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TWRS Tank Waste Pretreatment Process Development Hot Test Siting Report		ECN No. N/A

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Page 1 of 1

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Revised document is submitted for final approval of recommended facility allocations for performing hot test work, and sample retrieval infrastructure development to support the test program and Project design.

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16. KEY

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APPROVED FOR PUBLIC RELEASE

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V. L. Birkland 3/7/95

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7. Abstract

This report is the sixth in a series that have assessed the hot testing requirements for TWRS pretreatment process development and identified the hot testing support requirements. This report, based on the previous work, identifies specific hot test work packages, matches those packages to specific hot cell facilities, and provides recommendations of specific facilities to be employed for the pretreatment hot test work. Also identified are serious limitations in the tank waste sample retrieval and handling infrastructure. Recommendations are provided for staged development of 500 mL, 3 L, 25 L and 4000 L sample recovery systems and specific actions to provide those capabilities.

8. RELEASE STAMP

TANK WASTE REMEDIATION SYSTEM TANK WASTE PRETREATMENT PROCESS DEVELOPMENT HOT TEST SITING REPORT

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February 1995

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JL

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D. A. Dodd, WHC
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R. I. Hansen, PNL.

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P. F. Stevens
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J. S. Sparks
C. R. Stroup.

EXECUTIVE SUMMARY

The Tank Waste Remediation System pretreatment and treatment missions require extensive testing of processes and equipment to qualify them for use in the production facility designs.

In January 1994, the pretreatment facility project, known as Project W-236B, Initial Pretreatment Module, began an investigation to identify the types and amount of testing that would be needed to support the project design work. The objective was to determine the availability of existing facilities to perform the hot test work, and the infrastructure (sampling, casks, staff, etc.) to support the testing.

This report is the sixth in a series that have defined the major issues requiring testing and the needed strategies and capabilities to resolve those issues. The study considered a full spectrum of possible pretreatment testing and used test scaling that should bound the actual testing required. The report's recommendations are based on technical and schedular considerations. Because planning of the detailed pretreatment tests is incomplete at this time, the study did not attempt to make cost trade-off assessments for siting of the test work. The detailed test plans and final space allocations will be shaped by test specific cost considerations.

This report identifies groups of issues requiring testing for resolution and matches them to Hanford Site and offsite hot cell space.

Recommended siting for the test work is as follows:

Building number	Cell	Test description
325A	A+B+C	Ion-exchange testing with 10- to 45-mL columns with provision for 200-mL columns, if required
325B	SAL	Settle/decant tests
324 Radiochemical Engineering	D	Transuranic monitor tests
324 Shielded Materials Facility	East	Filtration tests
222-S	1F	Centrifugation tests
222-S	11A	Organic defunctionalization
222-S	1E1	Ion-exchange tests, Sr, Tc and TRU
Los Alamos National Laboratory	Wing 9	Sludge wash tests

This report also identifies a significant deficiency in infrastructure to recover and handle needed actual tank waste samples in the 1- to 4,000-L/sample size range. Because of the time needed to develop increasingly larger sample retrieval capabilities, interim cold test data and smaller scale hot test data will be employed to help validate assumptions made by the Architect-Engineer during conceptual and early definitive design work. Recommended are actions needed for staged development of the sample retrieval capability, such that the current scale of hot testing can be escalated as the sample retrieval capability increases.

An early calendar year 1995 commitment of resources is needed to develop the tank waste sample retrieval and handling equipment and infrastructure in the 500 mL, 3 L, 25 L and 100 to 4000 L capability to support the required testing schedule.

The 100 to 4000 L capability is based on utilizing a 4000 liter shielded transporter vehicle currently being procured by Waste Tank Plant Engineering as a means of emergency removal of liquids from a leaking single shell tank. It's pretreatment test support mission will be retrieval and transportation of a number of supernatant and slurry samples in the 100 to 500 L range and return of test effluents to the tank farms. If required by future test plans, it would also provide the capability to handle larger samples. Some Program investment will be required for a portable load/unload capability at the tank farms and fixed unloading facilities at the test facilities. A further analysis of the testing need for the larger samples ($\geq$ 100 L) and the risk of not performing those tests is planned before procurement of equipment for this system.

It is also recommended that the 324 Building, radiochemical engineering Cell C be outfitted to receive the 25-L sampler cask and perform those functions to recover the sample for transhipment to the user and service the sampler for reuse. The 222-S Laboratory will provide equivalent service for the 500-mL and 3-L samplers.

CONTENTS

CONTENTS (cont)

APPENDIXES

LIST OF FIGURES

LIST OF TABLES

TANK WASTE REMEDIATION SYSTEM TANK WASTE PRETREATMENT PROCESS DEVELOPMENT HOT TEST SITING REPORT

1.0 INTRODUCTION

Hanford Site tank waste will be pretreated to separate the low- and high-level fractions. The low-level waste (LLW) fraction, containing the bulk of the chemical constituents, must be processed into a vitrified waste product that will be disposed of onsite in accordance with current safety and environmental policy. The residual high-level waste (HLW) fraction from supernatant pretreatment (mainly cesium) will be combined with the HLW fraction from pretreatment of the tank sludges and solids, and immobilized as glass for disposal at a federal repository. Design of the tank waste sludge wash and solid/liquid separation functions, and the pretreatment facility (Project W-236B, Initial Pretreatment Module [IPM]), requires facilities and support infrastructure to perform developmental and performance testing.

1.1 PURPOSE

The purpose of this report is to identify the hot testing capabilities available to support the design of the sludge washing, solid liquid separation, and pretreatment processes and facilities. This document will also identify infrastructure development critically needed to support the testing programs.

This report is based on a study that investigated the availability and capabilities of hot laboratory facilities, hot cell facilities, and supporting infrastructure on U.S. Department of Energy (DOE) sites to perform the hot testing that was identified for the Tank Waste Remediation System (TWRS) solids/liquids separation and pretreatment functions (Howden 1994). The study also identified logical groupings of the tests needed to resolve 49 known open issues, and recommended candidate facilities and sites for performing the test work packages.

This report is the sixth in a series of coordinated reports that provide the following information.

- Broadly examined the testing needs of the pretreatment and vitrification functions (Howden 1994). This report identified and cataloged a number of issues for each pretreatment technology and for LLW vitrification. Each issue was one question that required varying combinations of cold or cold and hot testing to resolve and provide pretreatment facility design information. (In the following text, the sludge washing, solids/liquids separation, and radionuclide removal functions to supply feed to the low-level vitrification plant are generically referred to as "pretreatment.")

- Evaluated pretreatment test facility requirements and strategies (Reynolds 1994a). This report amplified the data on the 49 pretreatment issues provided by WHC-SD-WM-TA-156 (Howden 1994) and incorporated test information need dates provided by the pretreatment project's Architect-Engineer (A-E).

- Provided specific functional requirements for pretreatment hot testing facilities and sites (Reynolds 1994b). This report extracted from (Reynolds 1994a) information on the characteristics needed in hot test laboratories and hot cells and provided the basis for evaluating existing hot cell facilities in the DOE complex to do the required pretreatment test work.

- Provided criteria for evaluation of candidate hot test facilities and sites (Reynolds 1994c). This report developed spreadsheets for evaluating candidate hot cells for pretreatment testing.

- Provided an overall strategy for meeting the pretreatment facility design testing requirements, and the greater testing requirements for vitrification facility design, pretreatment, and vitrification facilities startup and operational support (Reddick 1994).

- This report documents the evaluation of candidate pretreatment testing sites and provides recommendations on the siting of test packages. This report also identifies facility and infrastructure upgrades critically needed to support the test work.

Figure 1-1 provides a block diagram of the investigative process that was employed during calendar year (CY) 1994 to develop this report and the other reports previously listed.

1.2 TECHNICAL BASIS

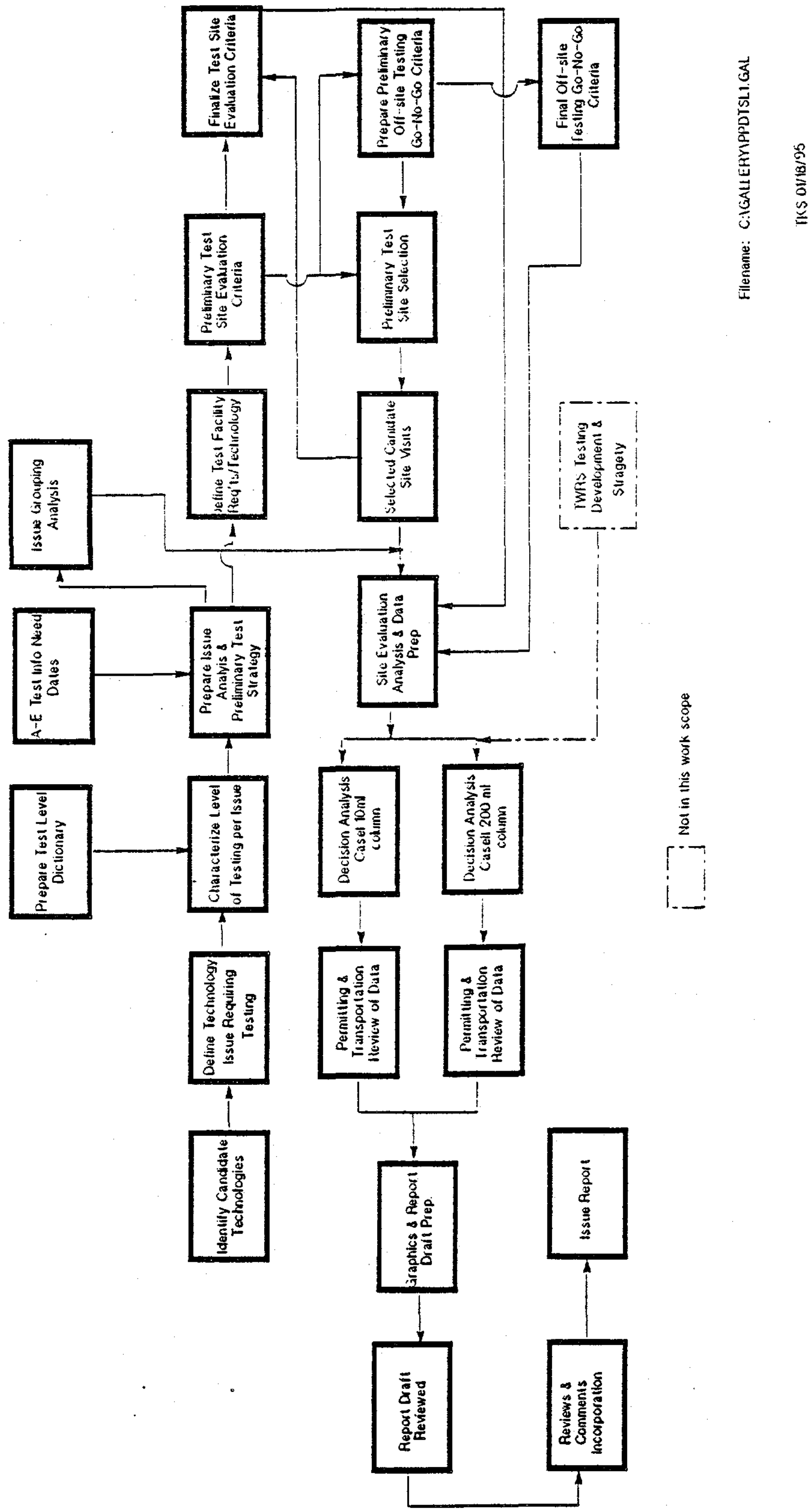
The basis for this and preceding parts of this study is the TWRS Pretreatment Program technical strategy as developed by Westinghouse Hanford Company (WHC) and the U.S. Department of Energy, Richland Operations Office (RL) (Appendix A-1). Appendixes A-2 and A-3 scope the volume of tank waste samples needed for testing, and the space requirements for ion-exchange work. For this assessment, 10- to 45-mL and 200-mL ion-exchange column sizes were the assumed bounding requirements.

1.3 BACKGROUND

In January 1992, the first assessment was initiated to determine the need for additional hot test facilities and infrastructure to support TWRS tank waste pretreatment and immobilization process development. That work culminated in March 1993 with a report (Howden 1993) that surveyed the hot cells on the Hanford Site and assessed their suitability for a long-range hot testing support mission.

In March 1993, a recommendation was sent to RL (Hansrote 1993) to support immediate engineering work on development of a hot test facility and supporting infrastructure. The uncertainty about the TWRS technical approach resulting from the impending 1993 Tri-Party Agreement renegotiation (which

Figure 1-1. Investigative Study Process Block Diagram.



began shortly thereafter) resulted in a decision to delay proceeding with the development of a hot test facility until a new technical strategy for waste tank remediation and disposition was established.

The fourth amendment to the *Hanford Federal Facility Agreement and Consent Order* (also known as the Tri-Party Agreement [Ecology et al. 1994]), as approved by the stakeholder representatives in January 1994, significantly redirected and expanded the previous Hanford Site cleanup goals and objectives to add the single-shell tanks (SST) to the work scope and redirect the disposition of LLW from a grout form to a vitrified glass waste form. With the signing of the revised Tri-Party Agreement in January 1994, this study was initiated by the TWRS Projects Department to redevelop an understanding of the technology issues and process development testing support needs of the newly revised technical strategy (Alumkal 1994) based on the revised Tri-Party Agreement.

1.4 CURRENT STATUS

There is adequate cold laboratory and other testing space at the Hanford Site and other national laboratories to support laboratory-scale pretreatment and vitrification process development test work, and larger-scale cold testing. There is, however, limited immediately available hot cell space for hot laboratory-, hot bench-, and larger-scale unit or integrated process testing with actual waste. Most of the available cell space falls into one of the following categories:

- Cannot be supplied with sufficient volumes of actual tank waste to perform the identified testing
- Must be cleaned out and refurbished
- Has never been used (Fuels and Materials Examination Facility [FMEF] at the Hanford Site) and must be outfitted.

Some of the hot cell space discussed in this document is in buildings that have little or no mission and are identified for DOE's decontamination and decommissioning program (Argonne National Laboratory-E, Building 200; Oak Ridge National Laboratory, Buildings 3047 and 3517) unless gainfully utilized. A number of cells considered and discussed are in facilities partially committed to other missions. Finally, some hot cell space that was considered that will not be discussed further has been committed to other missions (Savannah River Laboratory and Sandia National Laboratory) or is already being decontaminated and decommissioned (Lawrence Livermore National Laboratory).

The current scale of hot testing is limited by the infrastructure to retrieve and handle actual tank waste samples. As of this writing, sampling capability is limited to 250-mL samples of supernate, sludge, or salt cake using a coring sample system, and a 100-mL supernate and soft sludge "grab" sampling capability. There is no actual waste sampling capability or handling infrastructure to support the larger bench-scale testing needs of the TWRS disposal program. Work on this critical area is funded for fiscal year (FY) 1995 and outyears, however. Experience indicates that 12 to 24 months will be required (on receipt of funding) to develop needed 3-, 25-, and 4,000-L sampling infrastructures (equipment, facility modifications, trained staff, procedures, and permits) to support many of the tests assessed by this study. In the meantime, the testing can proceed but will be limited in scope by the existing retrieval capability, which with extraordinary effort will be able to provide only a few liter size samples per year.

Most of the testing needed to provide meaningful input to the design of the IPM must be accomplished in the next 3 years. To meet this need, and considering the (approximately) 2- to 5-year lead time required to finance and construct new testing facilities and infrastructure, this study has focused on using existing capabilities at DOE sites and identifying the need for upgrades to enable their use.

A separate document will define the testing facility and infrastructure requirements to support the testing strategy outlined in WHC-SD-WM-SP-006, *Testing and Development Strategy for the Tank Waste Remediation System* (Reddick 1994) for the low- and high-level vitrification facility designs, and the startup testing needs of all three facilities.

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2.0 ASSESSMENT CONSIDERATIONS

As briefly discussed earlier, a number of issues bound and limit the options for performing the pretreatment facility design testing. This section discusses the issues and provides recommendations for remedial action.

