ICAS robotically conveys a multisensor probe near the surfaces to be inspected, using coherent laser radar tracking, which also provides 3D facility maps. High-speed automated organic analysis is provided by means of gas chromatograph-mass spectrometer sensor which can process a sample without contact in one minute. Volatile organics are extracted directly from contaminated surfaces without sample removal; multiple stage focusing is used for high time resolution. Additional discrimination is obtained through a final stage time-of-flight mass spectrometer. The radionuclide sensors combines α, β, and γ counting with energy discrimination of the α channel; this quantifies isotopes of U, Pu, Th, Tc, Np, and Am in one minute. The Molecular Vibrational Spectrometry sensor is used to characterize substrate material such as concrete, transite, wood, or asbestos; this can be used to provide estimates of the depth of contamination. The 3D-ICAS will be available for real-time monitoring immediately after each 1 to 2 minute sample period. After surface mapping, 3-D displays will be provided showing contours of detected contaminant concentrations. Permanent measurement and contaminant level archiving will be provided, assuring data integrity and allowing regulatory review before and after D&D operations.

800
(DOE/MC/32110–97/C0810)
Measurement of radionuclides using ion chromatography and flow-cell scintillation counting with pulse shape discrimination. DeVol, T.A. (Clemson Univ., SC (United States). Dept. of Environmental Systems Engineering); Fjeld, R.A.; Roane, J.E.; Leyba, J.D.; Branton, S.D. South Carolina Universities Research and Education Foundation, Clemson, SC (United States). Strom Thurman Inst. [1996]. 11p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-95MC32110. (CONF-9610231–9: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052250. Source: OSTI; NTIS; INIS; GPO Dep.

Principal conclusions are: CsI(Tl) provides sufficient pulse shape discrimination for use in the flow-cell detector. However, an improved method of coating is needed to extend the useful life of a detection cell. Of the activation/fission products investigated, only the co-elution of ^{137}Cs and ^{63}Ni produced a radiological interference. Tritium (and presumably other non-ionic radioisotopes) can be separated during the loading of the solution onto the pre- concentration column. Natural U (and/or decay products) produced a radiological interference with ^{90}Sr. This is a potential problem. No potential radiological interferences were observed with ^{223}Th. Chemical interferences were observed to some degree for all the chemicals tested except for the chloride solutions, NaCl and KCl, and the sulfate solution, Na_2SO_4. The specific interference effects were decreased detection efficiencies and changes in peak elution times. The NEL's (non-observable effects loadings) are tentative targets for development of sample processing protocols, which is the next phase of the work.

801
(DOE/MC/33127–97/C0788)
Waste inspection tomography (WIT). Bernardi, R.T. BioImaging Research, Inc., Lincolnshire, IL (United States). [1996]. 4p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC21-96MC33127. (CONF-9610231–38: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052230. Source: OSTI; NTIS; INIS; GPO Dep.

WIT is a self-sufficient mobile semitrailer for nondestructive evaluation and nondestructive assay of nuclear waste drums using x-ray and gamma-ray tomography. The recently completed Phase I included the design, fabrication, and initial testing of all WIT subsystems installed on-board the trailer. Initial test results include 2 MeV digital radiography, computed tomography, Anger camera imaging, single

photon emission computed tomography, gamma-ray spectroscopy, collimated gamma scanning, and active and passive computed tomography using a 1.4 mCi source of ^{166}Ho. These techniques were initially demonstrated on a 55-gallon phantom drum with 3 simulated waste matrices of combustibles, heterogeneous metals, and cement using check sources of gamma active isotopes such as ^{137}Cs and ^{133}Ba with 9-250 μCi activities. Waste matrix identification, isotopic identification, and attenuation-corrected gamma activity determination were demonstrated nondestructively and noninvasively in Phase I. Currently ongoing Phase II involves DOE site field test demonstrations at LLNL, RFETS, and INEL with real nuclear waste drums. Current WIT experience includes 55 gallon drums of cement, graphite, sludge, glass, metals, and combustibles. Thus far WIT has inspected drums with 0-20 gms of ^{239}Pu.

802
(DOE/NV–462-Rev.1)
Resource Conservation and Recovery Act industrial site environmental restoration site characterization plan, Area 23, Building 650 Leachfield. Revision 1. USDOE Nevada Operations Office, Las Vegas, NV (United States). Mar 1997. 101p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC08-97NV13052. Order Number DE97003944. Source: OSTI; NTIS; INIS; GPO Dep.

This plan presents the strategy for the characterization of Corrective Action Unit 94, Area 23, Building 650 Leachfield (referred to as 650 Leachfield) at the Nevada Test Site, which will be conducted for the US Department of Energy Nevada Operations Office Environmental Restoration Division. The objectives of the planned activities are to: obtain sufficient sample analytical data from which further assessment, remediation, and/or closure strategies may be developed for the site; and obtain sufficient sample analytical data for management of investigation-derived waste. All references to regulations in this plan are to the versions of the regulations that are current at the time of publication of this plan. The scope of the characterization will include subsurface soil boring, in situ sampling of the soil within subsurface soil borings, and sample analysis for both site characterization and waste management purposes.

803
(DOE/NV/11508–19)
Assessment of hydrologic transport of radionuclides from the Rio Blanco underground nuclear test site, Colorado. Chapman, J.; Earman, S.; Andricevic, R. Nevada Univ., Las Vegas, NV (United States). Desert Research Inst. Oct 1996. 33p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC08-95NV11508. Order Number DE97003548. Source: OSTI; NTIS; INIS; GPO Dep.

DOE is operating an environmental restoration program to characterize, remediate, and close non-Nevada Test Site locations used for nuclear testing. Evaluation of radionuclide transport by groundwater is part of preliminary risk analysis. These evaluations allow prioritization of test areas in terms of risk, provide a basis for discussions with regulators and the public about future work, and provide a framework for assessing site characterization data needs. The Rio Blanco site in Colorado was the location of the simultaneous detonation of three 30-kiloton nuclear devices. The devices were located 1780, 1899, and 2039 below ground surface in the Fort Union and Mesaverde formations. Although all the bedrock formations at the site are thought to contain water, those below the Green River Formation (below 1000 in depth) are also gas-bearing, and have very low permeabilities. The transport scenario evaluated was the migration of radionuclides from the blast-created cavity through the Fort Union Formation. Transport calculations were performed using the solute flux method, with input based on the limited data available for the site. Model results suggest that radionuclides from the test are contained entirely within the area currently administered by DOE. This modeling was performed to investigate how the uncertainty in various physical parameters affect radionuclide transport at the site, and to serve as a starting point for discussion regarding further investigation; it was not intended to be a definitive simulation of migration pathways or radionuclide concentration values. Given the sparse data, the modeling results may differ significantly from reality. Confidence in transport predictions can be increased by obtaining more site data, including the amount of radionuclides which would have been available for transport (i.e., not trapped in melt glass or vented during gas flow testing), and the hydraulic properties of the formation. 38 refs., 6 figs., 1 tab.

804
(DOE/OR–01-1577&D1)
Sampling and analysis plan for volatile organic compounds in storm drain for the Upper East Fork Poplar Creek characterization area remedial investigation at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge National Lab., TN (United States). Mar 1997. 67p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97005320. Source: OSTI; NTIS; INIS; GPO Dep.

The Oak Ridge Y-12 Plant, located within the Oak Ridge Reservation (ORR), is owned by the US Department of Energy and managed by Lockheed Martin Energy Systems, Inc. The Y-12 Plant is one of three major facilities on the ORR. The ORR contains both hazardous- and mixed-waste sites that are subject to regulations promulgated under the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986. Under RCRA guidelines and requirements from the Tennessee Department of Environment and Conservation, the Y-12 Plant initiated investigation and monitoring of various sites within its boundaries in the mid-1980s. The entire ORR was placed on the National Priorities List of CERCLA sites in November 1989. Following CERCLA guidelines, sites under investigation require a remedial investigation (RI) to define the nature and extent of contamination, evaluate the risks to public health and the environment, and determine the goals for a feasibility study (FS) of potential remedial actions.

805
(DOE/RL–95-101)
An analysis of potential impacts to the groundwater monitoring networks in the Central Plateau. Revision 0. Department of Energy, Richland, WA (United States). Richland Operations Office. [1996]. 96p. Sponsored by USDOE,

Washington, DC (United States). DOE Contract AC06-93RL12367. Order Number DE96005876. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results of an evaluation of potential impacts to the four groundwater monitoring projects operating in the Central Plateau of the Hanford Site. It specifically fulfills Milestone M-15-81A of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement). Milestone M-15-81A specifies the evaluation of the potential impacts to the groundwater monitoring well systems in the Central Plateau caused by the following activities: reduction of liquids discharged to soil, proposed and operational liquid treatment facilities, and proposed pump-and-treat systems. For this report, an "impact" is defined as a restriction of the ability to draw samples from a well and/or a reduction of the ability of a monitoring well to meet its intended purpose (such as the detection of contaminant seepage from a facility). Approximately 20% (74 wells) of the groundwater monitoring wells potentially will experience sampling problems by the year 2005 due to the declining water table in the Central Plateau. Reduction of discharges to the B Pond complex and operation of the Treated Effluent Disposal System will directly cause four additional wells to potentially experience sampling problems. Approximately 90 monitoring wells (35 of which are Resource Conservation and Recovery Act of 1976 [RCRA] wells) will be potentially affected by the operation of pump-and-treat systems in the 200 West Area. Most of the impacts will be caused by local changes to groundwater flow directions that will potentially reduce the ability of the RCRA well network to monitor a limited number of RCRA facilities.

806
(DOE/WIPP–95-2154)
Basic data report for WQSP 1; WQSP 2; WQSP 3; WQSP 4; WQSP 5; WQSP6; and WQSP 6a. USDOE Albuquerque Operations Office, NM (United States). Waste Isolation Pilot Plant Project Office. [1996]. 146p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-86AL31950. Order Number DE96010604. Source: OSTI; NTIS; INIS; GPO Dep.

The Waste Isolation Pilot Plant (WIPP) is located in southeastern New Mexico about 30 miles east of Carlsbad, New Mexico. The WIPP was authorized by Congress in 1979 (Public Law 96-194) and given the mission to provide "...a research and development facility to demonstrate the safe disposal of radioactive wastes resulting from the defense activities and programs of the United States exempted from regulation by the Nuclear Regulatory Commission." The WIPP is intended to receive, handle, and permanently dispose of transuranic waste. To fulfill this mission, the U.S. Department of Energy is constructing a full scale facility to demonstrate both technical and operational principles of the permanent storage/disposal of transuranic waste. Technical aspects are those concerned with the design, construction, and performance of subsurface structures. Operational aspects refer to-the receiving, handling, and emplacement of transuranic waste in salt. The facility is also designed for in situ studies and experiments in salt. The Water Quality Sampling Program (WQSP) evaluates the physical and chemical properties of the groundwater above the repository horizon that are part of the technical performance aspects.

807
(EML–586)
Report of the Department of Energy, Office of Environmental Management, Gamma Spectrometry Data Validation Program. Decker, K.; Sanderson, C.G.; Greenlaw, P. USDOE Environmental Measurements Lab., New York, NY (United States). Nov 1996. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97007843. Source: OSTI; NTIS; INIS; GPO Dep.

This report represents the results of analyses received on or before August 15, 1996 for the first annual Gamma Spectrometry Data Validation Program (May 1996) designed to assess the capability of DOE laboratories and DOE contractors in performing routine gamma spectra analyses. Data reduction of gamma spectra are normally performed with computer codes supplied by commercial manufacturers or are developed in house. Earlier evaluations of commercial codes gave spurious results for complex spectrum. A calibration spectrum, a background spectrum and three sample spectra of increasing complexity were included for each format. The calibration spectrum contained nuclides covering the energy range from 59.5 keV to 1836 keV. The first two samples contained fallout nuclides with halflives of over 30 days. Naturally occurring nuclides were also present. The third sample contained both short and long lived fission product nuclides. The participants were asked to report values and uncertainties as Becquerel per sample with no decay correction. Sixteen software packages were evaluated. In general, the results do not appear to be dependent on the software used. Based on the control limits established for the Program for the three sample spectra, 62%, 63% and 53%, respectively, of the reported results were evaluated as acceptable.

808
(EML–587)
Semi-annual report of the Department of Energy Office of Environmental Management quality assessment program. Sanderson, C.G.; Greenlaw, P. USDOE Environmental Measurements Lab., New York, NY (United States). Jan 1997. 282p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97008521. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from the soil inorganic analysis of the 45th set of environmental quality assessment samples (QAP XLV) that were received on or before December 2, 1996.

809
(EML–591)
Semi-annual report of the Department of Energy, Office of Environmental Management, Quality Assessment Program. Greenlaw, P.D. USDOE Environmental Measurements Lab., New York, NY (United States). Jul 1997. 364p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). Order Number DE97008522. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents the results from the soil inorganic analysis of the 46th set of environmental quality assessment samples that were received on or before June 2, 1997.

810
(ES/ER/TM–144)
Technical specification for transferring National Pollutant Discharge Elimination System water data to the Oak Ridge Environmental Information System. Oak Ridge National Lab., TN (United States). Nov 1996. 57p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97001829. Source: OSTI; NTIS; INIS; GPO Dep.

The primary goal of this technical specification is to meet the consolidated environmental data requirements defined by the Federal Facility (FFA) and the Tennessee Oversight Agreement (TOA) as they pertain to NPDES surface water data maintained in Oak Ridge, Tennessee, by the Department of Energy's Maintenance and Operations (M&O) contractor Martin Marietta Energy Systems and prime contractors to DOE. This technical specification describes the organizational responsibilities for getting NPDES data into OREIS, describes the logical data transfer file required from NPDES, addresses business rules and submission rules, describes the physical data transfer file, addresses configuration control of this technical specification, and addresses required changes to the current OREIS data base structure due to the requirements of NPDES.

811
(GJO–96-3-TAR)
Environmental cleanup privatization, products and services directory, January 1997. Second edition. Mactec Environmental Restoration Services, Grand Junction, CO (United States). Jan 1997. 855p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87335. (GJO–122). Order Number DE97003299. Source: OSTI; NTIS; INIS; GPO Dep.

The US Department of Energy has undertaken an ambitious "Ten Year Plan" for the Weapons Complex, an initiative to complete cleanup at most nuclear sites within a decade. This Second Edition of the Directory is designed to facilitate privatization which is key to the success of the Plan. The Directory is patterned after the telephone Yellow Pages. Like the Yellow Pages, it provides the user with points of contact for inquiring further into the capabilities of the listed companies. This edition retains the original format of three major sections under the broad headings: Treatment, Characterization, and Extraction/Deliver/Materials Handling. Within each section, companies are listed alphabetically. Also, "company name" and "process type" indices are provided at the beginning of each section to allow the user quick access to listings of particular interest.

812
(GJO–96-13-TAR)
Spectrum shape-analysis techniques applied to the Hanford Tank Farms spectral gamma logs. Wilson, R.D. USAEC Grand Junction Office, CO (United States). May 1997. 65p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87335. Order Number DE97007326. Source: OSTI; NTIS; INIS; GPO Dep.

Gamma-ray spectra acquired with high-energy resolution by the spectral gamma logging systems (SGLSs) at the U.S. Department of Energy Hanford Tank Farms, Richland, Washington, are being analyzed for spectral shape characteristics. These spectral shapes, together with a conventional peak-area analysis, enable an analyst not only to identify the gamma-emitting species but also to determine in many instances its spatial distribution around a borehole and to identify the presence of the bremsstrahlung-producing contaminant ^{90}Sr. The analysis relies primarily on the results of computer simulations of gamma spectra from the predominant radionuclide ^{137}Cs for various spatial distributions. This log analysis methodology has evolved through an examination of spectral features from spectral logs taken at the SX, BY, and U Tank Farms at the Hanford Site. Initial results determined with this technique show it is possible, in most cases, to distinguish between concentrations of ^{137}Cs. Work is continuing by experimentally measuring shape factors, incorporating spectrum shape processing in routine log analysis, and extending the techniques to additional radionuclides.

813
(GJO–97-11-FOS)
Site environmental report for calendar year 1996. USAEC Grand Junction Office, CO (United States). Jun 1997. 152p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87460. Order Number DE97007304. Source: OSTI; NTIS; INIS; GPO Dep.

This Annual Site Environmental Report presents information pertaining to environmental activities conducted during calendar year 1996 at the U.S. Department of Energy (DOE) Grand Junction Office (GJO) facility in Grand Junction, Colorado. WASTREN-Grand Junction, the Facility Operations and Support contractor for the GJO, prepared this report in accordance with the requirements of DOE Order 5400.1, General Environmental Protection Program, and supplemental guidance from DOE Headquarters. This report applies specifically to the GJO facility; the Monticello Mill Tailings Site Environmental Summary for Calendar Year 1996 was prepared as a separate document. Primary GJO activities involve laboratory analysis of environmental samples from GJO and other DOE sites and site remediation of contamination caused by previous uranium mill operations. Activities at the GJO are conducted in compliance with applicable Federal, State, and local regulations and requirements and as directed by applicable DOE orders. Environmental monitoring is performed on air emissions, sewer effluent, surface water and groundwater, and wetlands restoration. Wastes are generated from the Analytical Laboratory, site remediation, and facility operation.

814
(GJO–97-12-FOS-Vol.1)
Technical basis for radiological release of Grand Junction Office Building 2. Volume 1, dose assessment. Morris, R.; Warga, J.; Thorne, D. USAEC Grand Junction Office, CO (United States). Jul 1997. 20p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87460. Order Number DE97007305. Source: OSTI; NTIS; INIS; GPO Dep.

Building 2 on the US Department of Energy (DOE) Grand Junction Office (GJO) site is part of the GJO Remedial Action Program (GJORAP). During evaluation of Building 2 for determination of radiological release disposition, some inaccessible surface contamination measurements were detected to be greater than the generic surface contamination

guidelines of DOE Order 5400.5 (which are functionally equivalent to US Nuclear Regulatory Commission [NRC] Regulatory Guide 1.86). Although the building is nominal in size, it houses the site telecommunications system, that is critical to continued GJO operations, and demolition is estimated at $1.9 million. Because unrestricted release under generic surface contamination guidelines is cost-prohibitive, supplemental standards consistent with DOE Order 5400.5 are being pursued. This report describes measurements and dose analysis modeling efforts to evaluate the radiation dose to members of the public who might occupy or demolish Building 2, a 2,480 square-foot (ft) building constructed in 1944. The north portion of the building was used as a shower facility for Manhattan Project uranium-processing mill workers and the south portion was a warehouse. Many originally exposed surfaces are no longer accessible for contamination surveys because expensive telecommunications equipment have been installed on the floors and mounted on panels covering the walls. These inaccessible surfaces are contaminated above generic contamination limits.

815
(GJO–97-12-FOS-Vol.2)
Technical basis for radiological release of Grand Junction Office Building 2. Volume 2, dose assessment supporting data. USAEC Grand Junction Office, CO (United States). Jul 1997. 620p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC13-96GJ87460. Order Number DE97007306. Source: OSTI; NTIS; INIS; GPO Dep.

The second volume of the Grand Junction Office Action Program Technical Basis for Radiological Release of Grand Junction Office Building 2 report includes the data quality objectives (DQO), sampling plan, collected data, and analysis used to model future radiation doses to members of the public occupying Building 2 on the U.S. Department of Energy (DOE) Grand Junction Office (GJO) site. This volume was assembled by extracting relevant components of the Grand Junction Projects Office Remedial Action Project Building 2 Public Dose Evaluation (DOE 1996) and inserting recent additional data that was gathered and dose pathway modeling that was performed. The intent of this document is to provide all derived guidance decisions, assumptions, measured data, testing results, and pathway modeling software input and output data that supports the discussion and determinations presented in Volume 1 of this report. For constructive employment of this document, the reader is encouraged to closely follow Volume 1 for proper association with the segment of information being examined.

816
(INEL–96/00052)
Field screening of soils contaminated with explosives using ion mobility spectrometry. Crockett, A.B. (Lockheed Idaho Technologies Co., Idaho Falls, ID (United States)); Atkinson, D.A.; Jenkins, T.F. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 7p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-9605208–1: Triservice environmental technology workshop; 12. annual waste testing and quality assurance symposium, Hershey, PA (United States); Washington, DC (United States), 20-22 May 1996; 22-24 Jul 1996; CONF-9607123–4). Order Number DE96014124. Source: OSTI; NTIS; GPO Dep.

Soils contaminated with explosives constitute a problem at DOE facilities and Army installations. Because explosives in soil are often heterogeneously distributed and require high density sampling, field screening is essential to characterize sites more quickly, economically and accurately. Current immunoassay and colorimetric field screening procedures have proven useful, but have significant per sample costs and limited throughput. At present, several field screening are available for TNT in soil, three procedures for RDX, and one procedure for 2,4-DNTand ammonium picrate/picric acid (AP/PA). Ion mobility spectrometry (IMS) has been used to detect explosives in air at ppt levels, but limited work has been done to apply the technique to quantify explosives in soils. The objective of this study has been to evaluate the utility of IMS as a screening technique for quantifying explosive residues in soils.

817
(INEL–96/00187)
Calculation of coincidence summing corrections for a specific small soil sample geometry. Helmer, R.G.; Gehrke, R.J. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 14p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-9609258–1: Advances in alpha-, beta-, and gamma-ray spectrometry, St. Petersburg (Russian Federation), 18-20 Sep 1996). Order Number DE96015243. Source: OSTI; NTIS; INIS; GPO Dep.

Previously, a system was developed at the INEL for measuring the γ-ray emitting nuclides in small soil samples for the purpose of environmental monitoring. These samples were counted close to a $\approx$20% Ge detector and, therefore, it was necessary to take into account the coincidence summing that occurs for some nuclides. In order to improve the technical basis for the coincidence summing corrections, the authors have carried out a study of the variation in the coincidence summing probability with position within the sample volume. A Monte Carlo electron and photon transport code (CYLTRAN) was used to compute peak and total efficiencies for various photon energies from 30 to 2,000 keV at 30 points throughout the sample volume. The geometry for these calculations included the various components of the detector and source along with the shielding. The associated coincidence summing corrections were computed at these 30 positions in the sample volume and then averaged for the whole source. The influence of the soil and the detector shielding on the efficiencies was investigated.

818
(INEL–96/00252)
An expert system framework for nondestructive waste assay. Becker, G.K. Lockheed Martin Idaho Technologies Co., Idaho Falls, ID (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC07-94ID13223. (CONF-960767–71: 37. annual meeting of the Institute of Nuclear Materials Management, Naples, FL (United States), 28 Jul - 1 Aug 1996). Order Number DE96015352. Source: OSTI; NTIS; INIS; GPO Dep.

Management and disposition of transuranic (RU) waste forms necessitates determining entrained RU and associated radioactive material quantities as per National RU Waste Characterization Program requirements. Technical justification and demonstration of a given NDA method used to determine RU mass and uncertainty in accordance with program quality assurance is difficult for many waste forms.

Difficulties are typically founded in waste NDA methods that employ standards compensation and/or employment of simplifying assumptions on waste form configurations. Capability to determine and justify RU mass and mass uncertainty can be enhanced through integration of waste container data/information using expert system and empirical data-driven techniques with conventional data acquisition and analysis. Presented is a preliminary expert system framework that integrates the waste form data base, alogrithmic techniques, statistical analyses, expert domain knowledge bases, and empirical artificial intelligence modules into a cohesive system. The framework design and bases in addition to module development activities are discussed.

819
(INEL–96/0343)
Uncertainty analysis of the SWEPP PAN assay system for glass waste (content codes 440, 441 and 442). Blackwood, L.G.; Harker, Y.D.; Meachum, T.R.; Yoon, W.Y. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Oct 1996. 104p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97050811. Source: OSTI; NTIS; INIS; GPO Dep.

INEL is being used as a temporary storage facility for transuranic waste generated by the Nuclear Weapons program at the Rocky Flats Plant. Currently, there is a large effort in progress to prepare to ship this waste to WIPP. In order to meet the TRU Waste Characterization Quality Assurance Program Plan nondestructive assay compliance requirements and quality assurance objectives, it is necessary to determine the total uncertainty of the radioassay results produced by the Stored Waste Examination Pilot Plant (SWEPP) Passive Action Neutron (PAN) radioassay system. This paper discusses a modified statistical sampling and verification approach used to determine the total uncertainty of SWEPP PAN measurements for glass waste (content codes 440, 441, and 442) contained in 208 liter drums. In the modified statistical sampling and verification approach, the total performance of the SWEPP PAN nondestructive assay system for specifically selected waste conditions is simulated using computer models. A set of 100 cases covering the known conditions exhibited in glass waste was compiled using a combined statistical sampling and factorial experimental design approach. Parameter values assigned in each simulation were derived from reviews of approximately 100 real-time radiography video tapes of RFP glass waste drums, results from previous SWEPP PAN measurements on glass waste drums, and shipping data from RFP where the glass waste was generated. The data in the 100 selected cases form the multi-parameter input to the simulation model. The reported plutonium masses from the simulation model are compared with corresponding input masses. From these comparisons, the bias and total uncertainty associated with SWEPP PAN measurements on glass waste drums are estimated. The validity of the simulation approach is verified by comparing simulated output against results from calibration measurements using known plutonium sources and two glass waste calibration drums.

820
(INEL–96/0431)
SIMS analysis: Development and evaluation program summary. Groenewold, G.S.; Appelhans, A.D.; Ingram, J.C.; Delmore, J.E.; Dahl, D.A. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Nov 1996. 36p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97050810. Source: OSTI; NTIS; INIS; GPO Dep.

This report provides an overview of the "SIMS Analysis: Development and Evaluation Program", which was executed at the Idaho National Engineering Laboratory from mid-FY-92 to the end of FY-96. It should be noted that prior to FY-1994 the name of the program was "In-Situ SIMS Analysis". This report will not go into exhaustive detail regarding program accomplishments, because this information is contained in annual reports which are referenced herein. In summary, the program resulted in the design and construction of an ion trap secondary ion mass spectrometer (IT-SIMS), which is capable of the rapid analysis of environmental samples for adsorbed surface contaminants. This instrument achieves efficient secondary ion desorption by use of a molecular, massive ReO_4^- primary ion particle. The instrument manages surface charge buildup using a self-discharging principle, which is compatible with the pulsed nature of the ion trap. The instrument can achieve high selectivity and sensitivity using its selective ion storage and MS/MS capability. The instrument was used for detection of tri-n-butyl phosphate, salt cake (tank cake) characterization, and toxic metal speciation studies (specifically mercury). Technology transfer was also an important component of this program. The approach that was taken toward technology transfer was that of component transfer. This resulted in transfer of data acquisition and instrument control software in FY-94, and ongoing efforts to transfer primary ion gun and detector technology to other manufacturers.