The bounding issues that have been identified and considered in this investigation are as follows:

- Needed sample sizes, quantity, and timing
- Present sample retrieval size and quantity capability
- Expanded sampling capability within CY 1995
- Expanded sampling capability in 18 to 24 months
- Sample transportation cask availability
- Sample transhipment capability
- Safety documentation and environmental permitting
- Cell accessibility on the Hanford Site
- Review of candidate sites' Quality Assurance Program.

The following sections will discuss each of these issues and as appropriate, provide recommendations for followup.

2.1 NEEDED SAMPLE SIZES, QUANTITY, AND TIMING

Figure 2-1 provides an approximation of the sample volume required each quarter of the next 3 years to support the pretreatment facility design testing using 200-mL ion-exchange columns for that test work. The data are derived from the catalog of issues (Appendix B-1) requiring hot testing, and test requirements (see Appendix B-2) which were based on PNL TWRSPP-94-096, *Hanford Tank Waste Remediation Systems (TWRS) Waste Pretreatment Program Test Requirements Strategy and Issues* (Reynolds 1994a). The data represent the approximate sample feed needed to respond to the IPM A-E's requested information availability dates as shown on the data sheets in Appendix B-1. The largest of these samples (3,600 L per test) are to support ion-exchange testing of the crystalline silicotanates (CST) resin using 200-mL column sizes and five repetitions with different wastes.

Figure 2-2 provides a similar presentation based on the same timing, but using 10- to 45-mL ion-exchange columns with the largest volume (180 L/test and five test runs) also applied to testing the CST resin. Substantially larger quantities are needed for filter testing and centrifuge testing.

Because of the limited sample retrieval and handling infrastructure, neither of these schedules can be met except for tests requiring no more than a few liters of sample material.

For comparison, Figures 2-3 and 2-4 provide the same data but on the probable basis that a 25-L retrieval capability will be unavailable until July 1996, and a 4,000-L capability will be unavailable until October 1996. It is also assumed that the earliest that samples >100 L can be retrieved and handled is October 1996 using the 4,000-L transporter (Appendix C-4). As a result, while much cold testing can be accomplished on all technologies, and

Figure 2-1. Pretreatment Testing Waste Sample Requirements--Ion-Exchange Case 2.

Waste sample delivery volumes needed for tests to meet Architect-Engineer data dates. Basis: All tests with ion-exchange Case 2 at 200-mL columns.

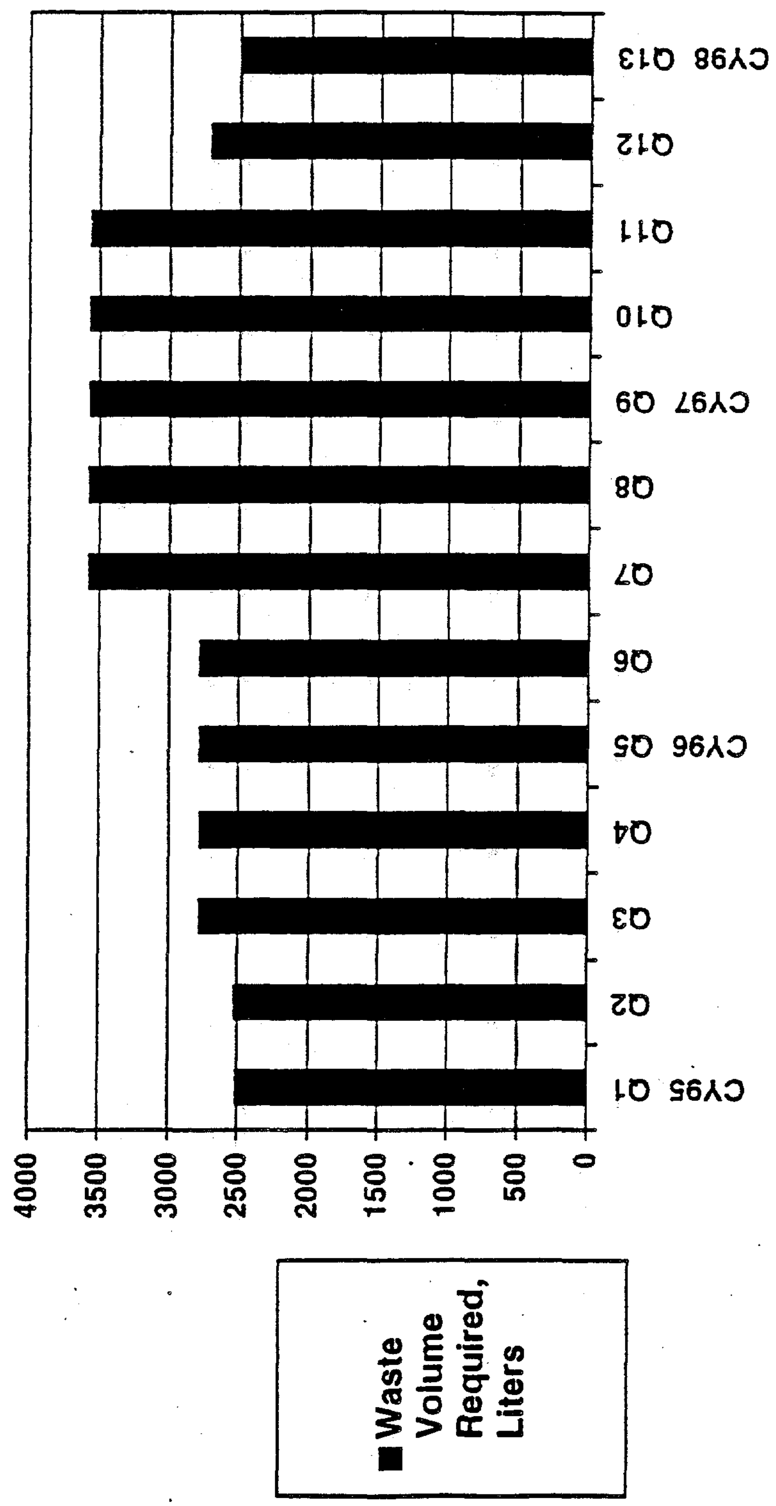


Figure 2-2. Pretreatment Testing Waste Sample Requirements--Ion-Exchange Case 1.

Waste sample delivery volumes needed for tests to meet Architect-Engineer data dates. Basis: All tests with ion-exchange Case 1 at 10- to 45-mL columns.

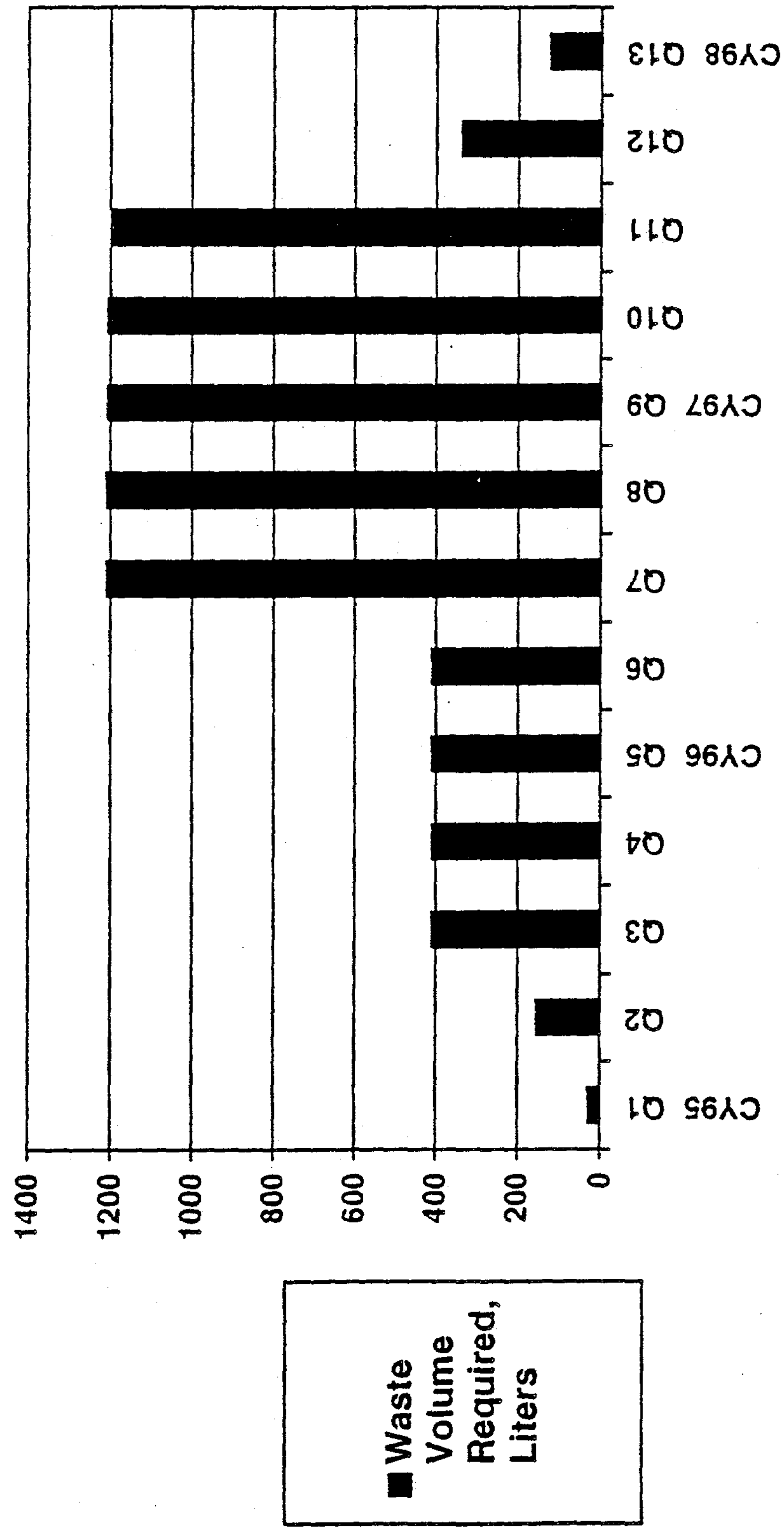


Figure 2-3. Pretreatment Testing Waste Sample Requirements--Ion-Exchange Case 2A.

Waste sample delivery volumes needed for tests to meet Architect-Engineer data dates. Basis: Ion-exchange Case 2. Tests requiring >100 L deferred until October 1996.

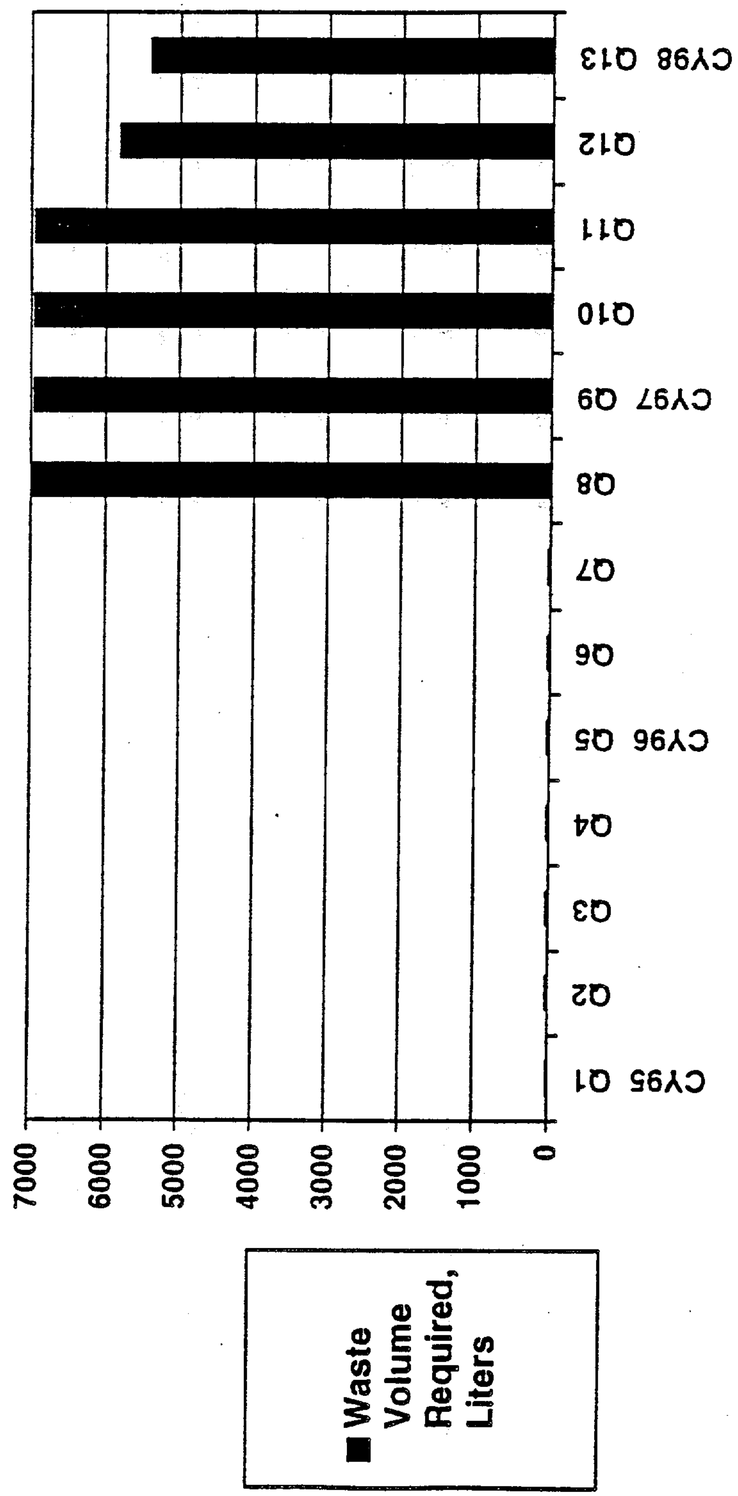
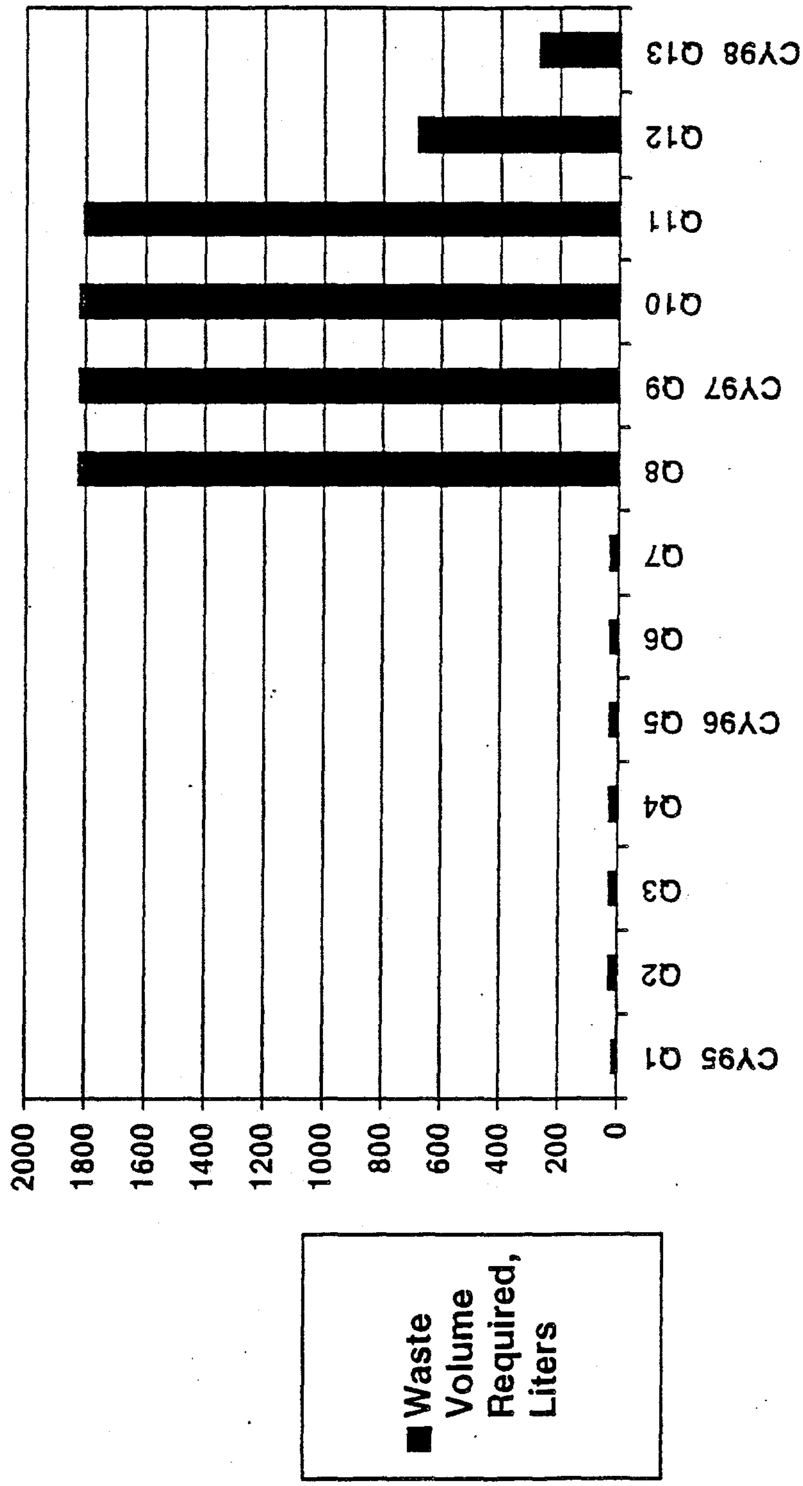


Figure 2-4. Pretreatment Testing Waste Sample Requirements--Ion-Exchange Case 1A.