821
(INEL–96/0437)
Development and testing of a SREX flowsheet for the partitioning of strontium and lead from simulated ICPP sodium-bearing waste. Law, J.D.; Wood, D.J. Lockheed Idaho Technologies Co., Idaho Falls, ID (United States). Nov 1996. 28p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97050836. Source: OSTI; NTIS; INIS; GPO Dep.

Laboratory experimentation has indicated that the SREX process is effective for partitioning ^{90}Sr from acidic radioactive waste solutions located at the Idaho Chemical Processing Plant. Previous countercurrent flowsheet testing of the SREX process with simulated waste resulted in 99.98% removal of Sr. With this previous test, however, Pb was extracted by the SREX solvent and was not back-extracted in the dilute nitric acid strip section. The Pb concentration increased in the recycled solvent and in the aqueous phase of the strip section, resulting in the formation of a Pb precipitate. Subsequently, studies were initiated to identify alternative stripping agents which will selectively strip Sr and Pb from the SREX solvent. Based on the results of these studies, a countercurrent flow sheet was developed and tested in the 5.5-cm Centrifugal Contactor Mockup using simulated waste. The flowsheet tested consisted of an extraction section (0.15 M 4′,4′(5)-di-(tert-butyldicyclohexo)-18-crown-6 and 1.2 M TBP in Isopar-L®), a 0.05 M nitric acid strip section for the removal of Sr from the SREX solvent, a 0.1 M ammonium citrate strip section for the removal

of Pb from the SREX solvent, and a 2.0 M nitric acid equilibration section. The behavior of Sr, Pb, Al, Ca, Hg, Na, Zr, and H^+ was evaluated. The described flowsheet successfully extracted and selectively stripped Sr and Pb from the SBW simulant. Removal efficiencies of 97.9% and 99.91% were obtained for Sr and Pb, respectively. Essentially all of the extracted Sr (99.998%) and 1.9% of extracted Pb exited with the 0.05 M nitric acid strip product; whereas, 0.002% of the extracted Sr and 97.9% of the extracted Pb existed with the 0.1 M ammonium citrate strip product. Also, 95% of the Hg and 63% of the Zr were extracted by the SREX solvent.

822
(INEL/EXT–97/00073)
APNEA/WIT system nondestructive assay capability evaluation plan for select accessibly stored INEL RWMC waste forms. Becker, G.K. Lockheed Martin Idaho Technologies Co., Idaho Falls, ID (United States). Jan 1997. 49p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC07-94ID13223. Order Number DE97053010. Source: OSTI; NTIS; INIS; GPO Dep.

Bio-Imaging Research Inc. (BIR) and Lockheed Martin Speciality Components (LMSC) are engaged in a Program Research and Development Agreement and a Rapid Commercialization Initiative with the Department of Energy, EM-50. The agreement required BIR and LMSC to develop a data interpretation method that merges nondestructive assay and nondestructive examination (NDA/NDE) data and information sufficient to establish compliance with applicable National TRU Program (Program) waste characterization requirements and associated quality assurance performance criteria. This effort required an objective demonstration of the BIR and LMSC waste characterization systems in their standalone and integrated configurations. The goal of the test plan is to provide a mechanism from which evidence can be derived to substantiate nondestructive assay capability and utility statement for the BIT and LMSC systems. The plan must provide for the acquisition, compilation, and reporting of performance data thereby allowing external independent agencies a basis for an objective evaluation of the standalone BIR and LMSC measurement systems, WIT and APNEA respectively, as well as an expected performance resulting from appropriate integration of the two systems. The evaluation is to be structured such that a statement regarding select INEL RWMC waste forms can be made in terms of compliance with applicable Program requirements and criteria.

823
(LA–13210-ENV)
Environmental surveillance at Los Alamos during 1995. Los Alamos National Lab., NM (United States). Oct 1996. 411p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. Order Number DE97005277. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the environmental surveillance program at Los Alamos National Laboratory (LANL or the Laboratory) during 1995. The Laboratory routinely monitors for radiation and for radioactive and nonradioactive materials at (or on) Laboratory sites as well as in the surrounding region. LANL uses the monitoring result to determine compliance with appropriate standards and to identify potentially undesirable trends. Data were collected in 1995 to assess external penetrating radiation; quantities of airborne emissions and liquid effluents; concentrations of chemicals and radionuclides in ambient air, surface waters and groundwaters, municipal water supply, soils and sediments, and foodstuffs; and environmental compliance. Using comparisons with standards, regulations, and background levels, this report concludes that environmental effects from Laboratory operations are small and do not pose a demonstrable threat to the public, Laboratory employees, or the environment.

824
(LA–13210-ENV-Summ.)
Summary of environmental surveillance at Los Alamos during 1995. Los Alamos National Lab., NM (United States). Oct 1996. 19p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-7405-ENG-36. (LALP–96-117). Order Number DE97005278. Source: OSTI; NTIS; INIS; GPO Dep.

Linking the Rio Grande Valley and the Jemez Mountains, New Mexico's Pajarito Plateau is home to a world-class scientific institution. Los Alamos National Laboratory (or the Laboratory), managed by the Regents of the University of California, is a government-owned, Department of Energy-supervised complex investigating all areas of modern science for the purposes of national defense, health, conservation, and ecology. The Laboratory was founded in 1943 as part of the Manhattan Project, whose members assembled to create the first nuclear weapon. Occupying the campus of the Los Alamos Ranch School, American and British scientists gathered on the isolated mesa tops to harness recently discovered nuclear power with the hope of ending World War II. In July 1945, the initial objective of the Laboratory, a nuclear device, was achieved in Los Alamos and tested in White Sands, New Mexico. Today the Laboratory continues its role in defense, particularly in nuclear weapons, including developing methods for safely handling weapons and managing waste. For the past twenty years, the Laboratory has published an annual environmental report. This pamphlet offers a synopsis that briefly explains important concepts, such as radiation and provides a summary of the monitoring results and regulatory compliance status that are explained at length in the document entitled Environmental Surveillance at Los Alamos during 1995.

825
(LA-UR–96-100)
Comparison of photoacoustic radiometry to gas chromatography/mass spectrometry methods for monitoring chlorinated hydrocarbons. Sollid, J.E.; Trujillo, V.L.; Limback, S.P.; Woloshun, K.A. Los Alamos National Lab., NM (United States). [1996]. 17p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-9606125–2: Air and Waste Management (AWM) annual meeting, Nashville, TN (United States), 23-28 Jun 1996). Order Number DE96007170. Source: OSTI; NTIS; INIS; GPO Dep.

A comparison of two methods of gas chromatography mass spectrometry (GCMS) and a nondispersive infrared technique, photoacoustic radiometry (PAR), is presented in the context of field monitoring a disposal site. First is presented an historical account describing the site and early monitoring to provide an overview. The intent and nature of the monitoring program changed when it was proposed to

expand the Radiological Waste Site close to the Hazardous Waste Site. Both the sampling methods and analysis techniques were refined in the course of this exercise.

826
(LA-UR–96-369)
Hydrogeologic analyses in support of the conceptual model for the LANL Area G LLRW performance assessment. Vold, E.L.; Birdsell, K.; Rogers, D.; Springer, E.; Krier, D.; Turin, H.J. Los Alamos National Lab., NM (United States). [1996]. 11p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960212–66: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96008161. Source: OSTI; NTIS; INIS; GPO Dep.

The Los Alamos National Laboratory low level radioactive waste disposal facility at Area G is currently completing a draft of the site Performance Assessment. Results from previous field studies have estimated a range in recharge rate up to 1 cm/yr. Recent estimates of unsaturated hydraulic conductivity for each stratigraphic layer under a unit gradient assumption show a wide range in recharge rate of 10^{-4} to 1 cm/yr depending upon location. Numerical computations show that a single net infiltration rate at the mesa surface does not match the moisture profile in each stratigraphic layer simultaneously, suggesting local source or sink terms possibly due to surface connected porous regions. The best fit to field data at deeper stratigraphic layers occurs for a net infiltration of about 0.1 cm/yr. A recent detailed analysis evaluated liquid phase vertical moisture flux, based on moisture profiles in several boreholes and van Genuchten fits to the hydraulic properties for each of the stratigraphic units. Results show a near surface infiltration region averages 8m deep, below which is a dry, low moisture content, and low flux region, where liquid phase recharge averages to zero. Analysis shows this low flux region is dominated by vapor movement. Field data from tritium diffusion studies, from pressure fluctuation attenuation studies, and from comparisons of in-situ and core sample permeabilities indicate that the vapor diffusion is enhanced above that expected in the matrix and is presumably due to enhanced flow through the fractures. Below this dry region within the mesa is a moisture spike which analyses show corresponds to a moisture source. The likely physical explanation is seasonal transient infiltration through surface-connected fractures. This anomalous region is being investigated in current field studies, because it is critical in understanding the moisture flux which continues to deeper regions through the unsaturated zone.

827
(LA-UR–96-578)
Airborne radioactive contamination monitoring. Whitley, C.R.; Adams, J.R.; Bounds, J.A.; MacArthur, D.W. Los Alamos National Lab., NM (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-9603129–2: 1996 New Mexico conference on the environment, Albuquerque, NM (United States), 12-14 Mar 1996). Order Number DE96006966. Source: OSTI; NTIS; INIS; GPO Dep.

Current technologies for the detection of airborne radioactive contamination do not provide real-time capability. Most of these techniques are based on the capture of particulate matter in air onto filters which are then processed in the laboratory; thus, the turnaround time for detection of contamination can be many days. To address this shortcoming, an effort is underway to adapt LRAD (Long-Range-Alpha-Detection) technology for real-time monitoring of airborne releases of alpa-emitting radionuclides. Alpha decays in air create ionization that can be subsequently collected on electrodes, producing a current that is proportional to the amount of radioactive material present. Using external fans on a pipe containing LRAD detectors, controlled samples of ambient air can be continuously tested for the presence of radioactive contamination. Current prototypes include a two-chamber model. Sampled air is drawn through a particulate filter and then through the first chamber, which uses an electrostatic filter at its entrance to remove ambient ionization. At its exit, ionization that occurred due to the presence of radon is collected and recorded. The air then passes through a length of pipe to allow some decay of short-lived radon species. A second chamber identical to the first monitors the remaining activity. Further development is necessary on air samples without the use of particulate filtering, both to distinguish ionization that can pass through the initial electrostatic filter on otherwise inert particulate matter from that produced through the decay of radioactive material and to separate both of these from the radon contribution. The end product could provide a sensitive, cost-effective, real-time method of determining the presence of airborne radioactive contamination.

828
(LA-UR–96-633)
Migration of Sr-20, Cs-137, and Pu-239/240 in Canyon below Los Alamos outfall. Murphy, J.M.; Mason, C.F.V.; Boak, J.M.; Longmire, P.A. Los Alamos National Lab., NM (United States). 1996. 14p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960212–72: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96008509. Source: OSTI; NTIS; INIS; GPO Dep.

Technical Area-21 (TA-21) of Los Alamos National Laboratory (LANL) is on a mesa bordered by two canyons DP Canyon and Los Alamos (LA) Canyon. DP Canyon is a small semiarid watershed with a well defined channel system where the stream flow is ephemeral. TA-21 has had a complex history of waste disposal as research to determine the chemical and metallurgical properties of nuclear materials occurred here from 1945-1978. Due to these operations, the TA-21 mesa top and bordering canyons have been monitored and characterized by the LANL Environmental Restoration Program. Results identify radionuclide values at outfall. 21-011 (k) which exceed Screening Action Levels, and points along DP Canyon which exceed regional background levels. The radiocontaminants considered in this study are strontium-90, cesium-137, and plutonium-239. This research examines sediment transport and speciation of radionuclide contaminant migration from a source term named SWMU 21-011 (k) down DP Canyon. Three dimensional surface plots of data from 1977-1994 are used to portray the transport and redistribution of radioactive contaminants in an alluvial stream channel. An overall decrease in contamination concentration since 1983 has been observed which could be due to more stringent laboratory controls and also to the removal of main plutonium processing laboratories to another site.

829
(LA-UR–96-1970)
Cyclodextrin-based surface acoustic wave chemical microsensors. Li, D.Q.; Shi, J.X.; Springer, K.; Swanson, B.I. Los Alamos National Lab., NM (United States). [1996]. 5p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-36. (CONF-960804–42: SPECTRUM '96: international conference on nuclear and hazardous waste management, Seattle, WA (United States), 18-23 Aug 1996). Order Number DE96012749. Source: OSTI; NTIS; GPO Dep.