Basis: Ion-exchange Case 1. Tests requiring >100 L deferred until October 1996.



some limited hot testing on some technologies during the next 18 to 21 months, most centrifugation, filtration, and ion-exchange hot testing will be delayed pending the availability of a 4,000-L transport capability starting around October 1996. However, its transporter procurement is in progress with delivery scheduled for December 1995. An October 1996 operational date is considered an achievable time frame for the supporting infrastructure (design and construction of load/unload capability, preparation of safety and environmental documentation, operating procedures and staff training) if started by early March 1995.

An uncertainty that must be resolved while preparing the test plans is whether the test durations (estimated at about 200 days for five runs) and the delayed start date (October 1996) may force the use of parallel ion-exchange test lines, each using different resins.

2.2 PRESENT SAMPLE RETRIEVAL SIZE AND QUANTITY CAPABILITY

As discussed in Section 1.4, the present tank waste sampling capability is limited to 100-mL grab samples and up to 250-mL sludge and solids samples. Table 2-1 shows the current plan for retrieving larger samples to support pretreatment testing for FYs 1995 and 1996, and early FY 1997 using extraordinary effort and the existing sampling equipment. While this effort and the volumes retrieved are important to enable smaller scale hot testing to proceed, they are not adequate for projected needs discussed in Section 2.1. To enable test work to proceed, development of a spectrum of sampling tools and supporting systems is recommended. Presented below is a strategy for development that will support small-scale testing during CY 1995 and increasingly larger scale testing as progressively larger sampling capabilities become operational throughout CY 1996. In the long run, it will provide a selection of sampling capability to support a wide range of testing for the pretreatment mission and subsequent vitrification programs.

2.3 EXPANDED SAMPLING CAPABILITY WITHIN CY 1995

A 500-mL sampler is commercially available at a cost that may preclude reuse, i.e., it is more cost-effective to discard rather than clean and reuse. This unit will have applications beyond CY 1995, but its greatest benefit will be to help meet the retrieval schedule shown in Table 2-1. Pigs or casks will be a critical path issue for this capability.

Savannah River Plant (SRP) staff have fabricated a 3-L version of their 25-L sampler device (see photographs and figures in Appendix C-1). The mechanism and its operation are similar with the advantage that they are smaller in diameter and length. The radioactivity dose rate would be somewhat less than that emanating from a 25-L sampler; however, extensive shielding would still be required. The weight of this sampler/container is within the capacity of hoisting systems available within the 222-S Laboratory for handling and sample recovery. With aggressive effort, this unit could be operational by the end of CY 1995 or early CY 1996 using a boom crane to lower it into a tank riser until a more dedicated truck-mounted system (Appendix C-2) is developed. The 3-L sampler would enable efficient recovery of all five of the 2- to 4-L samples for settle/decant testing, samples in

Table 2-1. Fiscal Year 1995 Planned Large-Volume Sample Retrieval Schedule - November 30, 1994.

Tank	Additional volume	Material	Method	Scheduled start
C-107	1 L	Sludge/saltcake	Push	January 1995
BY-109	1 core	Sludge/saltcake	Rotary	March 1995
AW-101	3 L	Supernate	Push	April 1995
AN-107	200 mL	Sludge/saltcake	Grab	May 1995
AN-107	5.1 L	Supernate	Grab	May 1995
C-106	600 mL	Sludge/saltcake	Rotary	June 1995
AP-105	6.1 L	Supernate	Grab	August 1995
AN-102	15 L	Supernate	Grab	September 1995
AN-105	5 L	Supernate	Push	November 1995
S-107	1,000 mL	Sludge/saltcake	Push	February 1996
BX-109	200 mL	Sludge/saltcake	Push	February 1996
TX-105	1 core	Saltcake	Rotary	April 1996
AW-105	850 mL	Supernate	Push	June 1996
B-109	400 mL	Sludge/saltcake	Push	September 1996
A-103	1,000 mL	Sludge/saltcake	Push	January 1997

Source: G. D. Forehand message to G. F. Howden, November 30, 1994, Westinghouse Hanford Company, Richland, Washington.

the 2- to 10-L range for all three organic defunctionalization tests, and one 15-L ion-exchange test sample, recovered resulting in acceleration of those schedules by at least 6 months, compared with waiting for the 25-L sampler capability discussed in Section 2.4.

2.4 EXPANDED SAMPLING CAPABILITY - 18-MONTH SCHEDULE

The capability to retrieve 25-L samples using the SRP sampler concept (Appendixes C-1 and C-2) could be available within 18 months. This effort will be more extensive because new transfer casks and intermediate containers will have to be designed and qualified, a portable tank riser interface device designed and fabricated, a sampler receiving and service cell set up, permits and procedures prepared, and operating staff trained. A working model of the SRP 25-L sampler is onsite and the WHC Transportation & Packaging engineering staff have prepared packaging design criteria for the sampler's transfer cask and container.

The 25-L sampler capability would enable efficient recovery of ten 25-L samples and one (early) 100-L sample for filtration testing, an early 100-L sample for centrifugation, and nine 15-L samples for more advanced ion-exchange testing.

The above sample data for the 500-mL through the 25-L sampler should be considered as minimum quantities because testing often identifies other issues with testing requirements.

The sample data in Appendix B-2 indicate an estimated 14 to 20 samples with volumes ranging from 100 to 3,600 L. Those volumes cannot reasonably be taken on a steady basis by any of the previously discussed sampling equipment. The WHC Tank Farms Maintenance organization has purchased a French-built LR-56 high-activity, over-the-road transporter with a capacity of 4,000 L. Figures and data on this system can be found in Appendix C-3. The transporter is scheduled for delivery in December 1995. The LR-56 is for onsite use, including the 300 Area. (This transporter was considered for shipping large samples to other DOE sites for testing, but WHC Transportation & Packaging engineering staff have indicated that an environmental impact statement would have to be prepared for use of the transporter off the Hanford Site. The time required for that activity is beyond the time window of the test work. Also, as discussed in Section 2.5, indications are that some states would oppose the use of the transporter on their highways.)

With authorization by early March 1995, design and construction of a relocatable load and unload capability for use at the several tank farms and fixed receiving facilities in the 324 and 325 Buildings could be completed to start beneficial use of the system for hauling samples by October 1996. The acceptability of the concept of a routinely used transportable load/unload capability for use at the tank farms hinges on the successful resolution of safety and containment issues that may arise during the design phase.

Because the unit has been purchased to make emergency transfers from a leaking tank, it will only be available on a fast turnaround basis and cannot be used as a storage or processing vessel at a test site. Cost of the transporter is about $2 million. Further assessment of peak demand for samples may dictate procurement of a second unit that would also provide a backup for tank farms emergency situations and a capability for removing existing high-activity waste from tanks in Buildings 324 and 325.

2.5 SAMPLE TRANSPORTATION CASK AVAILABILITY

Several types of shipping containers are, or soon will be, available and qualified for offsite shipment of small samples of tank wastes. These casks are shown in Table 2-2.

The WHC Packaging Engineering staff have been working to obtain DOE approval to permit the PAS-1 (Appendix C-4) cask to carry up to 4 L of liquid radioactive material on public roadways. Approval of the cask Certificate of Compliance is expected by early CY 1995. The PAS-1 Certificate of Compliance would allow the transportation of 4 L of liquid radioactive material per cask for a total of 16 L per month during at least part of CY 1995. Packaging Engineering staff have indicated that the PAS-1 may be readily modified

Table 2-2. Cask Descriptions.

Name	Type	Capacity	Quantity/availability
WHC liquid sample package*	A	4 L	6+
Warthog	A	250 mL	1 - 10 by May 1995
Hedgehog	A	400 mL	1+, certified by March 1995
PAS-1	B	4 L	2, certified by March 1995

*This package is unshielded.

WHC = Westinghouse Hanford Company

internally to carry up to 8 L/cask, provided hydrogen generation limits are not exceeded during the transportation time. An added permitting effort would be required to increase the capacity and would take an estimated 8 to 12 months to accomplish. Offsite shipment capacity during CY 1995 will therefore be limited to about 16 L per month, possibly doubling by mid-CY 1996.

The transportation of tank wastes was determined to be the limiting factor for performing larger scale (>30 to 50 L) testing off the Hanford Site. Two interstate highway routes are available for moving tank waste samples from the Hanford Site to other sites. The closest route to the Idaho National Engineering Laboratory (INEL), Los Alamos National Laboratory (LANL), and Oak Ridge National Laboratory (ORNL) would be via Interstate 80 through Oregon. Oregon State Department of Transportation (OSDT) representatives have indicated in recent meetings that the OSDT would support the shipment of up to four PAS-1 cask shipments per month of tank waste samples to the other northwest states (Stroup 1994); however, the OSDT representatives have indicated that they probably would not support the shipment of larger waste samples. As a result, this analysis is based on a maximum shipment of 30 to 50 L of waste to a site (approximately 1 1/2 months' shipping capacity) for a specific group of tests.

This limit per group of tests would allow up to eight other similar-sized samples to be shipped each year to one or more DOE sites. All sites except ORNL have indicated that they would have to return the waste to the Hanford Site after completing any test work. Return of sample remains and secondary test wastes would not decrease the number samples that could be shipped from the Hanford Site.

Some added cask capability for handling smaller volume samplers would be required for onsite use, as shown in Table 2-3.

Providing casks to meet the need dates for the 500-mL and 3-L samplers is expected to require an aggressive effort. The time available to provide the 25-L sampler and 25-L sample casks is achievable on a more normal basis. Immediate action to design and procure these casks is recommended.

Table 2-3. Cask Capabilities for use at the Hanford Site.

Description/application	Quantity (minimum)	Need date
500-mL sampler cask	4 to 6	May 1995
3-L sampler cask	4 to 6	November 1995
25-L sampler cask	6	May 1996
25-L sample cask	3	July 1996

2.6 SAMPLE TRANSHIPMENT CAPABILITY

A survey of the requirements and capability for receiving and handling the 500-mL, 3-L, and 25-L samplers indicated that the 222-S Laboratory staff would have the capability and interest in supporting the 500-mL and 3-L sampler servicing and sample transhipment mission. The facility does not have the structural features or crane capacity to enable its use to service the 25-L sampler. A new location will be required for that unit.

An initial scoping of the requirements for a window-type cell to receive and handle the 25-L sampler, its maintenance, and the repackaging of the sample is as follows:

- About 5.6 to 6.5 m^2 of floor space
- A means of top entry into the cell for the sampler
- An incell crane with a 0.45-metric ton minimum capacity
- A crane above the cell capable of handling a 9-metric ton cask.

It is recommended that the 222-S facility be designated as the transhipment point for the 500-mL and 3-L samplers. The Waste Encapsulation and Storage Facility (WESF), 324 radiochemical engineering (RCE) Cell C, and 325A Cell B or C have the above-listed attributes that would enable their use for the 25-L transhipment function. The 324 RCE Cell C is recommended by the hot testing site evaluation team for the mission based on its immediate availability, capability to meet the functional requirements, and low cost for access. The cell will need to be dedicated to this mission for 3 to 4 years.

Each facility that will receive samples via the LR-56 transporter will require a shielded interface capability, including enclosure for the vehicle during unload/reload activity and shielded/encased pipelines from the vehicle interface to receiving and effluent discharge tanks. Those facilities requiring this capability will be identified and discussed in Sections 4.0 and 5.0.

Preliminary discussions have been held with the Waste Tank Plant Engineering representative regarding design of a load/unload capability at one or more of the tank farm sites. An engineering study is required and recommended to provide a safety analysis and the design functions and requirements of this capability within the next 2 months.

2.7 SAFETY DOCUMENTATION AND ENVIRONMENTAL PERMITTING

The following sections identify safety documentation and permitting requirements that may affect the time required to make a facility operational for testing. Bolded text indicates facility development project hold points that will have to be observed in schedule development.

2.7.1 Safety Documentation

The safety analysis documentation requirements for each candidate facility are based on the status of the current facility safety documentation and the potential hazard of the proposed activity.

The status of the facility safety documentation is assessed based on (1) conformance to current criteria established in DOE Orders 5480.23 (DOE 1992a) and 5481.1B (DOE 1986), and (2) the similarity of the proposed activity to the facility operations evaluated in the safety documentation. If the safety documentation meets the current criteria and the evaluation of the facility operations encompasses the proposed activity, no new safety documentation would be required. This is the likely case for the performance of laboratory-scale testing. If the safety documentation is not current (e.g., WESF/B Plant), any upgrades required will depend on the similarity of the proposed activities with the current facility operation. If the hazards of the proposed activity are *not bounded* by the current facility operations, an additional accident analysis will be required. Approval of the safety documentation in this case will require that the documentation be upgraded to current safety analysis criteria.

The hazard of the activity is affected by the quantity of material at risk and the energy sources present in the process which could disperse the material.

Small quantities (<10 L) of high-activity waste are not expected to exceed the Category 3 threshold specified in DOE-STD-1027-92 (DOE 1992b). The applicable safety documentation requirements are specified in DOE Order 5481.1B for facilities whose inventories do not exceed Category 3 limits. The safety documentation requirements for facilities whose inventories do exceed Category 3 limits are specified in DOE Order 5480.23. Large quantities (>1,000 L) of high-activity waste could exceed the Category 2 threshold specified in DOE-STD-1027-92. Facilities whose inventories exceed the Category 2 levels (e.g., ion-exchange Case 2 testing) are required to include a greater amount of detail on the potential accidents and their consequences.

Energy sources associated with the proposed activities are considered in determining the potential hazards associated with the facility. Energetic reactions (e.g., ion exchange), which could increase the dispersal of hazardous material, require a greater amount of analysis.

2.7.2 National Environmental Policy Act of 1969 (NEPA) Documentation

The NEPA documentation is required to be in place before (1) detailed design, (2) committing irretrievable funds, and (3) construction or equipment installation. The NEPA is regulated by the DOE.

The NEPA documentation will be required for any testing with actual tank waste. If the planned activities are not covered under existing NEPA documentation, additional NEPA documentation will be required. The specific NEPA documentation required cannot be determined until the actual location and extent of the testing activities are known. However, it appears a categorical exclusion (CX) would be required. A CX would be required if the waste is tested at the Hanford Site or shipped to another site. If the waste is shipped to another site, that site would require additional NEPA documentation to cover the activities conducted there (probably a CX). A CX will take approximately 3 months to prepare and approve. If a CX is not sufficient and an environmental assessment is required, preparation and approval may take up to 12 months.