Cyclodextrin thin films were fabricated using either self-assembled monolayer (SAM) or solgel techniques. The resulting host receptor thin films on the substrates of surface acoustic wave (SAW) resonators were studied as method of tracking organic toxins in vapor phase. The mass loading of surface-attached host monolayers on SAW resonators gave frequency shifts corresponding to typical monolayer surface coverages for SAM methods and "multilayer" coverages for sol-gel techniques. Subsequent exposure of the coated SAW resonators to organic vapors at various concentrations, typically 5,000 parts per millions (ppm) down to 100 parts per billions (ppb) by mole, gave responses indicating middle-ppb-sensitivity (~50 ppb) for those sensor-host-receptors and organic-toxin pairs with optimum mutual matching of polarity, size, and structural properties.

830
(ORNL/ER–390)
3001 canal radiological characterization and waste removal report, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Ritchie, M.G. (Science Applications International Corp., Oak Ridge, TN (United States)). Oak Ridge National Lab., TN (United States). Dec 1996. 23p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OR21400. Order Number DE97051279. Source: OSTI; NTIS; INIS; GPO Dep.

An underground steel reinforced concrete transfer and storage canal was built in 1943 and operated as an integral part of the Oak Ridge Graphite Reactor Building (3001) until 1963 when the reactor was shutdown. During operation, the canal was used for under water transfer of irradiated materials and other metals from the reactor in Building 3001 to the Building 3019 hot cell for further processing. After shutdown of the reactor, the canal was used for storage of irradiated materials and fission products until 1990 when the larger materials were removed and stored in the Department of Energy (DOE) approved solid waste management storage facilities. At that time it was discovered that a considerable amount of sludge had accumulated over the intervening years and subsequent analysis showed that the sludge contained Resource Conservation and Recovery Act (RCRA) materials that violated quantities allowed by the RCRA regulations. It was also recognized in 1990 that the canal was losing water to evaporation and the ground at the rate of approximately 400 gallons per day. To maintain water quality; i.e., radionuclide content at or near DOE derived concentration guidelines (DCG), the water in the canal is constantly demineralized using a demineralizer in the Building 3001 and demineralized make up water is supplied from the Building 3004 demineralizer. This report summarizes the 301 Canal Cleanup Task and the solid waste removed from the 3001 Canal in 1996.

831
(ORNL/ER–395)
Summary review of the chemical characterization of liquid and sludge contained in the Old Hydrofracture tanks, Oak Ridge National Laboratory, Oak Ridge, Tennessee. Francis, C.W.; Herbes, S.E. Oak Ridge National Lab., TN (United States). Feb 1997. 46p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97004280. Source: OSTI; NTIS; INIS; GPO Dep.

This report presents analytical data developed from samples collected from the five inactive tanks located at the Old Hydrofracture Facility (OHF) at the Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. The samples were collected during December 1995 and January 1996. The purpose of the sampling and analysis project was (1) to determine whether the tank contents meet ORNL waste acceptance criteria, as specified in the Oak Ridge National Laboratory, Liquid Waste Treatment Systems, Waste Evaluation Criteria; (2) to determine various physical properties of the tank contents that would affect the design of a sludge mobilization system; and (3) to gather information to support a baseline risk assessment. The report focuses on the analytical results used to evaluate the tank contents with regard to nuclear criticality safety requirements and to regulatory waste characterization.

832
(ORNL/TM–13298)
Statistical analysis of radiochemical measurements of TRU radionuclides in REDC waste. Beauchamp, J.; Downing, D.; Chapman, J.; Fedorov, V.; Nguyen, L.; Parks, C.; Schultz, F.; Yong, L. Oak Ridge National Lab., TN (United States). Oct 1996. 105p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97050436. Source: OSTI; NTIS; INIS; GPO Dep.

This report summarizes results of the study on the isotopic ratios of transuranium elements in waste from the Radiochemical Engineering Development Center actinide-processing streams. The knowledge of the isotopic ratios when combined with results of nondestructive assays, in particular with results of Active-Passive Neutron Examination Assay and Gamma Active Segmented Passive Assay, may lead to significant increase in precision of the determination of TRU elements contained in ORNL generated waste streams.

833
(PNNL–11255)
Tank Vapor Characterization Project: Headspace vapor characterization of Hanford Waste Tank 241-BX-105: Results from samples collected on 04/24/96. Thomas, B.L. (and others); Evans, J.C.; Pool, K.H. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 36p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051558. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-BX-105 (Tank BX-105) at the Hanford Site in Washington State. The results described in this report were obtained

to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, on sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in Table S.1. Detailed descriptions of the analytical results appear in the appendices.

834
(PNNL–11256)
Headspace vapor characterization of Hanford waste Tank 241-BX-110: Results from samples collected on 04/30/96. Evans, J.C.; Pool, K.H.; Thomas, B.L.; Olsen, K.B.; Fruchter, J.S.; Silvers, K.L. Pacific Northwest National Lab., Richland, WA (United States). Jan 1997. 61p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051553. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-BX-110 (Tank BX-110) at the Hanford Site in Washington State. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in a table. The three highest concentration analytes detected in SUMMA™ canister and triple sorbent trap samples are also listed in the table. Detailed descriptions of the analytical results appear in the appendices.

835
(PNNL–11257)
Tank Vapor Characterization Project: Headspace vapor characterization of Hanford Waste Tank 241-S-109: Results from samples collected on 06/04/96. Pool, K.H. (and others); Thomas, B.L.; Evans, J.C. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 37p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051557. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-S-109 (Tank S-109) at the Hanford Site in Washington State. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, on sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in Table S.1. Detailed descriptions of the analytical results appear in the appendices.

836
(PNNL–11258)
Tank Vapor Characterization Project: Headspace vapor characterization of Hanford waste tank 241-S-101: Results from samples collected on 06/06/96. Thomas, B.L.; Evans, J.C.; Pool, K.H.; Olsen, K.B.; Fruchter, J.S.; Silvers, K.L. Pacific Northwest National Lab., Richland, WA (United States). Jan 1997. 67p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051519. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-S-101. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained. Analyte concentrations were based on analytical results and sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed.

837
(PNNL–11259)
Tank Vapor Characterization Project: Headspace vapor characterization of Hanford Waste Tank 241-S-103: Results from samples collected on 06/12/96. Evans, J.C. (and others); Pool, K.H.; Thomas, B.L. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 70p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051556. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-S-103 (Tank S-103) at the Hanford Site in Washington State. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in Table S.1. The three highest concentration analytes detected in SUMMA™ canister and

triple sorbent trap samples are also listed in Table S.1. Detailed descriptions of the analytical results appear in the appendices.

838
(PNNL–11262)
Headspace vapor characterization of Hanford waste Tank 241-C-201: Results from samples collected on 06/19/96. Thomas, B.L.; Evans, J.C.; Pool, K.H.; Olsen, K.B.; Fruchter, J.S.; Silvers, K.L. Pacific Northwest National Lab., Richland, WA (United States). Jan 1997. 36p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051554. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-C-201 (Tank C-201) at the Hanford Site in Washington State. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, on sample volumes provided by WHC. A summary, of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in a table. Detailed descriptions of the analytical results appear in the appendices.

839
(PNNL–11263)
Headspace vapor characterization of Hanford waste Tank 241-C-202: Results from samples collected on 06/25/96. Pool, K.H.; Evans, J.C.; Thomas, B.L.; Olsen, K.B.; Fruchter, J.S.; Silvers, K.L. Pacific Northwest National Lab., Richland, WA (United States). Jan 1997. 39p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051555. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-C-202 (Tank C-202) at the Hanford Site in Washington State. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, on sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in a table. Detailed descriptions of the analytical results appear in the appendices.

840
(PNNL–11264)
Tank Vapor Characterization Project: Headspace vapor characterization of Hanford Waste Tank 241-C-204: Results from samples collected on 07/02/96. Thomas, B.L. (and others); Evans, J.C.; Pool, K.H. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 72p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051559. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of the waste storage tank 241-C-204 (Tank C-204) at the Hanford Site in Washington State. The results described in this report were obtained to characterize the vapors present in the tank headspace and to support safety evaluations and tank farm operations. The results include air concentrations of selected inorganic and organic analytes and grouped compounds from samples obtained by Westinghouse Hanford Company (WHC) and provided for analysis to Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, sample volumes provided by WHC. A summary of the inorganic analytes, permanent gases, and total non-methane organic compounds is listed in Table S.1. The three highest concentration analytes detected in SUMMA™ canister and triple sorbent trap samples are also listed in Table S.1. Detailed descriptions of the analytical results appear in the appendices.

841
(PNNL–11269)
Tank vapor characterization project - headspace vapor characterization of Hanford Waste Tank 241-C-107: Second comparison study results from samples collected on 3/26/96. Evans, J.C. (and others); Pool, K.H.; Thomas, B.L. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 78p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052563. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of waste storage tank 241-C-107 (Tank C-107) at the Hanford Site in Washington State. The results described in this report is the second in a series comparing vapor sampling of the tank headspace using the Vapor Sampling System (VSS) and In Situ Vapor Sampling (ISVS) system without high efficiency particulate air (HEPA) prefiltration. The results include air concentrations of water (H_2O) and ammonia (NH_3), permanent gases, total non-methane organic compounds (TO-12), and individual organic analytes collected in SUMMA™ canisters and on triple sorbent traps (TSTs). Samples were collected by Westinghouse Hanford Company (WHC) and analyzed by Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, sample volume measurements provided by WHC.

842
(PNNL–11271)
Tank vapor characterization project. Headspace vapor characterization of Hanford waste tank 241-BY-108: Second comparison study results from samples collected on 3/28/96. Thomas, B.L. (and others); Pool, K.H.; Evans,

J.C. Pacific Northwest Lab., Richland, WA (United States). Jan 1997. 81p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051547. Source: OSTI; NTIS; INIS; GPO Dep.

This report describes the analytical results of vapor samples taken from the headspace of waste storage tank 241-BY-108 (Tank BY-108) at the Hanford Site in Washington State. The results described in this report is the second in a series comparing vapor sampling of the tank headspace using the Vapor Sampling System (VSS) and In Situ Vapor Sampling (ISVS) system without high efficiency particulate air (HEPA) prefiltration. The results include air concentrations of water (H_2O) and ammonia (NH_3), permanent gases, total non-methane organic compounds (TO-12), and individual organic analytes collected in SUMMA™ canisters and on triple sorbent traps (TSTs). Samples were collected by Westinghouse Hanford Company (WHC) and analyzed by Pacific Northwest National Laboratory (PNNL). Analyses were performed by the Vapor Analytical Laboratory (VAL) at PNNL. Analyte concentrations were based on analytical results and, where appropriate, sample volume measurements provided by WHC.

843
(PNNL–11417)
Characterization of anaerobic chloroethene-dehalogenating activity in several subsurface sediments. Skeen, R.S.; Gao, J.; Hooker, B.S.; Quesenberry, R.D. Pacific Northwest Lab., Richland, WA (United States). Nov 1996. 54p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97052706. Source: OSTI; NTIS; GPO Dep.

Anaerobic microcosms of subsurface soils from four locations were used to investigate the separate effects of several electron donors on tetrachloroethylene (PCE) dechlorination activity. The substrates tested were methanol, formate, lactate, acetate, and sucrose. Various levels of sulfate-reducing, acetogenic, fermentative, and methanogenic activity were observed in all sediments. PCE dechlorination was detected in all microcosms, but the amount of dehalogenation varied by several orders of magnitude. Trichloroethylene was the primary dehalogenation product; however, small amounts of cis-1,2-dichloroethylene, 1,1-dichloroethylene, and vinyl chloride were also detected in several microcosms. Lactate-amended microcosms showed large amounts of dehalogenation. in three of the four sediments. One of the two sediments which showed positive activity with lactate also had large amounts of delialogenation with methanol. Sucrose, formate, and acetate also stimulated large amounts of delialogenation in one sediment that showed activity with lactate. These results suggest that lactate may be an appropriate substrate for screening sediments for PCE or TCE delialogenation activity, but that the microbial response is not sufficient for complete in situ bioremediation. A detailed study of the Victoria activity revealed that delialogenation rates were more similar to the Cornell culture than to rates measured for methanogens, or a methanol-enriched sediment culture. This may suggest that these sediments contain a highly efficient delialogenation activity similar to the Cornell culture. This assertion is supported further by the fact that an average of 3% of added reducing equivalents could be diverted to dehalogenation in tests which were conducted using PCE-saturated hexadecane as a constant source of PCE during incubation. Further evidence is needed to confirm this premise. The application of these results to in situ bioremediation of highly contaminated areas are discussed.

844
(PNNL–11457)
West Siberian Basin hydrogeology: Site characterization of Mayak, Tomsk-7, and Krasnoyarsk-26. Hoover, K.A.; Foley, M.G.; Allen, E.A.; Alexander, L.J.; McKinley, M.I. Pacific Northwest National Lab., Richland, WA (United States). Jan 1997. 71p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97004316. Source: OSTI; NTIS; INIS; GPO Dep.