2.7.3 Resource Conservation and Recovery Act of 1976 (RCRA) Permitting

The RCRA permits would be required before any construction work related to the testing program is initiated and before equipment is installed in hot cells where construction is not required.

To meet RCRA regulations, the testing site will be required to obtain a research, development, and demonstration (RD&D) permit or a treatability study (TS) exemption. A TS does not require a permit and can be obtained by obtaining permission to conduct the onsite tests from the Washington State Department of Ecology (Ecology) for the Hanford Site, or responsible state authority at other DOE sites. This can be done in 1 to 3 months. A TS exemption has waste quantity restrictions. The restrictions are a maximum of 1,000 kg of waste for each process being evaluated for each waste stream. It is uncertain whether Ecology will concur that wastes from separate tanks constitute different streams and whether a change in the process material (e.g., resin) constitutes a change in process. If the State did interpret all tank wastes as one waste stream, an RD&D permit would be required. An additional 500 kg of waste can be used on a case-by-case basis if there (1) has been an equipment failure, (2) is a need to verify the results of a previous study, (3) is a need to study and analyze alternative techniques within a treatment process, or (4) is a need to further evaluate an ongoing TS to determine final specifications. If waste quantities >1,500 kg per process per waste stream are needed, an RD&D permit will be required.

The limitation on an RD&D permit is the treatment of no more than 15,000 kg of waste per month. There is also a time limitation of 3 years, including permit renewals. An RD&D permit would require approximately 12 months to obtain. The TS would be regulated by Ecology (in Washington State), while the RD&D permit would be regulated by the U.S. Environmental Protection Agency (EPA).

Similar requirements will be required if the tests are conducted at other sites. All sites, regardless of location, would have to meet at a minimum the federal or state RCRA treatment and storage requirements.

2.7.4 Air Permits

The air permits would be required before construction or equipment installation.

Air permits required for the testing depend on the test location and the waste being tested. If the tests are conducted in a facility with existing air permits that cover the proposed activities, additional permitting may be unnecessary or the permits may only require amending. Depending on the waste, as many as four air permits could be required and, depending on the permit, would be regulated by the EPA, Ecology, or the State of Washington Department of Health. If the tests are conducted in an existing facility, air permits could probably be obtained within 9 months, while a new facility could require up to 17 months. Similar requirements would apply at other sites in other states.

It is recommended that a detailed assessment of the permitting status of those facilities/sites recommended in Sections 4.0 and 5.0 be initiated immediately to confirm status information received during this assessment study. Preparation of an RD&D permit application must be initiated by April 1995 for the Case 2 ion-exchange test work because it will exceed the 1,500 kg per process limit as indicated in Appendix B-2.

2.8 CELL ACCESSIBILITY ON THE HANFORD SITE

The cells needed for this work are window-type cells outfitted with master/slave manipulators to support equipment installation, operation, analytical sample taking and handling, equipment troubleshooting, and in situ remedial action or repair.

Some cell space is available in the 222-S Laboratory with little cleanout required.

Cell space may be available in the WESF, but by the time permits are obtained to initiate cleanout and staffing is made available, it will be early to mid-CY 1996 before the cells can be accessed for equipment installation for any application. That time delay is prohibitive.

Eighteen new cells in sizes ranging from 3.4 to 372 m^2 are available in the FMEF in the 400 Area. Many of the smaller cells are stainless steel lined and have shielding windows, manipulators, and other equipment to outfit them available for installation. Some construction work would be required to complete the cell ventilation systems and provide piping and tankage to interface with the LR-56 transporter and the cells. Because of the time required to design and permit needed work described, it would take 12 to 18 months to make the cells available for equipment installation, assuming the work was done using expense funding. Capital funding would add an additional year or more to the schedule. That time delay is also prohibitive.

Cells C and D in the 324 Building's RCE cell complex are available immediately. Cells in the Shielded Materials Facility (SMF) complex are available immediately, but require minor cleanout (East Cell) to major cleanout (South Cell) and modification to make them better suited for remote maintenance. The cells can now be entered for maintenance, cleanout, and interior modification after removal of the source term. Some construction will be required to provide high-activity radioactive waste drains from the SMF cell complex and to provide large-volume sample transfer lines to the RCE and SMF cells for transferring waste from/to the LR-56 transporter.

In Buildings 325A and B, four cells are also available that have been or are now nearly cleaned and ready for a new mission. Some of these cells are available immediately for a new mission. They will require installation of some shielded piping between the truck dock and cells for transferring large samples from the LR-56 transporter.

Recommendations on use of these cells are provided in Sections 4.0 and 5.0.

2.9 OTHER SITING CONSIDERATIONS

Early in the site evaluation, the issue of comparatively ranking the attributes of a compact processing unit (CPU) for doing hot testing with those of window-type hot cells was discussed by the evaluation team. Based on current knowledge of the facility functional needs for doing hot testing, the tight schedule for performing the test work, and the significantly higher cost of designing and building a CPU-housed process, the evaluation team decided that the most flexible and less costly testing option is to use existing window-type hot cells to the extent they are available. The findings to date are that there are enough window-type hot cells available to exceed the current need. The development of a 4,000-L aboveground sample transport system that is now in progress at the Hanford Site supports this decision by providing the capability for high flow rate testing (should it be required), in fixed window-type cells. The 4,000-L transporter also provides access to a larger range of tank wastes than would be possible with a CPU located at a tank farm.

The use of the Plutonium Uranium Extraction (PUREX) and B Plant canyon or canyon cells was considered but discarded early in the assessment. The basis for this judgement was as follows:

- Staffed access to the canyons is very difficult and is minimized for personnel safety (as low as reasonably achievable). Setting up a shielded enclosure at canyon floor level for containment and operation of a test would be difficult to access, and would have to essentially operate in a full remote, non-contact mode of operation and maintenance. Sample taking could be manually accomplished but with higher staff exposure for canyon entry.

- All pipelines between the tank farms and PUREX or B Plant are single wall concrete-encased lines that do not meet current double containment requirements. They are operated on a limited basis for waste transport from the plants. When they were operated for tank waste transfers, their operation generated about 80,000 to 160,000 L of line preheat and flush water per transfer. A minimum pipeline transfer was considered to be about 40,000 L of waste.

- Use of the canyon cells or a new canyon floor level cell would require new and difficult to install doubly contained piping to/from the cell to a point a truck type transporter could access, and double containment for the test apparatus. It would also require nearly full remote, non-contact operation and maintenance. Use of below floor-level cells would require semi-remote sample recovery. All of these canyon set-ups would be more expensive and time consuming to establish than a window cell test set-up.

The use of the PUREX or B Plant canyons or canyon cells was therefore not considered practical for the scale of testing that has been identified.

2.10 QUALITY ASSURANCE PROGRAM REVIEW

The Quality Assurance Program Plan of each of the candidate sites was reviewed to ensure that data provided by their testing work would meet the IPM Project's minimum needs. The program attributes described in these plans were compared to the programmatic requirements described in 10 CFR 830, "Nuclear Safety Management," Subpart A, "General Provisions," Section 830.120, "Quality Assurance Requirements." The review team concluded that the programs of the candidate sites meet the minimum programmatic requirements necessary to support the IPM Project design with qualified test data. Some coordination will be required with supporting sites to ensure uniform application.

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3.0 SITE EVALUATION METHODOLOGY SUMMARY

Preliminary test facility functions and requirements for the hot testing process have been prepared to support the IPM Project design test work (Reynolds 1994b). The functions and requirements were organized into six categories of technologies: ion exchange, sludge washing, organic defunctionalization, settling/decanting, filtration, and centrifugation. This method was chosen to reduce the number of alternatives to be evaluated and make the evaluation problem more manageable.

The functions and requirements document was summarized into Assessment Matrices in (Reynolds 1994c). This report contained six detailed spreadsheets for the six technologies. In reviewing the spreadsheets, the evaluation team decided that nearly all sites and window-type cell facilities have common attributes that would score essentially the same in the evaluation. By eliminating those evaluation attributes from the spreadsheets, the spreadsheets were reduced to one common set of two pages and 12 criteria. These spreadsheets provided the basis for evaluating candidate sites and facilities.

Before initiating the site visits and evaluations, an initial four-stage screening of the candidate sites was implemented to focus the site visits and evaluations on those with the highest potential for support of the test program. The screening steps were as follows.

1. Working with the WHC analytical staff, an initial matrix of known site capabilities of the several DOE sites was prepared to identify those most likely to have the needed capability.

2. Personal contacts were made with key operations or program management staff (see Preliminary Hot Test Siting Evaluation, Appendix D-1) at the selected sites to solicit a preliminary indication of interest and an initial site survey was sent for review and response by return mail. A copy of the site survey format and spreadsheet of survey responses is included in Appendix D-1.

3. Following site visits to ORNL, LANL, INEL (ANL-W and Lockheed Idaho Technology Company [LITCO]) and hot cell facilities on the Hanford Site, and using a detailed data package from ANL-E, data sheets on key attributes of each site/facility were prepared (Appendix D). Also prepared were spreadsheets that show the logical groupings of several issues and the major test support requirements of each grouping (Appendix B-2). The test information need dates shown on these spreadsheets were provided by the IPM Project A-E in July 1994 and were based on the schedule and Multi-Year Program Plan for the project (see the spreadsheets in Appendix B-2).

4. Using the site attribute data sheets (Appendix D-2) and the test grouping spreadsheets (Appendix B-2), a preliminary assessment of the candidate sites was made to eliminate those candidates that could not be provided with suitably sized waste samples (due to retrieval or transportation issues) or that did not meet minimum

cell requirements. The assessment sheets on the Hanford Site's 222-S Laboratory facility are included in Appendix D-3 as an example.

The grouping of issues referred to in "3" above and shown on the tables in Appendix B-2 were developed by the evaluation team using the following "rules."

1. Work on an issue (see Appendix B-1 for list of issues) will not be split between sites; that is, when an issue requires combination of cold and hot testing, the work will all be done at the same site. The basis for this rule is avoidance of data correlation problems, reduced coordination, and administration costs.

2. Issues that can use the same radioactive sample(s) for resolution will be combined/grouped and will not be split between sites. The basis for this rule is avoidance of unnecessary retrieval and shipping of radioactive waste samples.

3. Issues that require an elaborate/costly hot laboratory or hot cell setup and can be resolved on the same setup as another issue(s) will be combined/grouped. The basis for this rule is avoidance of unnecessary test apparatus setup cost. The guidance for this rule is costs over $25,000 per setup.

Those candidate sites successfully meeting this screening for each technology were analyzed to provide data for use by Pacific Northwest Laboratory's (PNL) Decision Analysis group to rank the hot cells at the several sites for suitability for each test group. Appendix E provides summary spreadsheets of the evaluation scoring of all the candidate facilities and cells.

4.0 CONCLUSIONS AND DISCUSSION

This section will present and discuss the computer decision analysis program ranking of the candidate hot testing sites and their hot cells. This section will also present the results of the site evaluation team's application of the site/facility ranking data. A brief description of each candidate hot cell facility and figures showing the facility arrangement are provided in Appendix D-2.

4.1 SITE/FACILITY RANKING METHODOLOGY

The methodology of the series of supporting studies and site screenings was summarized in Section 3.0. On completion of the site evaluation data sheets described in Section 3.0, those data were analyzed using a computer program applying the Multiattribute Utility theory (Clemen 1991; Keeney 1992). A detailed description of the ranking process is provided in Appendix F. The development of the measures and their scales was completed as part of the pre-site visit work. Following the site visits, the evaluation team met to develop the weights applied to the measures. Figures E-1 through E-14 in Appendix E display the scale values assigned to each measure by the two-person site/facility evaluation teams. Figures E-1 and E-2 also display the weights assigned to each measure by consensus of the full site evaluation team.

4.2 FACILITY RANKINGS

Table 4-1 presents a tabulation of the weighted scoring of facilities evaluated under each technology testing group. A score of 100 would be the maximum score possible. Note that no scoring of offsite facilities was recorded for ion-exchange, filtration, and centrifugation testing. The reason was that anticipated waste shipping limits by adjacent states (Stroup 1994) would prohibit transportation of sufficient volumes of Hanford Site tank wastes to those sites to perform the tests.

The weighted scores of each facility shown on Table 4-1 were analyzed using the computer program to provide an overall ranking of all facilities for each technology.

The results of this ranking are shown on Figures 4-1 through 4-12 where the facilities are ladder ranked with the highest scoring facility/cell at the top.

4.3 TEST GROUP SITING RECOMMENDATIONS

The test siting evaluation team met to review the data provided in Figures 4-1 through 4-12 and to develop the recommendations for siting the specific test groups. The team decided that the facilities should be assigned based on their ranking relative to others in their test group, and based on a ladder ranking of the test groups that placed those requiring the largest tank waste samples at the top and the least at the bottom. The logic behind this decision was that those test groups that required the largest setups were the

Table 4-1. Facility Rankings.

NAME	Ion Exchange Case 1 Group 1	Ion Exchange Case 1 Group 2	Ion Exchange Case 2 Group 1	Sludge Washing Group 1	Sludge Washing Group 3	Sludge Washing Group 4	Organic Destruction Group 1	Settling Decanting Group 1	Filtration Group 1	Filtration Group 2	Filtration Group 3	Centrifugation Group 1
222-S(1A)	86			91	89	89	86					
222-S(1E1)	91	88		81	80	80	83	80				
222-S(1E2)				81	80	80	83	79				
222-S(11A)	89			91	89	89	86					
222-S(1F)	91	96		91	83	89	86	81	85		92	90
WESF B& C	62	75	62	69	69	69	60	66		72	70	74
WESF DE	75	75	71	69	69	69	60	66	62	75	75	74
WESF DE&C			71									
325 SAL				92	90	89	86	87	62			
325A C	95	91		92	90	89	86	89	88			
325A B	95	91		95	81	79	83	80	82			
325 AB&C			90									
325A A	95	95		92	90	88	86	83	86	94	94	91
324RCE C	87	89	87	83	78	84	79	78	84	87	87	87
324RCE D	87	89	87	83	84	84	79	78	84	88	87	87
324 SMF E	85	89	85	84	84	84	79	78	84	84	85	85
324 SMF S	85	89	85	84	84	84	79	78	84	84	85	85
LANLWING9				81	83	83	83	79				
ANLE 200 AC				67	60	65	61	54				
ANLE 200 KC				67	60	65	61	54				
ANLE 200 MC				57	57	62	57	51				
ORNL3517 12 13				71	67	71	71	71				
ORNL3517 11				71	67	71	71	71				
ORNL3517 14				71	67	71	71	71				
ORNL3517 15				71	67	71	71	71				
ORNL3517 16 17				71	67	71	71	71				
ORNL3047 A D				83	79	83	83	83				
ORNL3047 B C				83	79	83	83	74				
ORNL4501 B D				77	70	72	83	75				
ID CPP601				70	64	64	67					
ID CPP666				70	64	69	70	70				
ID CPP684				61	54	59	70	61				
ID HFEF				77	70	75	77	77				
ID FCF				64	58	62	64	64				
ID ANA LAB				80	74	79	71	71				
FMEF 132+6				60	56	60	58	60				
FMEF 145				60	56	60	58	62				
FMEF 146				60	56	60	58	62				
FMEF 147	58	60	64	60	56	60	58	62	60	60	63	60
FMEF 235								62				
FMEF 325	58	60	64	60	56	60	58	62	60	57	60	57
FMEF 507	58	60	64	60	56	60	58	62	60	59	60	57
327 B C D E	80			84	84	80	74					
327 G	82	82		80	84	80	74	74	79			
FMEF 135+4				63	61	61	58	64				

Figure 4-1. Ranking of Hot Cells for Ion-Exchange 1-1.

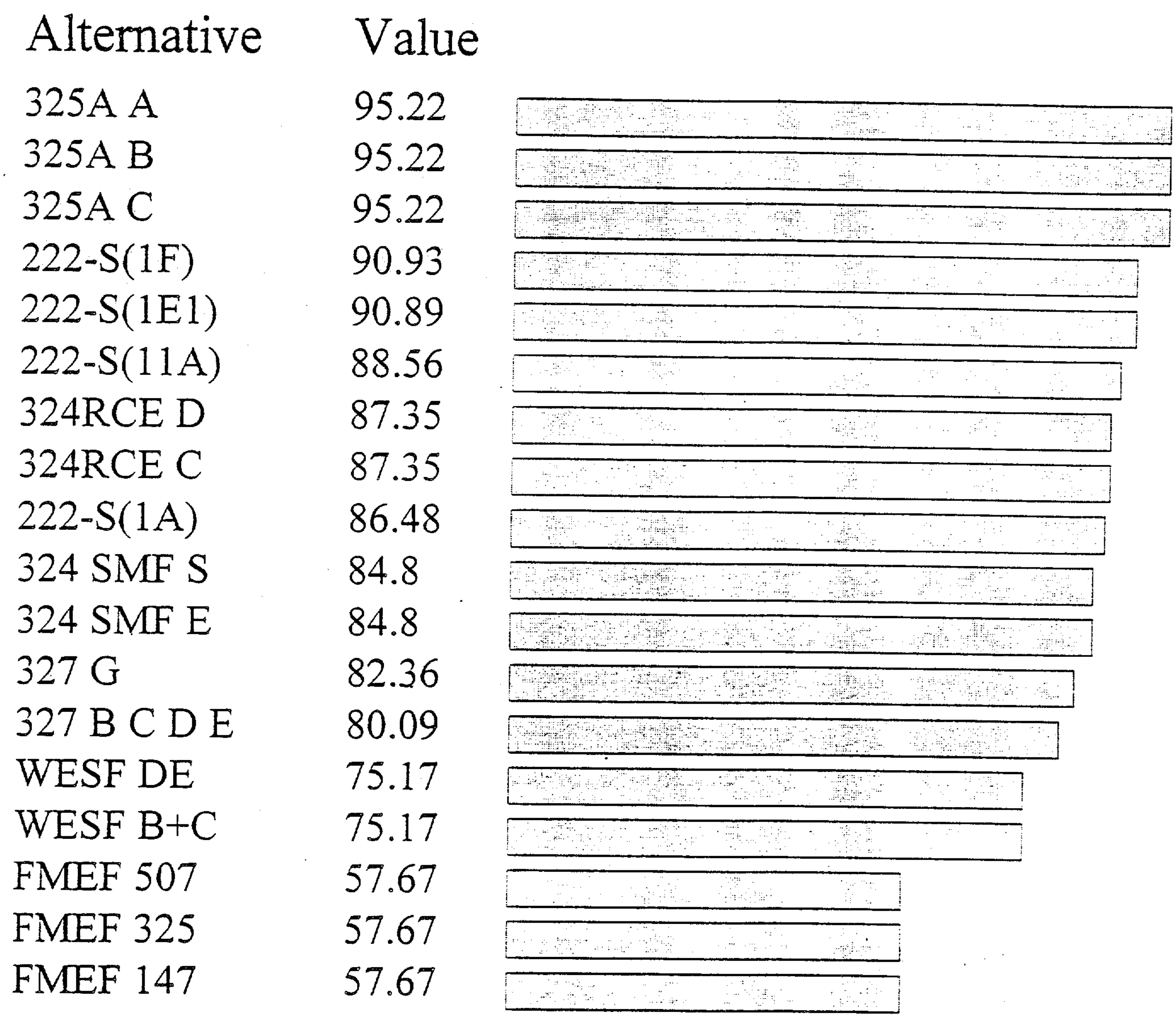


Figure 4-2. Ranking of Hot Cells for Ion-Exchange 1-2.

Alternative	Value
222-S(1F)	95.7
325A A	95.22
325A B	91.48
325A C	91.48
324 SMF S	88.95
324 SMF E	88.95
324 RCE D	88.95
324 RCE C	88.95
222-S(1E1)	88.23
327 G	82.36
WESF DE	75.17
WESF B+C	75.17
FMEF 507	60.23
FMEF 325	60.23
FMEF 147	60.23

Figure 4-3. Ranking of Hot Cells for Ion-Exchange 2-1.

Alternative	Value
325 A+B+C	90.06
324 RCE D	87.35
324 RCE C	87.35
324 SMF S	84.8
324 SMF E	84.8
WESF DE+C	71.49
FMEF 507	63.53
FMEF 325	63.53
FMEF 147	63.53

Figure 4-4. Ranking of Hot Cells for Sludge Wash Group 1.

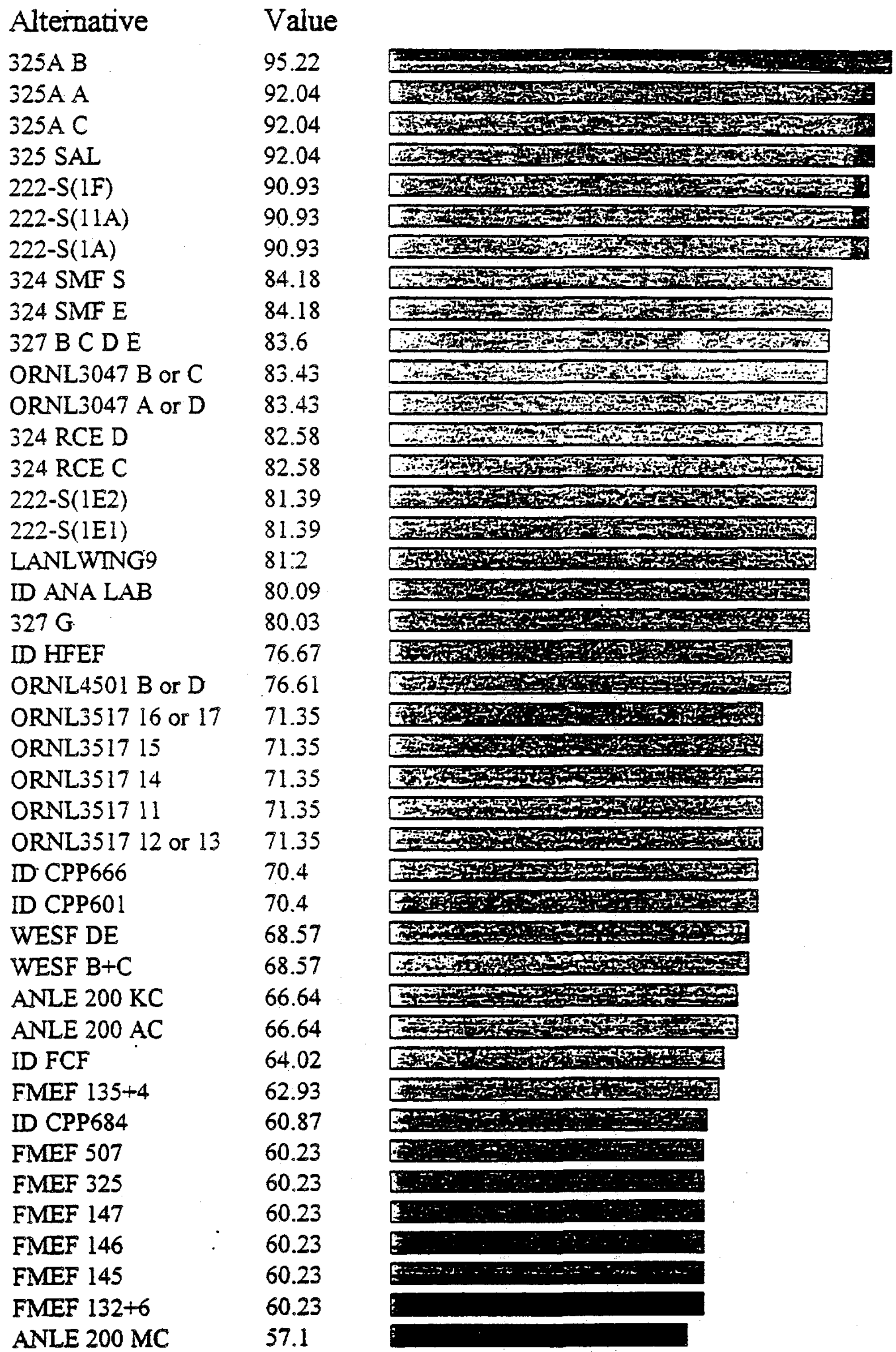


Figure 4-5. Ranking of Hot Cells for Sludge Wash Group 3.

Alternative	Value
325A A	90.45
325A C	90.45
325 SAL	90.45
222-S(11A)	89.33
222-S(1A)	89.33
324 SMF S	84.18
324 SMF E	84.18
324 RCE D	84.18
327 G	83.59
327 B C D E	83.59
222-S(1F)	82.98
LANLWING9	82.8
325A B	80.91
222-S(1E1)	79.8
222-S(1E2)	79.8
ORNL3047 B or C	78.65
ORNL3047 A or D	78.65
324 RCE C	77.82
ID ANA LAB	73.72
ID HFEF	70.3
ORNL4501 B or D	70.23
WESF DE	68.57
WESF B+C	68.57
ORNL3517 16 or 17	66.56
ORNL3517 15	66.56
ORNL3517 14	66.56
ORNL3517 11	66.56
ORNL3517 12 or 13	66.56
ID CPP666	64.03
ID CPP601	64.03
FMEF 135+4	61.24
ANLE 200 KC	60.28
ANLE 200 AC	60.28
ID FCF	57.65
ANLE 200 MC	57.1
FMEF 507	55.83
FMEF 325	55.83
FMEF 147	55.83
FMEF 146	55.83
FMEF 145	55.83
FMEF 132+6	55.83
ID CPP684	54.49

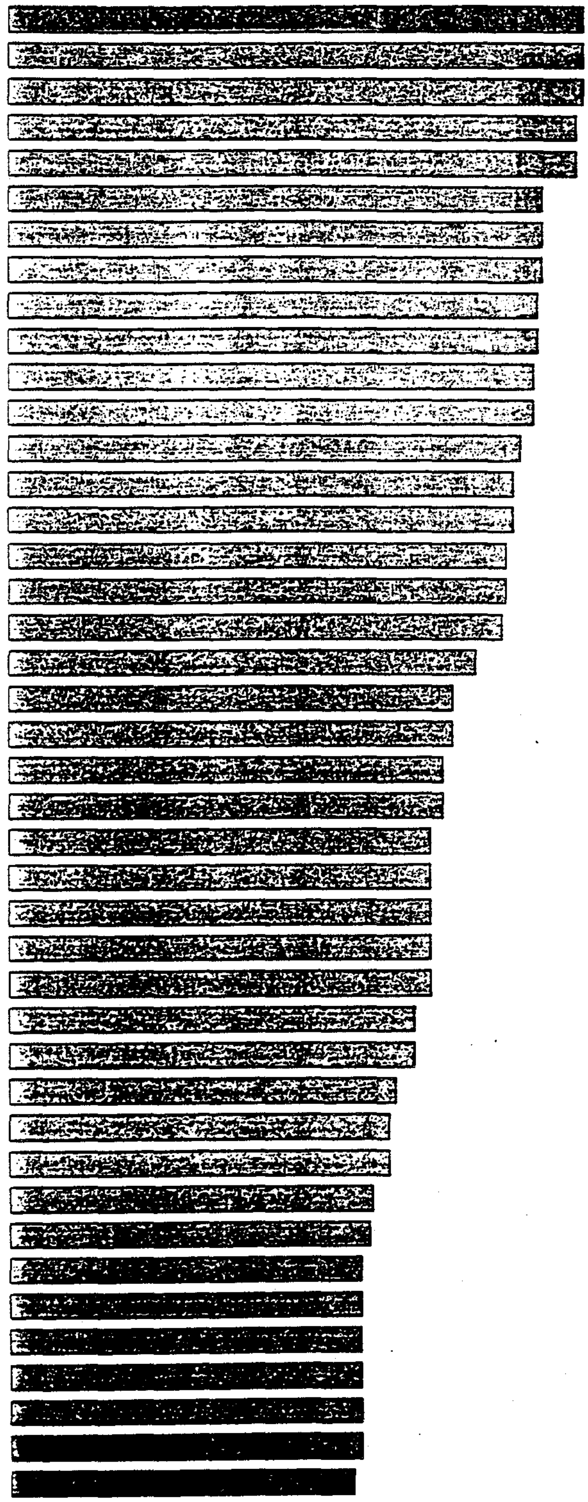


Figure 4-6. Ranking of Hot Cells for Sludge Wash Group 4.

Alternative	Value
325A C	89.49
325 SAL	89.49
222-S(1F)	89.33
222-S(11A)	89.33
222-S(1A)	89.33
325A A	87.89
324 SMF S	84.18
324 SMF E	84.18
324 RCE D	84.18
324 RCE C	84.18
ORNL3047 B or C	83.43
ORNL3047 A or D	83.43
LANLWING9	82.8
327 G	80.03
327 B C D E	80.03
325A B	79.95
222-S(1E1)	79.8
222-S(1E2)	79.8
ID ANA LAB	78.5
ID HFEF	75.08
ORNL4501 B or D	72.46
ORNL3517 16 or 17	71.35
ORNL3517 15	71.35
ORNL3517 14	71.35
ORNL3517 11	71.35
ORNL3517 12 or 13	71.35
ID CPP666	68.81
WESF DE	68.57
WESF B+C	68.57
ANLE 200 KC	65.06
ANLE 200 AC	65.06
ID CPP601	63.62
ID FCF	62.43
ANLE 200 MC	61.89
FMEF 135+4	61.24
FMEF 507	60.38
FMEF 325	60.38
FMEF 147	60.38
FMEF 146	60.38
FMEF 145	60.38
FMEF 132+6	60.38
ID CPP684	59.27

Figure 4-7. Ranking of Hot Cells for Organic Destruction Group 1.

Alternative	Value
222-S(1F)	86.16
222-S(11A)	86.16
222-S(1A)	86.16
325A A	85.68
325A C	85.68
325 SAL	85.68
ORNL4501 B or D	83.43
ORNL3047 B or C	83.43
ORNL3047 A or D	83.43
222-S(1E2)	82.99
222-S(1E1)	82.99
LANLWING9	82.8
325A B	82.51
324 SMF S	79.41
324 SMF E	79.41
324 RCE D	79.41
324 RCE C	79.41
ID HFEF	76.67
327 G	73.67
327 B C D E	73.67
ORNL3517 16 or 17	71.35
ORNL3517 15	71.35
ORNL3517 14	71.35
ORNL3517 11	71.35
ORNL3517 12 or 13	71.35
ID ANA LAB	71.18
ID CPP684	70.4
ID CPP666	70.4
ID CPP601	66.76
ID FCF	64.02
ANLE 200 KC	60.54
ANLE 200 AC	60.54
WESF DE	59.79
WESF B+C	59.79
FMEF 135+4	57.67
FMEF 507	57.67
FMEF 325	57.67
FMEF 147	57.67
FMEF 146	57.67
FMEF 145	57.67
FMEF 132+6	57.67
ANLE 200 MC	57.36

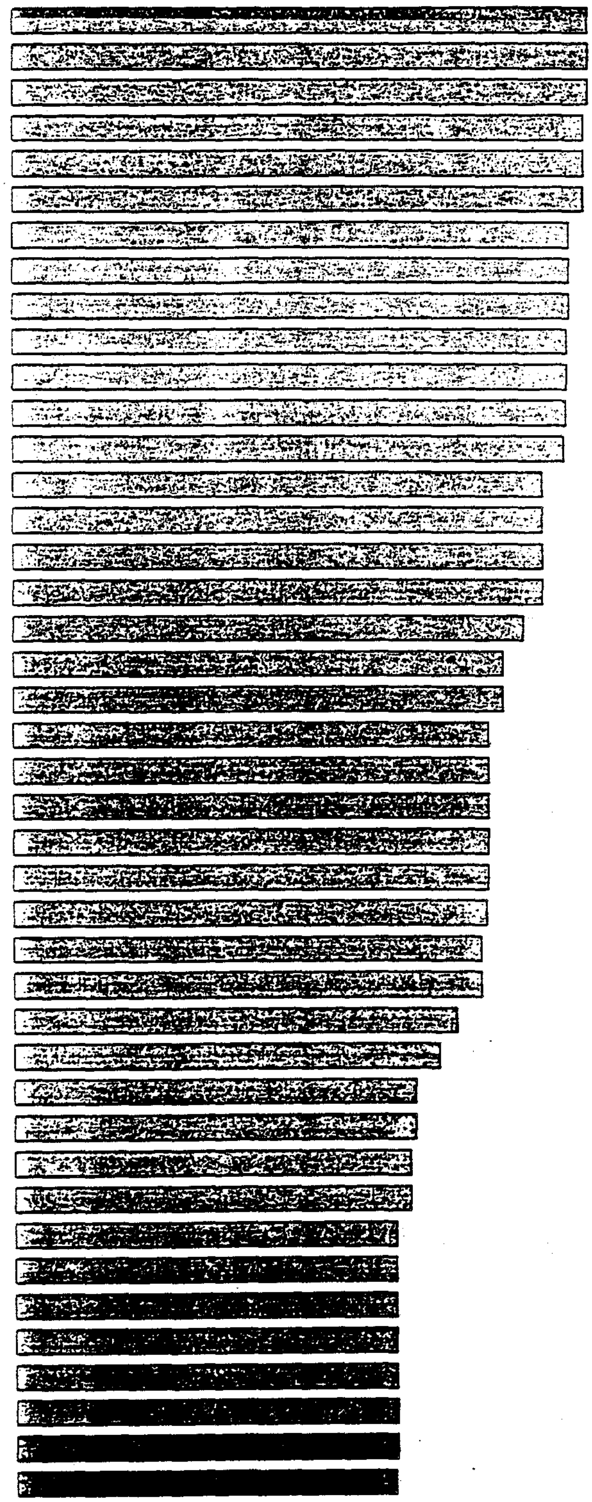


Figure 4-8. Ranking of Hot Cells for Settle/Decant-1.