The former Soviet Union has extensive defense-related nuclear production facilities that have released large amounts of hazardous and radioactive waste materials into the air, surface water, and ground water in areas surrounding the production sites. The key sites of concern are Mayak, Tomsk-7, and Krasnoyarsk-26, all located within the West siberian Basin. The Pacific Northwest National Laboratory (PNNL), in cooperation with the Russian Ministry of Atomic Energy (Minatom), has been conducted contaminant-migration studies of Mayak, Tomsk-7, and Krasnoyarsk-26 in Western Siberia since 1993. The intent of this program is to maximize use of US and Russian site characterization, contaminant transport modeling, and remediation technology for the benefit of DOE and Minatom site-cleanup activities. Site characterization activities conducted during FY 1996 comprised evaluating the existing database, developing methods for synthesizing missing data, and designing an effective means of data and technology transfer. Comparison of the database, most of the contents of which have been acquired remotely with contaminant transport modeling data requirements allowed the authors to evaluate the utility of data acquired remotely for modeling purposes, and to identify gaps in the characterization of Russian waste-disposal sites. Identifying these gaps led to the second activity, which was to develop methods for synthesizing missing data from an evaluation of existing data. The authors tested these methods by evaluating geologic fracturing at the Mayak site. The third activity was the development of an effective procedure for data and technology transfer. The goal was to provide the site characterization database to Russian modelers in such a way that the data were easily transported, viewed, and manipulated for use in their models. This report summarizes the results of the three site characterization activities performed during FY 1996.

845
(PNNL–11523)
Combination RCRA groundwater monitoring plan for the 216-A-10, 216-A-36B, and 216-A-37-1 PUREX cribs. Lindberg, J.W. Pacific Northwest National Lab., Richland, WA (United States). Jun 1997. 67p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97053374. Source: OSTI; NTIS; INIS; GPO Dep.

This document presents a groundwater quality assessment monitoring plan, under Resource Conservation and Recovery Act of 1976 (RCRA) regulatory requirements for

three RCRA sites in the Hanford Site's 200 East Area: 216-A-10, 216-A-36B, and 216-A-37-1 cribs (PUREX cribs). The objectives of this monitoring plan are to combine the three facilities into one groundwater quality assessment program and to assess the nature, extent, and rate of contaminant migration from these facilities. A groundwater quality assessment plan is proposed because at least one downgradient well in the existing monitoring well networks has concentrations of groundwater constituents indicating that the facilities have contributed to groundwater contamination. The proposed combined groundwater monitoring well network includes 11 existing near-field wells to monitor contamination in the aquifer in the immediate vicinity of the PUREX cribs. Because groundwater contamination from these cribs is known to have migrated as far away as the 300 Area (more than 25 km from the PUREX cribs), the plan proposes to use results of groundwater analyses from 57 additional wells monitored to meet environmental monitoring requirements of US Department of Energy Order 5400.1 to supplement the near-field data. Assessments of data collected from these wells will help with a future decision of whether additional wells are needed.

846
(PNNL–11553)
Pacific Northwest National Laboratory 300 area facility liquid effluent monitoring: 1994 and 1995 field tests. Riley, R.G.; Thompson, C.J.; Damberg, E.G.; Ballinger, M.Y. Pacific Northwest Lab., Richland, WA (United States). Jul 1997. 114p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054076. Source: OSTI; NTIS; INIS; GPO Dep.

Pacific Northwest National Laboratory Effluent Management Services manages liquid waste streams from some of the 300 Area buildings on the Hanford Site near Richland, Washington, to ensure liquid discharges to the Columbia River are in compliance with permit requirements. The buildings are owned by the U.S. Department of Energy and operated by Pacific Northwest National Laboratory. In fiscal year (FY) 1994 and FY 1995, three field tests were conducted to gather information that could be used to (1) increase the understanding of 300 Area building liquid waste streams based on the characterization and monitoring data collected during calendar year (CY) 1994 and CY 1995 and (2) establish improved methods for evaluating facility releases. The three field tests were (1) an evaluation of a continuous monitoring/event-triggered sampling system, (2) a volatile organic compound hold-time study, and (3) an investigation of the dilution and retention properties of the 300 Area process sewer. The results from the first field test showed that future characterization and monitoring of 300 Area facility liquid waste streams could benefit significantly from augmenting continuous monitoring with event-triggered sampling. Current continuous-monitoring practices (i.e., monitoring of pH, conductivity, and flow) cannot detect discharges of organic pollutants. Effluent control effectiveness would be enhanced by incorporating a continuous total organic carbon analyzer in the system to detect events involving releases of organic compounds. In the second field test, sample hold times were shown to have a significant effect on volatile organic compound data. Samples analyzed in the field within 1 hour of collection generally had 1.5 to 3 times higher volatile organic compound concentrations than those analyzed 1.5 to 4 weeks later at on-site and off-site laboratories, respectively. The number of volatile organic compounds detected also decreased with increasing hold times.

847
(PNNL–11673)
Historical review of long-term soil sampling for environmental surveillance at the Hanford Site and vicinity. Price, K.R.; Rickard, W.H. Pacific Northwest Lab., Richland, WA (United States). Aug 1997. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97054333. Source: OSTI; NTIS; INIS; GPO Dep.

Soil samples have been collected routinely from the environs of the Hanford Site and analyzed since 1971. Correct interpretation of results depends on samples being collected from the same locations, the locations remaining relatively undisturbed, and collection and analytical procedures remaining the same or being equivalent. Historical files, documents, and annual environmental reports were reviewed to evaluate these factors. It was determined that 20 soil sampling locations, 11 onsite and 9 offsite, were established between 1971 and 1977 and represent long-term sampling locations. Sample collection and analytical procedures have remained essentially the same since 1971. The physical ecological attributes of each long-term soil sampling location were evaluated. During the review of historical records, a few results for 1970, 1971, and 1972 were noted as previously unreported in annual or special reports. These results are included in Appendix A. To complete the record, results previously reported in annual environmental reports are given in Appendix B. Global Positioning System (GPS) reading for 20 long-term soil sampling locations are provided in Appendix C.

848
(SAND–95-2583C)
Scoping evaluation of the technical capabilities of DOE sites for disposal of mixed low-level waste. Examples: Sandia National Laboratories and Los Alamos National Laboratory. Gruebel, M.R. (Tech Reps, Inc., Albuquerque, NM (United States)); Parsons, A.M.; Waters, R.D. Sandia National Labs., Albuquerque, NM (United States). 1996. 16p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9603129–1: 1996 New Mexico conference on the environment, Albuquerque, NM (United States), 12-14 Mar 1996). Order Number DE96007059. Source: OSTI; NTIS; INIS; GPO Dep.

The disposal of mixed low-level waste has become an issue for the U.S. Department of Energy and the States since the inception of the Federal Facilities Compliance Act in 1992. Fifteen sites, including Sandia National Laboratories (SNL) and Los Alamos National Laboratory (LANL), have been evaluated to estimate their technical capabilities for disposal of this type of waste after it has been subjected to treatment processes. The analyses were designed to quantify the maximum permissible concentrations of radioactive and hazardous constituents in mixed low-level waste that could potentially be disposed of in a facility at one of the fifteen sites and meet regulatory requirements. The evaluations provided several major insights about the disposal of mixed low-level waste. All of the fifteen sites have the technical capability for disposal of some waste. Maximum permissible concentrations for the radioactive component of

the waste at and sites such as SNL and LANL are almost exclusively determined by pathways other than through groundwater. In general, for the hazardous component of the waste, travel times through groundwater to a point 100 meters from the disposal facility are on the order of thousands of years. The results of the evaluations will be compared to actual treated waste that may be disposed of in a facility at one of these fifteen evaluated sites. These comparisons will indicate which waste streams may exceed the disposal limitations of a site and which component of the waste limits the technical acceptability for disposal. The technical analyses provide only partial input to the decision-making process for determining the disposal sites for mixed low-level waste. Other, less quantitative factors such as social and political issues will also be considered.

849
(SAND–96-0692C)
A general method for the efficient selection of sampling locations for problems in environmental restoration. Rutherford, B.M. Sandia National Labs., Albuquerque, NM (United States). [1996]. 10p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9605103–1: 2. international symposium on spatial accuracy assessment in natural resources and environmental sciences, St. Collins, CO (United States), 21-23 May 1996). Order Number DE96006981. Source: OSTI; NTIS; INIS; GPO Dep.

Problems in environmental restoration that involve detecting or monitoring contamination or site characterization often benefit from procedures that help select sampling or drilling locations for obtaining meaningful data that support the analysis. One example of this type of procedure is a spatial sampling program that will "automatically" (based on the implementation of a computer algorithm) guide an iterative investigation through the process of site characterization at a minimal cost to determine appropriate remediation activities. In order to be effective, such a procedure should translate site and modeling uncertainties into terms that facilitate comparison with regulations and should also provide a methodology that will lead to an efficient sampling plan over the course of the analysis. In this paper, a general framework is given that can accomplish these objectives and can be applied to a wide range of environmental restoration applications. The methodology is illustrated using an example where soil samples support the characterization of a chemical waste landfill area.

850
(SAND–96-1960)
Condensed listing of surface boreholes at the Waste Isolation Pilot Plant Project through 31 December 1995. Hill, L.R. (Sandia National Labs., Albuquerque, NM (United States)); Aguilar, R.; Mercer, J.W.; Newman, G. Sandia National Labs., Albuquerque, NM (United States). Jan 1997. 85p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97003302. Source: OSTI; NTIS; INIS; GPO Dep.

This report contains a condensed listing of Waste Isolation Pilot Plant (WIPP) project surface boreholes drilled for the purpose of site selection and characterization through 31 December 1995. The US Department of Energy (DOE) sponsored the drilling activities, which were conducted primarily by Sandia National Laboratories. The listing provides physical attributes such as location (township, range, section, and state-plane coordinates), elevation, and total borehole depth, as well as the purpose for the borehole, drilling dates, and information about extracted cores. The report also presents the hole status (plugged, testing, monitoring, etc.) and includes salient findings and references. Maps with borehole locations and times-of-drilling charts are included.

851
(SAND–96-2628C)
Scientific studies in support of the Waste Isolation Pilot Plant (WIPP) repository. Chu, M.S.Y.; Weart, W.D. Sandia National Labs., Albuquerque, NM (United States). [1996]. 10p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-971040–1: ICEM '97: 6. international conference on radioactive waste management and environmental remediation, Singapore (Singapore), 12-16 Oct 1997). Order Number DE97005375. Source: OSTI; NTIS; INIS; GPO Dep.

The DOE submitted a Compliance Certification Application for WIPP in october, 1996. A critical part of this application was a Performance Assessment which predicts the cumulative radioactive release to the accessible environment over a time period of 10,000 years. Comparison of this predicted release to the EPA standard shows a comfortable margin of compliance. The scientific understanding that was critical to developing this assessment spans a broad range of geotechnical disciplines, and required a thorough understanding of the site's geology and hydrology. Evaluation of the geologic processes which are active in the site region establishes that there will be no natural breach of site integrity for millions of years, far longer than the 10,000 year regulatory period. Inadvertent human intrusion is, therefore, the only credible scenario to lead to potential radioactive release to the accessible environment. To substantiate this conclusion and to quantify these potential releases from human intrusion, it has been necessary to develop an understanding of the following processes: salt creep and shaft seal efficacy; gas generation from organic decomposition of waste materials and anoxic corrosion of metals in the waste and waste packages; solubilities for actinides in brine; fluid flow in Salado formation rocks, and hydrologic transport of actinides in the overlying dolomite aquifers. Other issues which had to be evaluated to allow definition of breach scenarios were brine reservoir occurrences and their associated reservoir parameters, consequences of mining over the repository, and drilling for natural resources in the vicinity of the repository. Results of all these studies will be briefly summarized in this paper.

852
(SAND–96-2695C)
Prediction of dissolved actinide concentrations in concentrated electrolyte solutions: a conceptual model and model results for the Waste Isolation Pilot Plant (WIPP). Novak, C.F. (Sandia National Labs., Albuquerque, NM (United States)); Moore, R.C.; Bynum, R.V. Sandia National Labs., Albuquerque, NM (United States). 25 Oct 1996. 12p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-960911–5: Canadian Nuclear Society (CNS) international conference on deep geological disposal of radioactive waste, Winnipeg

(Canada), 15-18 Sep 1996). Order Number DE97001806. Source: OSTI; NTIS; INIS; GPO Dep.

The conceptual model for WIPP dissolved concentrations is a description of the complex natural and artificial chemical conditions expected to influence dissolved actinide concentrations in the repository. By a set of physical and chemical assumptions regarding chemical kinetics, sorption substrates, and waste-brine interactions, the system was simplified to be amenable to mathematical description. The analysis indicated that an equilibrium thermodynamic model for describing actinide solubilities in brines would be tractable and scientifically supportable. This paper summarizes the conceptualization and modeling approach and the computational results as used in the WIPP application for certification of compliance with relevant regulations for nuclear waste repositories. The WIPP site contains complex natural brines ranging from sea water to 10x more concentrated than sea water. Data bases for predicting solubility of Am(III) (as well as Pu(III) and Nd(III)), Th(IV), and Np(V) in these brines under potential repository conditions have been developed, focusing on chemical interactions with Na, K, Mg, Cl, SO_4, and CO_3 ions, and the organic acid anions acetate, citrate, EDTA, and oxalate. The laboratory and modeling effort augmented the Harvie et al. parameterization of the Pitzer activity coefficient model so that it could be applied to the actinides and oxidation states important to the WIPP system.

853
(SAND–96-2796C)
Design, modeling, and current interpretations of the H-19 and H-11 tracer tests at the WIPP site. Meigs, L.C. (Sandia National Labs., Albuquerque, NM (United States)); Beauheim, R.L.; McCord, J.T.; Tsang, Y.W.; Haggerty, R. Sandia National Labs., Albuquerque, NM (United States). [1996]. 14p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. (CONF-9608182–2: 1. geotrap workshop, Cologne (Germany), 28-30 Aug 1996). Order Number DE97004035. Source: OSTI; NTIS; INIS; GPO Dep.

Site-characterization studies at the Waste Isolation Pilot Plant (WIPP) site in southeastern New Mexico, US identified ground-water flow in the Culebra Dolomite Member of the Rustler Formation as the most likely geologic pathway for radionuclide transport to the accessible environment in the event of a breach of the WIPP repository through inadvertent human intrusion. The results of recent tracer tests, as well as hydraulic tests, laboratory measurements, and reexamination of Culebra geology and stratigraphy, have led to a significant refinement of the conceptual model for transport in the Culebra. Tracer test results and geologic observations suggest that flow occurs within fractures, and to some extent within interparticle porosity and vugs connected by microfractures. Diffusion occurs within all connected porosity. Numerical simulations suggest that the data from the tracer tests cannot be simulated with heterogeneous single-porosity models; significant matrix diffusion appears to be required. The low permeability and lack of significant tracer recovery from tracers injected into the upper Culebra suggest that transport primarily occurs in the lower Culebra.

854
(UCRL-JC–123342)
Application of gamma-ray active and passive computed tomography to nondestructively assay TRU waste. Martz, H.E.; Decman, D.J.; Roberson, G.P.; Johansson, E.M.; Keto, E.R. Lawrence Livermore National Lab., CA (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract W-7405-ENG-48. (CONF-960187–1: Nondestructive assay/nondestructive evaluation (NDA/NDE) program review, Pittsburgh, PA (United States), 23-26 Jan 1996). Order Number DE96009253. Source: OSTI; NTIS; INIS; GPO Dep.

The authors have developed an active and passive computed tomography scanner for assaying radioactive waste drums. They describe the hardware and software components of the system used for data acquisition, gamma-ray spectroscopy analysis, and image reconstruction. They have measured the performance of the system using mock waste drums and calibrated radioactive sources. They describe the results of measurements using this system to assay a real TRU waste drum with relatively low Pu content.

855
(WSRC-MS–95-0261)
Waste certification review program at the Savannah River Site. Faulk, G.W. (Westinghouse Savannah River Co., Aiken, SC (United States)); Kinney, J.C.; Knapp, D.C.; Burdette, T.E. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 6p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-960212–3: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96005347. Source: OSTI; NTIS; INIS; GPO Dep.

After approving the waste certification programs for 45 generators of low-level radioactive and mixed waste, Westinghouse Savannah River Company (WSRC) moved forward to implement a performance-based approach for assuring that approved waste generators maintain their waste certification programs. WSRC implemented the Waste Certification Review Program, which is comprised of two sitewide programs, waste generator self-assessments and Facility Evaluation Board reviews, integrated with the WSRC Solid Waste Management Department Waste Verification Program Evaluations. The waste generator self-assessments ensure compliance with waste certification requirements, and Facility Evaluation Board reviews provide independent oversight of generators' waste certification programs. Waste verification evaluations by the TSD facilities serve as the foundation of the program by confirming that waste contents and generator performance continue to meet waste acceptance criteria (WSRC 1994) prior to shipment to treatment, storage, and disposal facilities. Construction of the Savannah River Site (SRS) was started by the US Government in 1950. The site covers approximately 300 square miles located along the Savannah River near Aiken, South Carolina. It is operated by the US Department of Energy (DOE). Operations are conducted by managing and operating contractors, including the Westinghouse Savannah River Company (WSRC). Historically, the primary purpose of the SRS was to produce special nuclear materials, primarily plutonium and tritium. In general, low-level radioactive and mixed waste is generated through activities in operations. Presently, 47 SRS facilities generate low-level radioactive and mixed waste. The policies, guidelines, and requirements for managing these wastes are determined by DOE and are reflected in DOE Order 5820.2A (US DOE 1988).

856
(WSRC-MS–96-0005)
Characterization of the Burma Road Rubble Pit at the Savannah River Site, Aiken, South Carolina. Ward, K.G. (Westinghouse Savannah River Co., Aiken, SC (United States)); Frazier, W.L.; McAdams, T.D.; McFalls, S.L.; Rabin, M.; Voss, L. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 12p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-960212–87: Waste management '96: HLW, LLW, mixed wastes and environmental restoration - working towards a cleaner environment, Tucson, AZ (United States), 25-29 Feb 1996). Order Number DE96009644. Source: OSTI; NTIS; INIS; GPO Dep.

The Burma Road Rubble Pit (BRRP) is located at the Savannah River Site (SRS). The BRRP unit consists of two unlined earthen pits dug into surficial soil and filled with various waste materials. It was used from 1973–1983 for the disposal of dry inert rubble such as metal, concrete, lumber, poles, light fixtures, and glass. No record of the disposal of hazardous substances at the BRRP has been found. In 1983, the BRRP was closed by covering it with soil. In September 1988, a Ground Penetrating Radar survey detected three disturbed areas of soil near the BRRP, and a detailed and combined RCRA Facility Investigation/ Remedial Investigation was conducted from November 1993 to February 1994 to determine whether hazardous substances were present in the subsurface, to evaluate the nature and extent of contamination, and to evaluate the risks posed to the SRS facility due to activities conducted at the BRRP site. Metals, semi-volatile organic compounds, volatile organic compounds, radionuclides and one pesticide (Aldrin) were detected in soil and groundwater samples collected from seventeen BRRP locations. A baseline risk assessment (BRA) was performed quantitatively to evaluate whether chemical and radionuclide concentrations detected in soil and groundwater at the BRRP posed an unacceptable threat to human health and the environment. The exposure scenarios identifiable for the BRRP were for environmental researchers, future residential and occupational land use. The total site noncancer hazard indices were below unity, and cancer risk levels were below 1.0E-06 for the existing and future case environmental researcher scenario. The future case residential and occupational scenarios showed total hazard and risk levels which exceeded US EPA criterion values relative to groundwater scenarios. For the most part, the total carcinogenic risks were within the 1.0E-04 to 1.0E-06 risk range. Only the future adult residential scenario was associated with risks exceeding 1.0E-04.

857
(WSRC-MS–96-0042)
Effects of closure cap and liner on contaminant release rates from grouted wastes. Yu, A.D.; Fowler, J.R.; Bignell, D.T. Westinghouse Savannah River Co., Aiken, SC (United States). [1996]. 8p. Sponsored by USDOE, Washington, DC (United States). DOE Contract AC09-89SR18035. (CONF-960482–9: Society of Computer Simulation (SCS) multiconference: high performance computing, New Orleans, LA (United States), 8-11 Apr 1996). Order Number DE96012429. Source: OSTI; NTIS; INIS; GPO Dep.

This paper describes a groundwater modeling study of waste disposal concepts using grouted waste forms. The focus of the study is on the effects of clay caps and concrete vaults on contaminant migration. The authors modeled three waste disposal scenarios: (1) Grouted waste was solidified in an earthen trench and covered with soil, there was no vault and no cap; (2) grouted waste was solidified in an earthen trench, the entire waste disposal facility was then closed under a clay cap; (3) grouted waste was solidified in a concrete vault and protected by the same closure as in 2. Because of the huge contrast in hydraulic conductivities and highly non-linear multi-phase flow characteristics, these waste disposal concepts presented a difficult problem for numerical simulation. Advanced fluid flow and contaminant transport codes were used to solve the problem. Among the codes tested, ECLIPSE out-performed other codes in speed, accuracy (smaller material balance errors) and capability in handling sophisticated scenarios. The authors used nitrate as a tracer for the simulation. Nitrate does not absorb in the solid phase and does not decay. As a result, predicted release rate based on nitrate is conservative. They also assumed that the facility is intact for 10,000 years. In other words, properties of the materials used for this study do not change with time. Predicted peak flux for the no vault and no closure case was 5.8×10^{-4} per year at 12 years. If a clay cap was installed, predicted peak flux was 8.5×10^{-5} per year at 110 years. If the grout was disposed in a concrete vault and covered by a clay cap, predicted peak flux became 4.4×10^{-6} per year at 8,000 years. Both concrete liner and clay cap can reduce the rate of contaminant release to the water table and delay the peak time.

858
(WSRC-RP–97-132-Rev.1-Final)
Removal Site Evaluation Report to the C-Reactor Seepage Basins (904-066, -067 and -068G). Palmer, E.R. (Westinghouse Savannah River Company, AIKEN, SC (United States)). Westinghouse Savannah River Co., Aiken, SC (United States). Jul 1997. 17p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98051298. Source: OSTI; NTIS; INIS; GPO Dep.

Removal Site Evaluation Reports are prepared in accordance with Section 300.410 of the National Contingency Plan (NCP) and Section X of the Federal Facility Agreement (FFA). The C-Reactor Seepage Basins (904-066G,-067G,-068G) are listed in Appendix C, Resource Conservation and Recovery Act (RCRA)/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Units List, of the FFA. The purpose of this investigation is to report information concerning conditions at this unit sufficient to assess the threat (if any) posed to human health and the environment and to determine the need for additional CERCLA action. The scope of the investigation included a review of past survey and investigation data, the files, and a visit to the unit.Through this investigation unacceptable conditions of radioactive contaminant uptake in on-site vegetation were identified. This may have resulted in probable contaminant migration and become introduced into the local ecological food chain. As a result, the SRS will initiate a time critical removal action in accordance with Section 300.415 of the NCP and FFA Section XIV to remove, treat (if required), and dispose of contaminated vegetation from the C-Reactor Seepage Basins. Erosion in the affected areas will be managed by an approved erosion control plan. further remediation of this unit will be conducted in accordance with the FFA.

859
(WSRC-RP–97-164-Rev.1-Final)
Removal site evaluation report for the SRL seepage basins. Palmer, E.R. (Westinghouse Savannah River Company, AIKEN, SC (United States)). Westinghouse Savannah River Co., Aiken, SC (United States). Aug 1997. 28p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98051297. Source: OSTI; NTIS; INIS; GPO Dep.

Removal Site Evaluation Reports are prepared in accordance with Section 300.410 and 300.415 of the National Contingency Plan (NCP) and Section X of the Federal Facility Agreement (FFA). The Savannah River Laboratory (SRL) Seepage Basins is one of the units that is listed in the Appendix C. Resource Conservation and Recovery Act (RCRA)/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Units List, of the FFA. The purpose of this investigation is to report information concerning conditions at this unit sufficient to assess the threat (if any) posed to human health and the environment and to determine the need for additional CERCLA action. The scope of the investigation included recent surveys and sampling data, reviews of historical data, and visits to the unit. Through the investigation, unacceptable conditions of radioactive contaminant uptake in on-site vegetation were identified. This has resulted in introduction of contamination into the local ecological food chain and probable contaminant migration through biotic pathways. As a result, the Savannah River Site (SRS) will initiate a time critical removal action to remove and dispose of contaminated vegetation from the SRL Seepage Basins. Potential erosion in affected areas will be inhibited by implementation of the SCDHEC approved Stormwater Management and Sediment Reduction Plan/Pollution Prevention Plan, Permit # SCR-100221. This report addresses the removal of the vegetation within the SRL Seepage Basin fence and, if necessary, the vegetation immediately outside the fence. The remediation of the waste unit will be addressed in other CERCLA documentation.

860
(WSRC-RP–97-169-Rev.1-Final)
Explanation of significant differences for the TNX groundwater operable unit. Palmer, E.R. (Westinghouse Savannah River Company, AIKEN, SC (United States)). Westinghouse Savannah River Co., Aiken, SC (United States). 22 Sep 1997. 3p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98051296. Source: OSTI; NTIS; INIS; GPO Dep.

This Explanation of Significant Differences (ESD) is being issued by the Department of Energy (DOE), the lead agency for the Savannah River Site (SRS), with concurrence by the Environmental Protection Agency-Region IV (EPA) and South Carolina Department of Health and Environmental Control (SCDHEC) to announce changes in the interim remediation strategy selected for the TNX Groundwater Operable Unit. The TNX Area is located adjacent to the Savannah River in the southwestern portion of SRS. The remedy selected in the Interim Record of Decision (IROD) to achieve the interim action goals was the Hybrid Groundwater Corrective Action (HGCA). The HGCA consisted of a recirculation well system and an air stripper with a series of groundwater extraction wells. The original remediation strategy needs to be modified because the recirculation well system was determined to be ineffective in this area due to geological factors and the nature of the contamination.

861
(WSRC-RP–97-0265)
Glass formulation requirements for Hanford coupled operations using crystalline silicotitanates (CST). Andrews, M.K. (Westinghouse Savannah River Company, AIKEN, SC (United States)); Harbour, J.R. Westinghouse Savannah River Co., Aiken, SC (United States). 6 May 1997. 6p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98051317. Source: OSTI; NTIS; INIS; GPO Dep.