Alternative	Value
325A C	89.13
325 SAL	87.11
ORNL3047 A or D	83.12
325A A	82.51
222-S(1F)	81.39
325A B	79.6
222-S(1E1)	79.56
LANLWING9	79.37
222-S(1E2)	79.11
324 SMF S	77.82
324 SMF E	77.82
324 RCE D	77.82
324 RCE C	77.82
ID HFEF	76.67
ORNL4501 B or D	74.53
ORNL3047 B or C	73.9
327 G	73.67
ORNL3517 15	71.35
ORNL3517 14	71.35
ORNL3517 11	71.35
ORNL3517 12 or 13	71.35
ID ANA LAB	71.18
ORNL3517 16 or 17	71.03
ID CPP666	70.4
WESF DE	66.02
WESF B+C	66.02
ID FCF	64.02
FMEF 134 + 4	63.79
FEMF 507	62.45
FMEF 325	62.45
FMEF 235	62.45
FMEF 147	62.45
FMEF 146	62.45
FMEF 145	62.45
ID CPP684	60.87
FMEF 132+6	60.07
ANLE 200 KC	54.16
ANLE 200 AC	54.16
ANLE 200 MC	50.98

Figure 4-9. Ranking of Hot Cells for Filtration Group 1.

Alternative	Value
325A C	87.99
325A A	85.68
222-S(1F)	84.57
324 SMF S	84.18
324 SMF E	84.18
324 RCE D	84.18
324 RCE C	84.18
325A B	81.63
327 G	79.18
WESF DE	62.34
WESF B+C	62.34
FMEF 507	60.12
FMEF 325	60.12
FMEF 147	60.12

Figure 4-10. Ranking of Hot Cells for Filtration Group 2.

Alternative	Value
325A A	93.75
324 RCE D	88.19
324 RCE C	86.6
324 SMF S	84.03
324 SMF E	84.03
WESF DE	75.06
WESF B+C	71.63
FMEF 147	60.26
FMEF 507	59

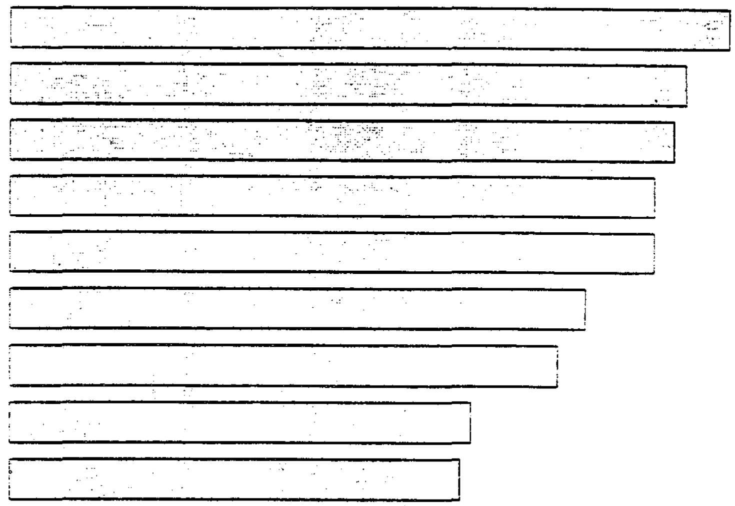
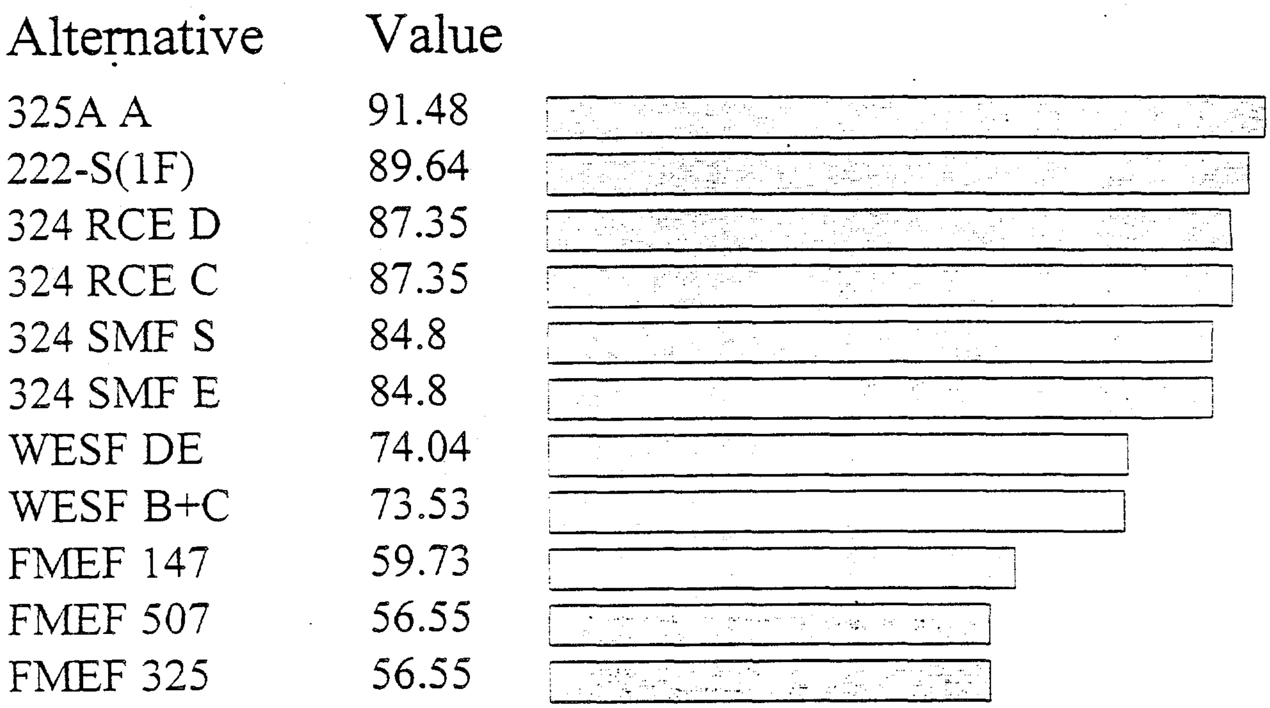


Figure 4-11. Ranking of Hot Cells for Filtration Group 3.

Alternative	Value
325A A	94.08
222-S(1F)	91.93
324 RCE D	87.35
324 RCE C	87.35
324 SMF S	84.8
324 SMF E	84.8
WESF DE	75.06
WESF B+C	69.56
FMEF 147	63.3
FMEF 507	60.12
FMEF 325	60.12

Figure 4-12. Ranking of Hot Cells for Centrifugation.



least flexible in fitting in with other work, and would need the most time to set up and operate. Therefore, they were spotted first and the others fit into the rest of the available cells based on their relative ranking. The basic rule of the exercise was that once a cell was assigned, it was no longer on the "availability" list even though the decision analysis for other (usually lower ranked) test groupings may also identify that cell as first choice. In that case, the next lower ranked and available cell was assigned. Exceptions to the logic applied in developing cell assignment recommendations are noted in Table 4-2.

Table 4-2 displays the results of this effort with the more difficult test setups at the top of the page, listed in descending order of complexity.

4.3.1 Logic Exceptions

As noted, two exceptions were made to the assignment logic. First, a cell to house the 25-L sampler servicing and transhipment function was considered a high priority due to its space and special cask access requirements, but it was not believed by the evaluation team to warrant one of the most highly ranked cells, such as Building 325A, Cell A. Second, the Filtration Group 2 test is a performance test of the transuranic (TRU) monitor instrument development. While the volume of waste identified as needed to perform that test is larger than even the ion-exchange Case 2 test requirement, a measure of uncertainty about the future of the instrument led the evaluation team to rank it below the importance of the two ion-exchange test groups for cell assignment.

Table 4-2. Test Group Siting Recommendations. (sheet 1 of 2)

Pretreatment technology infrastructure	Test group	Sample size/test run	No. test runs/start date	Recommended test/ infrastructure location	First backup location	Comments*	Logic of exceptions to decision analysis ranking of facilities
25-L sampler service facility	--	--	7/96	Bldg 324 RCE Cell C	WESF B & C	*If not used for ion exchange Case 2. No RCRA required. Include in NEPA. May require air permit.	Best access for cask handling, sampler unloading, and maintenance.
Ion-exchange Case 2	2	3,600 L	3-9 10/96	Bldg 325A Cells A + B + C	Bldg 324 RCE Cell C	RCRA - 1 year for RD&D permit. NEPA and air required.	--
Ion-exchange Case 1	1	180 L	3-9 10/96	Bldg 325A Cell A	Bldg 325A Cells B & C	RCRA treatability study. NEPA and air review.	Potential for consolidation with test group ion-exchange Case 2, Group 1.
Filtration (TRU monitor)	2	4,000 L	1 10/96	Bldg 324 RCE Cell D	WESF B & C	No RCRA required. NEPA and air evaluation needed.	First choice Cell 325A - Cell A assigned to ion-exchange Case 2. Second candidate, 324 SMF, not used in favor of WESF because design for WESF available; 324 SMF more useful for other tests.
Centrifugation	1	100-500 L	4 10/96	Bldg 222-S Cell 1F	Bldg 324 SMF-East Cell	--	--
Filtration	3	100 L/25 L	5/5 10/96 & 7/96	Bldg 324 SMF-East Cell	Bldg 324 SMF-South Cell	--	--
Filtration	1	1 L/25 L	5/5 7/95 & 7/96	Bldg 324 SMF-East	Bldg 324 SMF-South	*If Cell C not used for ion-exchange Case 2, Group 1.	Locate in same cell as filtration, Group 3. Use some of same equipment. Part of Group 1 could start in calendar year 1995 as needed. Part of Group 1 and all of Group 3 delayed until July/Oct 1998 waiting for large samples.
Ion-exchange Case 1	2	15 L/150 mL	10/4 7/96 & 6/95	Bldg 222-S Cell 1E1	Bldg 324 SMF-South	--	--
Organic defunctionalization	1	100 mL/10 L	15/1 1/95 & 7/96	Bldg 222-S Cell 11A	Bldg 222-S-1A	--	--
Settle/decant	1	2-4 L	5 7/96	Bldg 325B Cell SAL	ORNL Bldg 3047 Cells A & D	--	--

Table 4-2. Test Group Siting Recommendations. (sheet 2 of 2)

Pretreatment technology infrastructure	Test group	Sample size/test run	No. test runs/start date	Recommended test/ infrastructure location	First backup location	Comments*	Logic of exceptions to decision analysis ranking of facilities
Sludge wash	1	40 g	30 12/94	LANL Wing 9 and PNL	Bldg 222-S Cell 1A	--	Work in progress at LANL Wing 9. Staffing and work initiation completed since 12/1/94, otherwise would have recommended 222-S Cell 1A.
Sludge wash	3	10 mL	18 12/94	LANL Wing 9 and PNL	Bldg 222-S Cell 1A	--	Work in progress at LANL Wing 9. Staffing and work initiation completed since 12/1/94, otherwise would have recommended 222-S Cell 1A.
Sludge wash	4	20 mL	18 12/94	LANL Wing 9 and PNL	Bldg 222-S Cell 1A	--	Work in progress at LANL Wing 9. Staffing and work initiation completed since 12/1/94, otherwise would have recommended 222-S Cell 1A.

LANL = Los Alamos National Laboratory
NEPA = National Environmental Policy Act of 1969
ORNL = Oak Ridge National Laboratory
PNL = Pacific Northwest Laboratory
RCE = Radiochemical engineering
RCRA = Resource Conservation and Recovery Act of 1976
RD&D = Research, development, and demonstration
SMF = Shielded Materials Facility
WESF = Waste Encapsulation and Storage Facility

4.3.2 Ion-Exchange Testing

Considering these exceptions, the evaluation team debated the needs of the ion-exchange Case 2 and Case 1 testing simultaneously with the needs of the 25-L sampler in arriving at the recommended cell assignments for those functions.

The test scenario for the ion-exchange test work was to perform 10-mL cold ion-exchange column testing followed by 10-mL hot testing of the resins. If successful, a 200-mL cold test would be performed. If that proved successful, a full-scale cold test would be performed. If the 200-mL cold test identified problem areas or further uncertainty, the tests would be repeated at 200-mL scale using actual waste. As a result, it is recommended that the 325A Building, Cells A, B, and C, be committed to the ion-exchange test work. The cells initially will be set up to do the 10-mL column test, but with tankage installed in those cells to receive and handle samples for 200-mL column testing should that level of testing be required.

As noted in Table 4-2, the 10-mL test should fall in the range of a TS whereas the 200-mL tests will require an RD&D permit, which takes about a year to obtain. It is recommended that work on obtaining the RD&D permit be initiated by April 1995 to ensure its timely availability, if needed.

The actual sizing of the ion-exchange column tests has not been finalized. If the 10- to 45-mL range is accepted, one and possibly two of the three cells in the 325A complex would be available for other missions. The first alternative use of those cells is shown in the "First backup location" column.

4.3.3 Filtration (TRU Monitor Testing)

The recommended siting for the TRU monitor test was the 324 Building RCE cell complex, Cell D. As noted in the "Exceptions" column in Table 4-2, the first choice would have been the 325A Building, Cell A, but that cell was identified for ion-exchange work. A second exception was the backup location identified as the WESF instead of the 324 SMF because a design for the WESF is available with some updating.

4.3.4 Centrifugation and Filtration Testing

The recommended siting for the centrifugation testing is the 222-S Laboratory Cell 1F with a backup location in the 324 Building SMF-East Cell. It is recommended that both filtration tests be set up in the same location because both could use most of the same equipment. As noted, larger scale flow testing will be delayed until mid-CY 1996 when the 25-L sampler system needs to become operational. As noted, the 324 SMF-East Cell is recommended for the filter testing.

4.3.5 Ion-Exchange Case 1 Group 2 Testing

This test uses 150-mL and 15-L samples. Placement of the work in the 222-S Laboratory, Cell 1E1, will allow the small sample work to proceed on schedule. Initial 15-L samples may be provided by the 3-L sampler capability early in CY 1996. Later, 15-L samples will probably be retrieved with the 25-sampler and shipped in from the recommended 324 Building sampler service cell.