The U.S. Department of Energy (DOE) through the Richland Operations Office has requested proposals from the private sector for the treatment of waste from the Hanford Waste Tanks. Phase I of this privatization initiative may include a demonstration for treatment and immobilization of both low activity and high-level waste. If the demonstration includes high-level waste, then the Cs-137 waste stream most likely will be combined with the high-level waste sludge to produce a coupled feed for immobilization (most likely vitrification using a borosilicate glass). It appears that pretreatment will involve the removal of cesium (and perhaps strontium and some transuranic radionuclides) from the supernate using an ion exchange material such as crystalline silicotitanate (CST). The ion exchange sorbent (or the eluted Cs-137) can then be combined with the sludge and vitrified in a coupled operation similar to the DWPF process. Alternatively, the cesium-loaded ion exchange sorbent can be vitrified directly to produce a separate glass waste form. SRTC has been involved in an Office of Science and Technology (EM-50) funded project to determine if Cs-137 loaded CST can be successfully incorporated into glass at significant levels. 1 For a waste form which would include only Cs-137 loaded CST, concentrations up to 60 wt% of CST in glass have been achieved. 2 The glass produced from this demonstration is both processable and durable. This CST-only waste form could be used at Hanford if the cesium-loaded CST is vitrified in a separate melter. For coupled feed operations, the CST would be mixed with high-level radioactive sludge from the Hanford tanks. This report provides the basis and the path forward for SRTC's efforts at developing a glass frit formulation which will incorporate both Hanford sludge and cesium-loaded CST for a coupled flowsheet. (Abstract truncated)

862
(WSRC-TR–96-348)
Field test of single well DNAPL characterization using alcohol injection/extraction. Jerome, K.M. (Westinghouse Savannah River Co., Aiken, SC (United States)); Looney, B.B.; Rhoden, M.L.; Riha, B.; Burdick, S. Westinghouse Savannah River Co., Aiken, SC (United States). 29 Oct 1996. 74p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE97004891. Source: OSTI; NTIS; INIS; GPO Dep.

Soils and groundwater beneath an abandoned process sewer line in the A/M Area of the Savannah River Site (SRS) contain elevated levels of volatile organic compounds, specifically trichloroethylene (TCE) and tetrachloroethylene

(PCE), two common chlorinated solvents. These compounds have low aqueous solubilities, thus when released to the subsurface in sufficient quantity, tend to exist as immiscible fluids or nonaqueous phase liquids (NAPLs). Because chlorinated solvents are also denser than water, they are referred to by the acronym DNAPLs, or dense non-aqueous phase liquids. Technologies targeted at efficient characterization or removal of DNAPL are not currently proven. The authors performed injection/extraction characterization tests in six existing wells in A/M Area. Water concentrations for TCE and/or PCE in these wells ranged from 0% to 100% of solubility. For each test, small amounts of solubilizing solution were used to try to confirm or deny the presence or absence of DNAPL in the immediate vicinity of the well screen.

863
(WSRC-TR–97-0120)
Vapor corrosion of aluminum cladding alloys and aluminum-uranium fuel materials in storage environments. Lam, P.; Sindelar, R.L.; Peacock, H.B. Jr. Westinghouse Savannah River Co., Aiken, SC (United States). Apr 1997. 52p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE97060228. Source: OSTI; NTIS; INIS; GPO Dep.

An experimental investigation of the effects of vapor environments on the corrosion of aluminum spent nuclear fuel (A1 SNF) has been performed. Aluminum cladding alloys and aluminum-uranium fuel alloys have been exposed to environments of air/water vapor/ionizing radiation and characterized for applications to degradation mode analysis for interim dry and repository storage systems. Models have been developed to allow predictions of the corrosion response under conditions of unlimited corrodant species. Threshold levels of water vapor under which corrosion does not occur have been identified through tests under conditions of limited corrodant species. Coupons of aluminum 1100, 5052, and 6061, the US equivalent of cladding alloys used to manufacture foreign research reactor fuels, and several aluminum-uranium alloys (aluminum-10, 18, and 33 wt% uranium) were exposed to various controlled vapor environments in air within the following ranges of conditions: Temperature – 80 to 200 C; Relative Humidity – 0 to 100% using atmospheric condensate water and using added nitric acid to simulate radiolysis effects; and Gamma Radiation – none and 1.8×10^6 R/hr. The results of this work are part of the body of information needed for understanding the degradation of the A1 SNF waste form in a direct disposal system in the federal repository. It will provide the basis for data input to the ongoing performance assessment and criticality safety analyses. Additional testing of uranium-aluminum fuel materials at uranium contents typical of high enriched and low enriched fuels is being initiated to provide the data needed for the development of empirical models.

864
(WSRC-TR–97-0201)
Scoping calculations of liquid mixing behavior in tank 48. Dimenna, R.A.; Lee, S.Y. Westinghouse Savannah River Co., Aiken, SC (United States). Aug 1997. 39p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC09-96SR18500. Order Number DE98051501. Source: OSTI; NTIS; INIS; GPO Dep.

The analysis described in this report, while directed at Tank 48, is applicable to any High Level Waste system waste storage tank for which water provides a reasonable approximation of the contents.

865
(Y/ER–205)
Sampling results, DNAPL monitoring well GW-729, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Annual report. Drier, R.B. (Oak Ridge National Lab., TN (United States)); Caldanaro, A.J. Oak Ridge National Lab., TN (United States). Dec 1996. 43p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002408. Source: OSTI; NTIS; INIS; GPO Dep.

This document, Sampling Results, DNAPL Monitoring Well G W-729, Third Quarter FY 1995 through Third Quarter FY 1996, was performed under Work Breakdown Structure 1.4.12.1.1.02 (Activity Data Sheet 2312, 'Bear Creek Valley'). This document provides the Environmental Restoration Program with groundwater concentrations for nonradionuclides in the vicinity of the Y-12 Burial Grounds. These data can be used to determine reference concentrations for intermediate and deep groundwater systems.

866
(Y/ER–258/R1)
Confirmatory Sampling and Analysis Plan for the Lower East Fork Poplar Creek Operable Unit, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States); Science Applications International Corp., Oak Ridge, TN (United States). Dec 1996. 76p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002407. Source: OSTI; NTIS; INIS; GPO Dep.

This document describes the organization, strategy, and procedures to be used to confirm that mercury concentrations in soils in the remediated areas are statistically less than, or equal to, the cleanup standard of 400 ppm. It focuses on confirming the cleanup of the stretch of the Lower East Fork Popular Creed flowing from Lake Reality at the Y-12 Plant, through the City of Oak Ridge, to Poplar Creek on the Oak Ridge Reservation and its associated flood plain.

867
(Y/ER–277)
Mercury abatement report on the U.S. Department of Energy's Oak Ridge Y-12 Plant. Fiscal year 1996. Oak Ridge Y-12 Plant, TN (United States). Nov 1996. 90p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97001831. Source: OSTI; NTIS; INIS; GPO Dep.

This report summarizes the status of activities and the levels of mercury contamination in Upper East Fork Poplar Creek (UEFPC) resulting from activities at the Department of Energy's (DOE's) Y-12 Facility during fiscal year 1996 (FY96). The report outlines the status of ongoing and new project activities in support of project goals, the results of sampling and characterization efforts conducted during FY 1996, biological monitoring activities, and our conclusions relative to the progress in demonstrating compliance with

the National Pollutant Discharge Elimination (NPDES) permit. Although the pace of mercury remediation activities at DOE's Y-12 Plant is ahead of the compliance schedule established in the NPDES permit, the resulting level of mercury in UEFPC is higher than predicted based on the projects completed. Fortunately, recently recognized opportunities are being pursued for implementation in the next two years to assist in meeting permit requirements.

868
(Y/ER–279)
Wetland Survey of Selected Areas in the Oak Ridge Y-12 Plant Area of Responsibilty, Oak Ridge, Tennessee. Rosensteel. Oak Ridge Y-12 Plant, TN (United States). Jan 1997. 31p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002416. Source: OSTI; NTIS; INIS; GPO Dep.

This document was prepared to summarize wetland surveys performed in the Y- 1 2 Plant area of responsibility in June and July 1994. Wetland surveys were conducted in three areas within the Oak Ridge Y- 12 Plant area of responsibility in June and July 1994: the Upper East Fork Poplar Creek (UEFPC) Operable Unit (OU), part of the Bear Creek Valley OU (the upper watershed of Bear Creek from the culvert under Bear Creek Road upstream through the Y-12 West End Environmental Management Area, and the catchment of Bear Creek North Tributary 1), and part of Chestnut Ridge OU 2 (the McCoy Branch area south of Bethel Valley Road). Using the criteria and methods set forth in the Wetlands Delineation Manual, 18 wetland areas were identified in the 3 areas surveyed; these areas were classified according to the system developed by Cowardin. Fourteen wetlands and one wetland/pond area that are associated with disturbed or remnant stream channels and seeps were identified in the UEFPC OU. Three wetlands were identified in the Bear Creek Valley OU portion of the survey area. One wetland was identified in the riparian zone of McCoy Branch in the southern portion of Chestnut Ridge OU 2.

869
(Y/ER–281)
Mercury concentrations in air during the Phase I remediation of Lower East Fork Poplar Creek floodplain at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Barnett, M.O. (Oak Ridge National Lab., TN (United States)); Owens, J.G.; Lindberg, S.E.; Turner, R.R. Oak Ridge Y-12 Plant, TN (United States). Jan 1997. 20p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97002415. Source: OSTI; NTIS; INIS; GPO Dep.

During the Phase I remediation of Lower East Fork Poplar Creek (LEFPC), the mercury concentration in air was monitored continuously at a nearby off-site location. The purpose of the monitoring was to ensure that the remediation did not adversely affect the off-site concentration of mercury in air. The concentrations of mercury in air did increase during the remediation. However, based on the results of a previous study, this increase was caused by the increase in sunlight intensity and temperature during remediation, which occurred in the summer months. In any case, all concentrations measured before, during, and after remediation were well below the standard of 300 ng/m^3 recommended for continuous exposure to mercury in air.

870
(Y/ER–283)
Hydraulic head data from the DNAPL monitoring wells GW-726, GW-727, GW-729, GW-730, and GW-790 at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Third quarter FY 1992 through second quarter FY 1996. Drier, R.B.; Caldanaro, A.J. Oak Ridge National Lab., TN (United States). Feb 1997. 38p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97004307. Source: OSTI; NTIS; INIS; GPO Dep.

In January 1990, dense nonaqueous-phase liquids (DNAPLs) were discovered at a depth of approximately 274 ft below ground surface along the southern border of the Y-12 Plant Burial Grounds. Immediately after the discovery, an investigation was conducted to assess the occurrence of DNAPL at the site and to make recommendations for further action. Detailed results of the preliminary DNAPL investigation are presented in Haase and King (1990a), and a work plan for assessment and characterization of the DNAPL is presented in Haase and King (1990b). A major task in the work plan calls for the construction and installation of five multiport wells. This report summarizes fluid pressure monitoring activities for the five multiport wells. The report includes a discussion of data collection and processing, and presents the data in the form of hydraulic head graphs. The report does not include interpretation of (1) flow paths, (2) aquifer characteristics, or (3) spatial synthesis of data. As funding and need arises, these topics will be addressed in future reports. To date, a series of fluid pressure measurements have been collected from each of the five Westbay-instrumented multiport wells that were built to quantify groundwater characteristics in the vicinity of a DNAPL plume. These measurements have been converted to hydraulic head, and the results are presented graphically in this report. It is recommended that future tasks use this data to support technically sound environmental remediation decisions. For example, these data can be used to design a remediation strategy or can be used to evaluate and rate a variety of remediation strategies.

871
(Y/ER–286)
Field characterization report on Phase 1 of the Bear Creek Valley treatability study, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States); Science Applications International Corp., Oak Ridge, TN (United States). Apr 1997. 111p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97005265. Source: OSTI; NTIS; INIS; GPO Dep.

A treatability study is being performed to investigate the practicability of using passive, in situ treatment systems to remove contaminants from the Bear Creek Valley (BCV) Characterization Area (CA). This draft document is a report of the site characterization results and is part of Phase 1 of this study. Field activities performed are outlined in Bear Creek Valley Passive Surface Water Treatment Technology Demonstrations, Phase 1, Site Characterization. The focus of the characterization was to obtain sufficient site-specific data on hydrogeology of NT-1, NT-2, and upper Bear Creek (above its confluence with NT-1) to support selection of groundwater capture and treatment systems in Phases 2

and 3. Groundwater samples from the S-3 Site and NT-1 area were also collected for the principal investigators to test during Phase 1 laboratory work. Three contaminant migration pathways were delineated in the S-3 Area. Each is described and briefly characterized by field observations and analysis of surface and groundwater collected within each pathway.

872
(Y/ER–290)
Sampling and analysis plan for phase II of the Bear Creek Valley treatability study Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). May 1997. 57p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. Order Number DE97006011. Source: OSTI; NTIS; INIS; GPO Dep.