4.3.6 Organic Defunctionalization Testing

The recommended site for the organic defunctionalization testing is the 222-S Laboratory, Cell 11A, with Cell 1A as a backup. This work will require 15 100-mL samples that can be readily supplied with the present sample infrastructure, and possibly from the 222-S facility archived samples. One 10-L sample has been identified which could be supplied using the 3-L sampler capability that would be supported by the 222-S Laboratory.

4.3.7 Settle/Decant Testing

The recommended site for the settle/decant test work is the 325B Building Shielded Analytical Laboratory cell. The recommended backup for this work was the 3047 Building, Cell A or D at ORNL. Needed sample sizes are five 2- to 4-L samples, which can be taken with the 3-L sampler and transhipped from the 222-S Laboratory to either location using the PAS-1 cask.

4.3.8 Sludge Washing Tests

The sludge washing tests, as noted in the tables in Appendix B, address 12 issues and are therefore more extensive than most of the technologies. The site evaluations rated 222-S Laboratory Cell 1A as best suited for this work with the LANL Wing 9 facility rated slightly lower, but highly qualified. The LANL does have some needed laboratory equipment (ES-MS) not available at other sites except PNL. While this analysis was being developed and in the interests of meeting March, July, and September information need dates identified by the A-E, PNL's Office of Technology Development placed this work with LANL. The evaluation team fully supports that move and has concurred by listing LANL Wing 9 as its recommended location with the 222-S Laboratory, Cell 1A as the backup.

4.4 SUMMATION

The scheduled test information need dates that have been identified by the IPM Project A-E require prompt commitment of facilities, staff, and funding to enable these test programs to move ahead at the needed pace. The activities required include preparation of detailed test plans based on this work, development of multiple sample retrieval and handling capabilities, facilities modifications to support sample receiving and test effluent management, design and fabrication of a wide range of test apparatus, extensive permitting reviews, preparation of an RD&D permit and safety reviews, and aggressive performance of the tests.

The 324 Building SMF-South Cell has 11 window work stations that would be appropriate for other hot test work (e.g., enhanced sludge washing) if the inner cell partitions are removed and a shielded and encased transfer line is installed to the cell from the truck lock where a connection could be made to the LR-56 transporter for waste and effluent transfers.

Although the cell is capable of personnel entry, it will take an estimated 6 to 8 months to clean it out. The cell lighting and incell manipulators have been designed on the basis of personnel entry for repairs. That hardware will need modification for remote maintenance if the need arises to use the cell. A reassessment of the need for this cell should be performed when the test documentation is complete and the space requirements more clearly defined.

Section 5.0 provides a detailed action item list of recommendations for implementing this work.

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5.0 RECOMMENDATIONS

This section provides an action item list of recommendations to implement the findings and conclusions of the hot testing site evaluation team.

5.1 HOT CELL FACILITIES

- The hot cells recommended (Table 4-2) for the test work identified in this document should be committed and reserved solely for this effort.

  While the study team was assured that the cells identified in this report were available for these missions, the team is aware that design work has been started for other applications of one cell. Firm commitments of these cells to the recommendations must be requested immediately and adhered to for the time it takes to make the cells operational for these test missions.

- A coordination team composed of Tank Farms Operations and Maintenance staff, test engineering staff, and IPM Project staff must be established and fully supported by their respective organizations to coordinate the design of the retrieval and transport systems and do the detailed planning required to enable the system operation when the equipment is available.

- An early assessment by the coordination team is needed to identify needed tank farm hardware (pumps, jumpers, etc.) that may require procurement and installation to support an October 1996 testing start date. This assessment should be followed by a general appraisal of requirements including staffing to ensure the success of the program.

- Cell cleanout and refurbishment now in progress in the 325A complex should be complete by the first quarter of CY 1996. Design and installation of shielded and encased sample feed/effluent lines between the cells and the truck lock, and design and installation of sample and effluent tankage in the cells, should be complete by mid-CY 1996. Hot startup is planned for October 1996.

- Cleanout of the 324 Building RCE Cell D should be initiated. Cell C must be available for 25-L sampler servicing equipment installation by March 1996 and hot application by July 1996.

  Cell D should be ready for the TRU monitor installation in mid-CY 1996 and hot operation the last quarter of CY 1996. A means to transfer up to 4,000 L of high-activity waste from an LR-56 transporter in the truck lock to/from the cell will be required.

- Cleanout of the 324 SMF-East cell and upgrade of its lighting, master/slave manipulators, and crane for remote maintenance should be initiated for completion by May 1996. A shielded and encased waste transfer line is needed between the cell and the truck lock for transfer of five 100-L samples from the LR-56 transporter.

- Requirements need to be developed by the end of February 1995 for safely field loading the LR-56 liquid waste transporter. Design and construction of facilities/equipment to enable start of large-volume waste transfers are needed by October 1996.

5.2 PERMITTING AND SAFETY

- Preparation of an RD&D permit for ion-exchange Case 2 testing in the 325A facility must be started by April 1995 to support hot testing by October 1996 should the larger scale testing be needed.

- The WHC Safety and Quality Assurance organizations must be intimately involved in developing the requirements and designs for the LR-56 loading/unloading facilities, and the 3- and 25-L sampling systems to ensure ontime availability of those systems.

5.3 RETRIEVAL EQUIPMENT, <3 L

- An aggressive effort is needed to obtain the commercially available 500-mL sampler and locate casks capable of transferring the sampler to the 222-S Laboratory for servicing. A cell at the 222-S Laboratory must be identified for servicing and transhipment of samples to other site locations. The operational need date is July 1995 to support the aggressive CY 1995 multi-liter sampling plan.

- A similar effort is needed to develop the 3-L sample capability and servicing capability in the 222-S Laboratory, locate usable transfer casks, and provide and train operating staff. The operational need date is January 1996 or earlier.

5.4 RETRIEVAL EQUIPMENT, 25 L

- A systems analysis of the 25-L sampler is needed by the end of March 1995 to provide a basis for interim and longer term development of this retrieval system.

- An operational system, including sampler, tank riser interface, means of insertion/removal/transfer to a cask, transfer cask and incell sampler servicing equipment, safety and operating procedures, and trained operating staff is needed by July 1996. Packaging design criteria have been prepared for the transfer cask.

5.5 RETRIEVAL EQUIPMNENT, 100 L TO 4000 L

- A conceptual design study and safety analysis of a portable load/unload capability for use at the tank farms is needed to define the requirments of this capability when used on a repetitive basis.

This design study and analysis are needed by April, 1995 to support the development schedule for this capability.

- The 100 to 4000 L capability is based on utilizing a 4000 liter shielded transporter vehicle currently being procured by Waste Tank Plant Engineering as a means of emergency removal of liquids from a leaking single shell tank. It's pretreatment test support mission will be retrieval and transportation of a number of supernatant samples in the 100 to 500 L range and return of test effluents to the tank farms. If required by future test plans, it would also provide the capability to handle larger samples.

- Infrastructure development to enable use of the transporter vehicle will include the portable hardware to enable field loading and unloading of the transporter at a tank farm, and fixed unload/reload capability and sample storage at the hot test facilites (324 and 325 Buildings) serviced by this equipment.

5.6 TEST PLANNING

- Individual test plans defining cold and hot testing are required for each of 49 issues that comprise the twelve test groups identified in this report. As noted in Section 3.0, the test groups are groupings of individual or related issues for testing purposes that have common requirements that can be shared by the group to reduce overall testing cost and/or schedules. All plans should be available by the end of March 1995 to support test and facility design modification work and permit application preparation.

- Close involvement of the WHC Quality Assurance organization is needed to ensure that the data quality received from these tests are suitable for facility design and eventual qualification.

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7.0 GLOSSARY

ABBREVIATIONS AND ACRONYMS

ANL	Argonne National Laboratory
CST	crystalline silicotanate
CX	categorical exclusion
FY	fiscal year
INEL	Idaho National Engineering Laboratory
LANL	Los Alamos National Laboratory
LITCO	Lockheed Idaho Technology Company
NEPA	National Environmental Policy Act of 1969
ORNL	Oak Ridge National Laboratory
OSDT	Oregon State Department of Transportation
PNL	Pacific Northwest Laboratory
PUREX	Plutonium Uranium Extraction
RCE	radiochemical engineering
RCRA	Resource Conservation and Recovery Act of 1976
RD&D	research, development, and demonstration
SMF	Shielded Materials Facility
SRL	Savannah River Laboratory
SRP	Savannah River Plant
TRU	transuranic
TS	treatability study
TWRS	Tank Waste Remediation System
WESF	Waste Encapsulation and Storage Facility
WHC	Westinghouse Hanford Company

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APPENDIX A

TECHNICAL BASIS

CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDIX A1

TANK WASTE REMEDIATION SYSTEM PRETREATMENT PROGRAM TECHNICAL STRATEGY

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APPENDIX A

TECHNICAL BASIS

A1.0 TANK WASTE REMEDIATION SYSTEM PRETREATMENT PROGRAM TECHNICAL STRATEGY

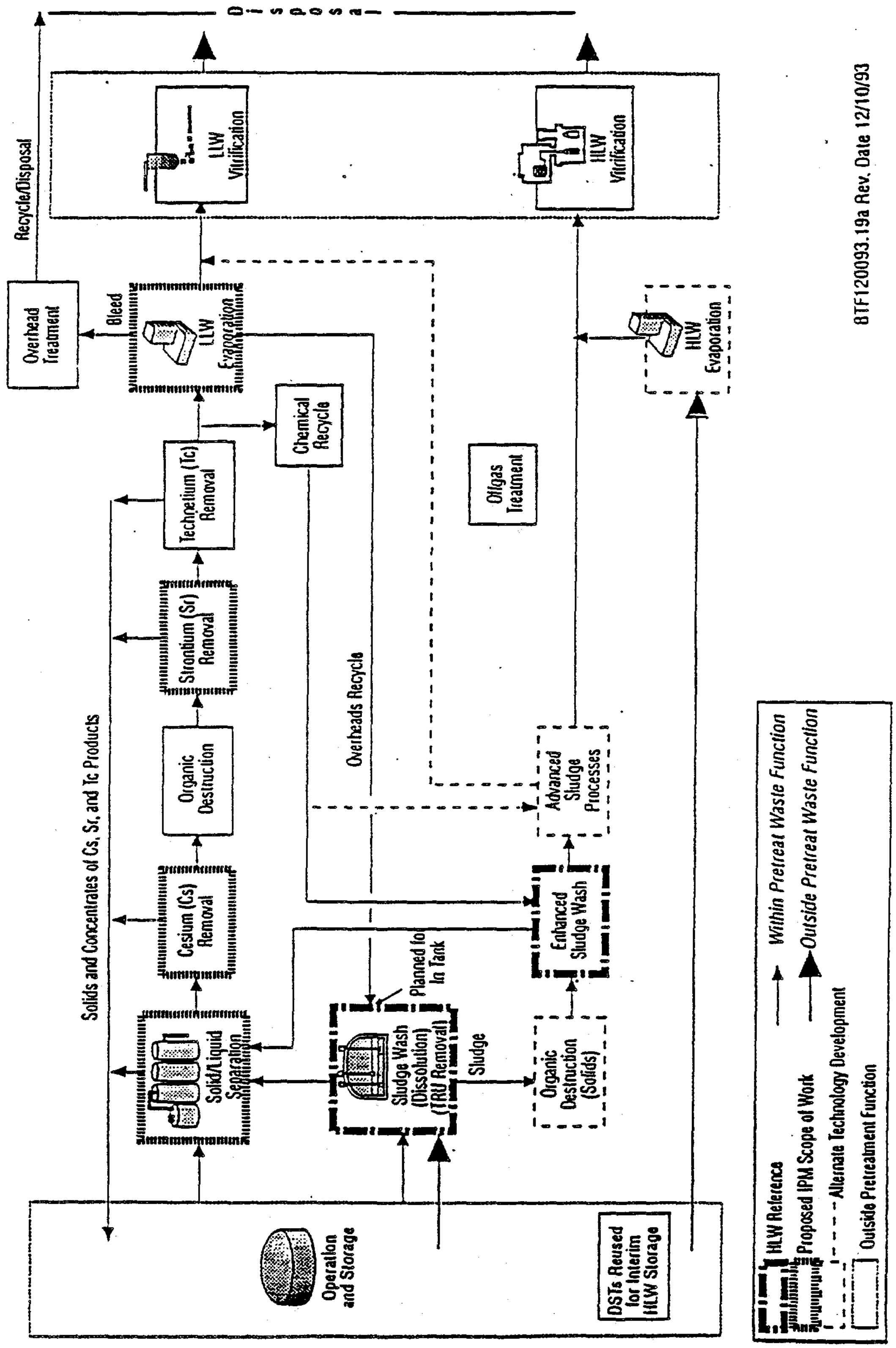
The pretreatment technical strategy was developed as part of the Tank Waste Remediation System rebaselining effort in fiscal year (FY) 1993, culminated in an agreed upon strategy in November and December 1993 and described in Gasper 1994. The technical strategy is in harmony with the fourth amendment to the Tri-Party Agreement and is graphically illustrated on Figure A-1, taken from that document. This strategy provides the following functional descriptions for the mission.

- Prepare tank wastes to provide suitable feeds to low-level waste (LLW) pretreatment and high-level waste (HLW) pretreatment processes.
- Pretreat prepared supernate to produce feed for LLW immobilization. (This function includes removal of radionuclides and product concentration to remove bulk chemicals including water.)
- Condition HLW sludges and transuranic tank waste sludges for immobilization and eventual disposal in a designated geological repository.
- Place separated radionuclides into a form that may be blended with pretreated HLW solids to become feed for HLW immobilization.

Key assumptions of the pretreatment technical strategy are summarized as follows.

- Current tank waste characterization information is sufficient for planning purposes.
- Sludge washing, leaching, and blending will be adequate to achieve an acceptably low HLW volume and composition. Acid dissolution and advanced separations are not required. Organic destruction is not required for organic content reduction.
- Sludge washing, leaching (including enhanced sludge washing) will be performed within the double-shell tanks.
- Waste will be blended to increase waste loading in the LLW and HLW forms.
- The LLW feed stream to the LLW immobilization facility will be acceptable if the ^{137}Cs is reduced to 1 Ci/m^3 in the resulting LLW glass and ^{90}Sr is removed when necessary.

Figure A-1. Pretreatment Block Diagram.



- Evaporators in the pretreatment facility will perform the volume reduction function.

The following are current baseline assumptions being used in the conceptual design of the pretreatment facility.

- Primary HLW/LLW separation will be carried out in existing underground waste tanks.
- The supernate LLW feed stream will require separation of fine solids before other pretreatment functions.
- Removal of cesium and strontium are the primary pretreatment functions. Technetium removal may be required and for planning purposes is required.
- Organic destruction in support of radionuclide removal is assumed for planning purposes.
- Pretreatment product stream volume reduction is required but does not require development effort.

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APPENDIX A2

ION-EXCHANGE TEST CELL SPACE ESTIMATE

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Figure A-2. Ion-Exchange Test Cell Space Estimate. (6 sheets)

DON'T SAY IT -- *Write It!*

Date: October 31, 1994

To: BA Reynolds

From: DE Kurath DEK

Subject: Space Requirements for IX hot testing

I've attached some information reflecting a range of IX hot testing requirements. The space requirements are a strong function of the bed volume so I have presented some ranges. My recommendation is to go as small as possible to reduce cost and waste requirements.

Summary Table - Hot Cell Space Requirements, ft^2

	R-F = 12 mL CS-100 = 42 mL	100 mL columns	200 mL columns
R-F, CS-100 regenerable system	15	25	30
R-F, CS-100 regenerable system + tanks for CST system	25	70	95

Note: The 100 mL R-F, CS-100 regenerable system can handle 10 mL columns of CST (100 mL column system) or 20 mL columns of CST (200 mL column system).