The Bear Creek Valley (BCV) Treatability Study is intended to provide site-specific data defining potential treatment technologies applicable to contaminated groundwater and surface water. This project directly supports Alternative 5 of the base action in the BCV Feasibility Study, and indirectly supports other alternatives through proof of concept. In that role, the ultimate goal is to install a treatment system that will remove uranium and nitrate from groundwater before it reaches Bear Creek. A secondary goal is the concurrent removal of technetium and several metals that impact ecological risk. This project is intended to produce hydraulic and treatment performance data required to design the treatment system to reach those goals. This project will also generate information that can be applied at other facilities within the Oak Ridge Reservation. This report is the sampling and analysis plan (SAP) for the field work component of Phase II of the BCV Treatability Study. Field work for this phase of the BCV Treatability Study consists of media testing. In-field continuous flow tests will be conducted over an extended time period (5 weeks) to generate data on long-term treatment effects on potential treatment media including sorbents and zero valent iron, over 28 weeks for constructed wetlands treatment, and over 24 weeks for algal mats treatment. The SAP addresses environmental sampling at the S-3 Site at the Oak Ridge Y-12 Plant. Samples will be taken from groundwater, effluent from test columns, effluent from an algal mat reactor, and effluent from a pilot-scale wetlands. This plan will be implemented as part of the BCV Phase II Treatability Study Best Management Practices Plan and in conjunction with the BCV Phase II Treatability Study Health and Safety Plan and the BCV Phase II Treatability Study Waste Management Plan.

873
(Y/ER–290/R1)
Sampling and analysis plan for Phase II of the Bear Creek Valley Treatability Study, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. Oak Ridge Y-12 Plant, TN (United States). Sep 1997. 66p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-84OS21400. Order Number DE97009321. Source: OSTI; NTIS; INIS; GPO Dep.

The Bear Creek Valley (BCV) Treatability Study is intended to provide site-specific data defining potential treatment technologies applicable to contaminated groundwater and surface water. This project directly supports Alternative 5 of the base action in the BCV Feasibility Study and indirectly supports other alternatives through proof of concept. In that role, the ultimate goal is to install a treatment system that will remove uranium and nitrate from groundwater before it reaches Bear Creek. A secondary goal is the concurrent removal of technetium and several metals that affect ecological risk. This project is intended to produce hydraulic and treatment performance data required to design the treatment system to reach those goals. This project will also generate information that can be applied at other facilities within the Oak Ridge Reservation. This report is the sampling and analysis plan (SAP) for the field work component of Phase II of the BCV Treatability Study. Field work for this phase of the BCV Treatability Study consists of environmental and media testing. The SAP addresses environmental sampling at the S-3 Site at the Oak Ridge Y-12 Plant. Samples will be taken from groundwater, surface water, seeps, effluent from test columns, effluent from an algal mat reactor, and effluent from a pilot-scale wetland. Groundwater, surface water, and seeps will be monitored continuously for field parameters and sampled for analytical parameters during pump tests conducted periodically during the investigation. In-field continuous flow tests will be conducted over an extended time period (5 weeks) to generate data on long-term treatment effects on potential treatment effects on potential treatment media including sorbents and zero valent iron, over 28 weeks for constructed wetlands treatment, and over 24 weeks for algal mats treatment.

EFFICIENT SEPARATIONS

Refer also to citation(s) 634

874
(ANL/ET/CP–92582)
Immobilization of ^{99}Tc in low-temperature phosphate ceramic waste forms. Singh, D. (Argonne National Lab., IL (United States). Energy Technology Div.); Mandalika, V.; Wagh, A.; Strain, R.; Tlustochowicz, M. Argonne National Lab., IL (United States). May 1997. 13p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract W-31109-ENG-38. (CONF-970568–11: 99. annual meeting of the American Ceramic Society, Cincinnati, OH (United States), 4-7 May 1997). Order Number DE97053534. Source: OSTI; NTIS; INIS; GPO Dep.

Radionuclides such as ^{99}Tc are by-products of fission reactions in high-level wastes. Technetium poses a serious environmental threat because it is easily oxidized into its highly leachable pertechnetate form. Magnesium potassium phosphate ceramics have been developed to treat ^{99}Tc that has been separated and eluted from simulated high-level tank wastes by sorption processes. Dense and hard ceramic waste forms were fabricated by acid-base reactions between mixtures of magnesium oxide powders and wastes, and acid phosphate solutions. Standard leaching tests, such as ANS 16.1 and the Product Consistency Test, were conducted on the final waste forms to establish their performance. The fate of the contaminants in the final waste forms was established with scanning electron microscopy techniques. In addition, stability of the waste forms in aqueous environments was evaluated by long-term water immersion tests.

875
(CONF-961202–43)
Waste vitrification: prediction of acceptable compositions in a lime-soda-silica glass-forming system. Gilliam, T.M. (Oak Ridge National Lab., TN (United States)); Jantzen, C.M. Oak Ridge National Lab., TN (United States). Oct 1996. 7p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC05-96OR22464. From 1996 Fall meeting of the Materials Research Society (MRS); Boston, MA (United States); 2-6 Dec 1996. Order Number DE97002967. Source: OSTI; NTIS; INIS; GPO Dep.

A model is presented based upon calculated bridging oxygens which allows the prediction of the region of acceptable glass compositions for a lime-soda-silica glass-forming system containing mixed waste. The model can be used to guide glass formulation studies (e.g., treatability studies) or assess the applicability of vitrification to candidate waste streams.

876
(DOE/MC/33080–97/C0826)
Liquid membrane system for the removal and concentration of transuranic elements. Timmins, M.R.; Wysk, S.R.; Smolensky, L.A.; Jiang, D.; Lumetta, G.J. LSR Technologies, Inc., Acton, MA (United States). [1996]. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-96MC33080. (CONF-9610231–21: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052267. Source: OSTI; NTIS; INIS; GPO Dep.

The goal of this program is to develop an efficient, reliable, and radiation-resistant modified liquid membrane system (MLMS) for the selective removal and concentration of transuranic elements (TRUs) and strontium-90 from dissolved Hanford sludge wastes. The efforts are divided into three categories: (1) demonstration and optimization of the MLMS for the TRUEX and SREX processes using simulant waste solution; (2) development of a radiation-resistant microporous divider and membrane module for testing with actual waste solutions; and (3) demonstration of the MLMS for the TRUEX and SREX processes using actual Hanford waste. Successful completion of these development efforts will yield a compact, versatile, and reliable MLMS for implementation with the TRUEX and SREX processes. The MLMS is simple, stable, more efficient, and easier to control and operate than conventional solvent-extraction processes, such as those employing centrifugal contactors. In addition, the MLMS process offers operational cost savings over the conventional technology, by exhibiting at least a 10% reduction in the consumption of extractant chemicals.

877
(DOE/MC/33088–97/C0809)
Novel silica-based ion exchange resin. Gula, M.; Harvey, J. Eichrom Industries, Inc., Darien, IL (United States). [1996]. 16p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AR21-96MC33088. (CONF-9610231–26: Conference on industry partnerships to deploy environmental technology, Morgantown, WV (United States), 22-24 Oct 1996). Order Number DE97052249. Source: OSTI; NTIS; INIS; GPO Dep.

Shortcomings of chelating resins have been addressed by a new class of ion exchange resins called dual mechanism bifunctional polymers (DMBPs). DMBPs use hydrophilic cation exchange ligands with rapid uptake kinetics and use chelating ligands for selectivity for one or more metals; result is a resin that quickly recognizes and removes targeted metals from waste, remediation, and process streams. Eichrom's Diphonix ® resin is the first DMBP to be widely released as a commercial product; it is polystyrene based. Objective of this work is to synthesize commercial quantities of a silica-based ion exchange resin with the same or better metal ion selectivity, metal uptake kinetics, and acid stability as Diphonix. Feasibility was determined, however the process needs to be optimized. Studies at Eichrom and ANL of the performance of Diphonix resin over a broad range of HNO3 and HCl conditions and inorganic salt loadings are discussed together with the proposed method of incorporating similar characteristics into a silica-based resin. The new, silica-based resin functionalized with diphosphonic acid ligands can be used in environmental restoration and waste management situations involving processing of low-level, transuranic, and high-level radioactive wastes; it can also be used for processing liquid mixed waste including wastes contaminated with organic compounds.

878
(PNNL–11454)
Preconceptual design of a salt splitting process using ceramic membranes. Kurath, D.E. (Pacific Northwest National Lab., Richland, WA (United States)); Brooks, K.P.; Hollenberg, G.W.; Clemmer, R.; Balagopal, S.; Landro, T.; Sutija, D.P. Pacific Northwest National Lab., Richland, WA (United States). Jan 1997. 58p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC06-76RL01830. Order Number DE97051516. Source: OSTI; NTIS; INIS; GPO Dep.

Inorganic ceramic membranes for salt splitting of radioactively contaminated sodium salt solutions are being developed for treating U. S. Department of Energy tank wastes. The process consists of electrochemical separation of sodium ions from the salt solution using sodium (Na) Super Ion Conductors (NaSICON) membranes. The primary NaSICON compositions being investigated are based on rare- earth ions (RE-NaSICON). Potential applications include: caustic recycling for sludge leaching, regenerating ion exchange resins, inhibiting corrosion in carbon-steel tanks, or retrieving tank wastes; reducing the volume of low-level wastes volume to be disposed of; adjusting pH and reducing competing cations to enhance cesium ion exchange processes; reducing sodium in high-level-waste sludges; and removing sodium from acidic wastes to facilitate calcining. These applications encompass wastes stored at the Hanford, Savannah River, and Idaho National Engineering Laboratory sites. The overall project objective is to supply a salt splitting process unit that impacts the waste treatment and disposal flowsheets and meets user requirements. The potential flowsheet impacts include improving the efficiency of the waste pretreatment processes, reducing volume, and increasing the quality of the final waste disposal forms. Meeting user requirements implies developing the technology to the point where it is available as standard equipment with predictable and reliable performance. This report presents two preconceptual designs for a full-scale

salt splitting process based on the RE-NaSICON membranes to distinguish critical items for testing and to provide a vision that site users can evaluate.

879
(SAND–97-0771)
Development and properties of crystalline silicotitanate (CST) ion exchangers for radioactive waste applications. Miller, J.E.; Brown, N.E. Sandia National Labs., Albuquerque, NM (United States). Apr 1997. 61p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97005332. Source: OSTI; NTIS; INIS; GPO Dep.

Crystalline silicotitanates (CSTs) are a new class of ion exchangers that were jointly invented by researchers at Sandia National Laboratories and Texas A&M University. One particular CST, known as TAM-5, is remarkable for its ability to separate parts-per-million concentrations of cesium from highly alkaline solutions (pH> 14) containing high sodium concentrations (>5M). It is also highly effective for removing cesium from neutral and acidic solutions, and for removing strontium from basic and neutral solutions. Cesium isotopes are fission products that account for a large portion of the radioactivity in waste streams generated during weapons material production. Tests performed at numerous locations with early lab-scale TAM-5 samples established the material as a leading candidate for treating radioactive waste volumes such as those found at the Hanford site in Washington. Thus Sandia developed a Cooperative Research and Development Agreement (CRADA) partnership with UOP, a world leader in developing, commercializing, and supplying adsorbents and associated process technology to commercialize and further develop the material. CSTs are now commercially available from UOP in a powder (UOP IONSIV® IE-910 ion exchanger) and granular form suitable for column ion exchange operations (UOP IONSIV® IE-911 ion exchanger). These materials exhibit a high capacity for cesium in a wide variety of solutions of interest to the Department of Energy, and they are chemically, thermally, and radiation stable. They have performed well in tests at numerous sites with actual radioactive waste solutions, and are being demonstrated in the 100,000 liter Cesium Removal Demonstration taking place at Oak Ridge National Laboratory with Melton Valley Storage Tank waste. It has been estimated that applying CSTs to the Hanford cleanup alone will result in a savings of more than $300 million over baseline technologies.

880
(SAND–97-1251)
Design, demonstration and evaluation of a thermal enhanced vapor extraction system. Phelan, J. (and others); Reavis, B.; Swanson, J. Sandia National Labs., Albuquerque, NM (United States). Aug 1997. 168p. Sponsored by USDOE Office of Environmental Restoration and Waste Management, Washington, DC (United States). DOE Contract AC04-94AL85000. Order Number DE97008819. Source: OSTI; NTIS; INIS; GPO Dep.

The Thermal Enhanced Vapor Extraction System (TEVES), which combines powerline frequency heating (PLF) and radio frequency (RF) heating with vacuum soil vapor extraction, was used to effectively remove volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) from a pit in the chemical waste landfill (CWL) at Sandia National Laboratories (SNL) within a two month heating period. Volume average temperatures of 83°C and 112°C were reached for the PLF and RF heating periods, respectively, within the 15 ft x 45 ft x 18.5 ft deep treated volume. This resulted in the removal of 243 lb of measured toxic organic compounds (VOCs and SVOCs), 55 gallons of oil, and 11,000 gallons of water from the site. Reductions of up to 99% in total chromatographic organics (TCO) was achieved in the heated zone. Energy balance calculations for the PLF heating period showed that 36.4% of the heat added went to heating the soil, 38.5% went to evaporating water and organics, 4.2% went to sensible heat in the water, 7.1% went to heating the extracted air, and 6.6% was lost. For the RF heating period went to heating the soil, 23.5% went to evaporating water and organics, 2.4% went to sensible heat in the water, 7.5% went to heating extracted air, and 9.7% went to losses. Energy balance closure was 92.8% for the PLF heating and 98% for the RF heating. The energy input requirement per unit soil volume heated per unit temperature increase was 1.63 kWH/yd^3-°C for PLF heating and 0.73 kWH/yd^3°C for RF heating.

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