Assumptions

1) 1 Feed tank and 1 LLW receiver tanks - 30 L (small column size), 200 L Feed tank (100 mL columns for R-F and CS-100, 10 mL column for CST's), 400 L (200 mL column for R-F, CS-100, 20 mL column for CST's), 1600 L (CST's, 100 mL columns), 3200 (CST's 200 mL columns). Column rinse, wash and regeneration steps contribute minimal volume to LLW receiver tank. The tanks are sized to allow one full loading (1.5 λ) bed volumes of feed for both the R-F and CS-100 resins plus head space. CST's would be a separate run because of the large volume requirements.

2) 1 heat exchanger for temperature control of feed tank and columns.

3) 1 eluant receiver tank - 50 L. Assume 40 bed volumes of eluant per elution, the volume of eluant is 4L per elution (100 mL column) and 8 L per 200 mL column plus space needed for neutralization of acidic eluant. 50 L is probably bigger than needed.

E54-3000-101 (10/89)

Figure A-2. Ion-Exchange Test Cell Space Estimate. (6 sheets)

4) 3 pumps

5) The feed tank size for CST's is based on SNL's sample request of 80 L for in-tank waste (10 mL column), waste is assumed (my assumption) to be 10 M sodium and diluted to 5 M sodium).

6) Waste volume for CST's is based on an assumed λ of 1000.

Note: nitric acid, sodium hydroxide, water are assumed to be added directly to the process from the nonradioactive side of the hot cell. In cell chemical supply feed tanks are not required.

Table 2 Minimum Bed Volume - Casium IX

	R-F resin	CS-100
Minimum	0.8 mL	5.4 mL
Replicate 200 mL columns	12 mL	42 mL

E54-3000-101 (10/89)

Figure A-2. Ion-Exchange Test Cell Space Estimate. (6 sheets)

Table 1. Estimated Volumes of Actual Waste Required for Ion Exchange Testing

Waste	Tank	Volume, kgal	Na, M	K, M	Cs, M	Na/Cs	est λ R-F @ 25°C	est λ CS-100 @ 25°C	required volume, L (in-tank) (a)	required volume, L (in-tank) (b)	Comments
NCAW	101-AZ	940	5	0.06	5E-4	10,000	180	30	31	5.1	λ@ 5 M Na
DSSF	101-AW	1141	10	1.07	1.35E-4	74,000	170	14	19	4.1	λ@ 7 M Na
DSSF	104-AN	1057	12	0.18	2.11E-4	57,000	370	36	35	9.0	λ@ 7 M Na
DSSF	106-AN	1129	12	0.16	1.41E-4	85,000	400	38	38	9.6	λ@ 7 M Na
DSSF	105-AP	821	6.35	0.86	7.16E-5	89,000	170	14	30	4.1	λ@ 7 M Na
CC	107-AN	1066	9.15	ND	1.0E-4	92,000	400	38	50	9.6	λ@ 7 M Na
CC	103-SY	743	11.4	0.11	1.72E-4	66,000	380	37	38	9.2	top 1/3 λ@ 7 M Na
CC	102-AN	1097	10	0.053	1.03E-4	97,000	400	38	46	9.6	λ@ 7 M Na
DSS	103-AN	954	14.6	0.39	1.7E-4	85,000	400	38	31.5	9.6	λ@ 7 M Na
ESW (avg)	--	6.42E08	5	0.08	2.15E-05	2.32E05	750	80	122	17.3	λ@ 5 M Na
Low Cs	--	--	5	0.06	1.0E-05	5.0E05	900	65	145	20.3	λ@ 5 M Na

In-tank sample volume is determined by estimating the volume of waste required to obtain a full breakthrough curve (i.e. C/Co of > 0.75). The formula is [(bed volume, R-F)*(λ_{R-F}) + (bed volume, CS-100)*(λ_{CS-100})]*1.5*[sodium molarity @ λ/sodium molarity in-tank]. Smaller volumes will suffice if one one resin is to be tested.
(a) The bed volume is assumed to be 100 mL.
(b) the bed volume is assumed to be: R-F = 12 mL, CS-100 = 42 mL.

Figure A-2. Ion-Exchange Test Cell Space Estimate. (6 sheets)

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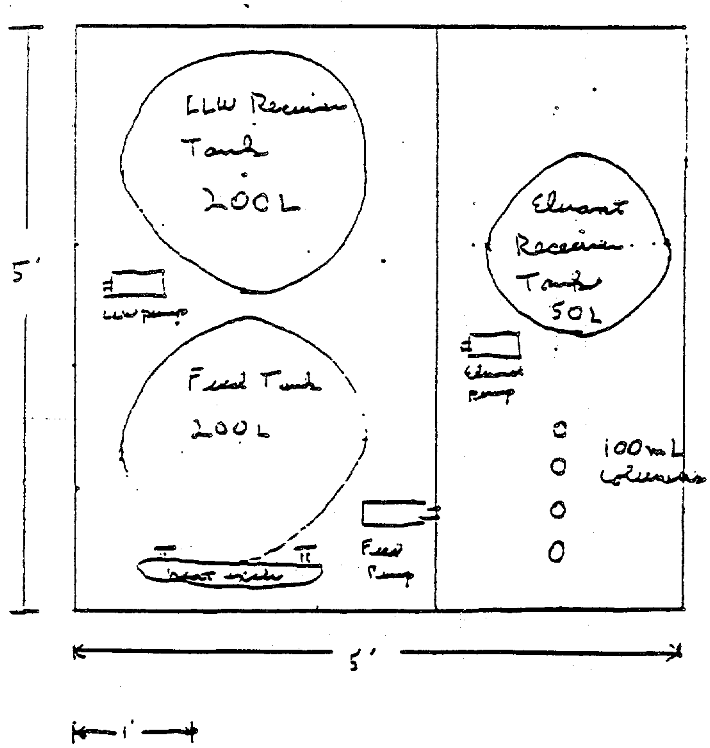
CALCULATION WORKSHEET

Calc. No. ______

Page ______ of ______

IX layout - actual waste testing

Tank sizes based on TWRS PD-93-059 - Bench Scale SX Preliminary Design Description



For 200 mL columns, feed & Receiver tank increases by $\sqrt[3]{\frac{200\ mL}{100\ mL}} = 1.26$.

Tank diameter is $2 \cdot 1.26 = 2.5$ ft. width of each OK length 2' longer

Title: IX layout - actual waste Testing		Project: IPI PI - Hot Test Strategy	
Prepared by: ES Kurath	Date: 11/1/94	Reviewed by:	Date:

Figure A-2. Ion-Exchange Test Cell Space Estimate. (6 sheets)

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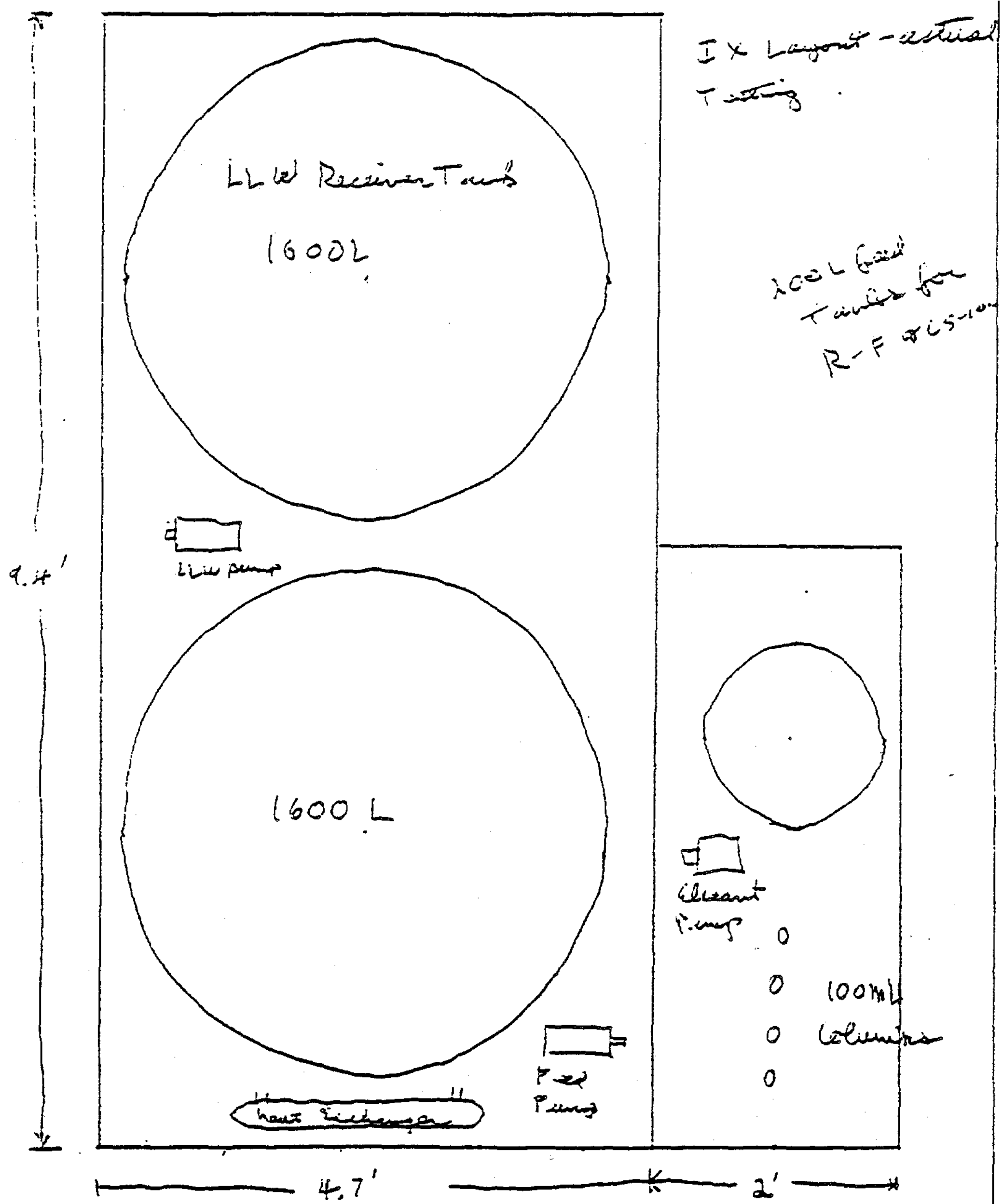
CALCULATION WORKSHEET

Calc. No. ______

Page ______ of ______

IX Layout - actual waste Testing



IX System CST's

A for 1600L Feed & LLW tanks = 44.2 ft² + 15 ft² for R-F, CS-100 System

Title: IX Layout - Actual Waste Testing	Project: IPM - Hot Test Strategy

Prepared by:	Date	Reviewed by:	Date
D E Kurath	11/1/94		

Figure A-2. Ion-Exchange Test Cell Space Estimate. (6 sheets)

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Pacific Northwest Laboratories

CALCULATION WORKSHEET

Calc. No. ______
Page ______ of ______

CST feed Tanks for a 200 mL column system

$\frac{D'}{D} = \sqrt{\frac{3200}{1600}} = 1.26$

$D' = 4' \cdot 1.26 = 5'$

Rack space is $(5.5)(9.4+2) = 63\ ft^2$

+ 30 for R-F, CS-100 system is $95\ ft^2$

Title | Project
Prepared by: | Date | Reviewed by: | Date

APPENDIX A3

TESTING SAMPLE SIZE ESTIMATE

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Table A-1. Testing Sample Size Estimate. (2 sheets)

filename = WASTEBEN.XLS 12/5/94

Bed Size, mL (b)		Number of cycles
CS-100 =	200	5
R-F =	200	5
CST's =	200	1
Superlig =	200	5

Waste	Tank	Volume, kgal in-tank	Na, M in-tank	K, M in tank	Cs,M in-tank	Na/Cs	Na/K	cal lambda CS-100 (a)	cal lambd R-F (a)	cal lambda CST's (a)	cal lambda superlig (a	lambda at Na = M mole/L	Required waste Volume, L of feed to column, One loading cycle/one column, L: CS-100	R-F	CST's	superlig
NCAW	101-AZ	940	5	0.06	5.00E-04	10000	83	30	180	4000	120	5	6	36	800	24
DSSF	101-AW	1141	10	1.07	1.35E-04	74074	9	25	170	1000	120	7	5	34	200	24
DSSF	104-AN	1057	12	0.18	2.11E-04	56872	67	36	370	3000	120	7	7.2	74	600	24
DSSF	105-AN	1129	12	0.16	1.41E-04	85106	75	38	400	3000	120	7	7.6	80	600	24
DSSF	105-AP	821	6.35	0.86	7.16E-05	88687	7	25	170	1000	120	7	5	34	200	24
CC	107-AN	1066	9.15	ND	1.00E-04	91500	ND	38	400	3000	120	7	7.6	80	600	24
CC	103-SY	743	11.4	0.11	1.72E-04	66279	104	37	380	3000	120	7	7.4	76	600	24
CC	102-AN	1097	10	0.053	1.03E-04	97087	189	38	400	3000	120	7	7.6	80	600	24
DSS	103-AN	954	14.6	0.39	1.70E-04	85882	37	38	400	3000	120	7	7.6	80	600	24
ESW (ave)	–	6.40E+08	5	0.06	2.15E-05	232558	83	60	750	4000	120	5	12	150	800	24
Low Cs	–	–	5	0.06	1.00E-05	500000	83	65	900	4000	120	5	13	180	800	24

Waste	Tank	Required waste Volume, L of feed to column, One loading cycle/3 column series, L: CS-100	R-F	CST's	superlig	Required waste Volume, L of feed to column, 5 loading cycles/3 column series (except CST's are a 5 column series): CS-100	R-F	CST's	superlig	Required in-tank volume, L: CS-100	R-F	CST's	superlig	sodium concentration feed to column mole/L	Total volume in-tank L.
NCAW	101-AZ	18	108	2400	72	90	540	4000	360	90.00	540.00	4000.00	360.00	5	4990
DSSF	101-AW	15	102	600	72	75	510	1000	360	52.50	357.00	700.00	252.00	7	1362
DSSF	104-AN	21.6	222	1800	72	108	1110	3000	360	63.00	647.50	1750.00	210.00	7	2671
DSSF	105-AN	22.8	240	1800	72	114	1200	3000	360	66.50	700.00	1750.00	210.00	7	2727
DSSF	105-AP	15	102	600	72	75	510	1000	360	82.68	562.20	1102.36	396.85	7	2144
CC	107-AN	22.8	240	1800	72	114	1200	3000	360	87.21	918.03	2295.08	275.41	7	3576
CC	103-SY	22.2	228	1800	72	111	1140	3000	360	68.16	700.00	1842.11	221.05	7	2831
CC	102-AN	22.8	240	1800	72	114	1200	3000	360	79.80	840.00	2100.00	252.00	7	3272
DSS	103-AN	22.8	240	1800	72	114	1200	3000	360	54.66	575.34	1438.36	172.60	7	2241
ESW (ave)	–	36	450	2400	72	180	2250	4000	360	180.00	2250.00	4000.00	360.00	5	6790
Low Cs	–	39	540	2400	72	195	2700	4000	360	195.00	2700.00	4000.00	360.00	5	7255

by DE Kurath Page 1

Table A-1. Testing Sample Size Estimate. (2 sheets)

filename = WASTEBEN.XLS 12/5/94

Bed Size, mL (b)		Number of cycles
CS-100 =	10	5
R-F =	10	5
CST's =	10	1
Superlig =	10	5

Waste	Tank	Volume, kgal in-tank	Na, M in-tank	K, M in-tank	Cs, M in-tank	Na/Cs	Na/K	est lambda CS-100 (a)	est lambd R-F (a)	est lambda CST's (a)	est lambda superlig (a	lambda at Na = M mole/L	Required waste Volume, L of feed to column One loading cycle/one column, L CS-100	R-F	CST's	superlig
NCAW	101-AZ	940	5	0.06	5.00E-04	10000	83	30	180	4000	120	5	0.3	1.8	40	1.2
DSSF	101-AW	1141	10	1.07	1.35E-04	74074	9	25	170	1000	120	7	0.25	1.7	10	1.2
DSSF	104-AN	1057	12	0.18	2.11E-04	56872	67	36	370	3000	120	7	0.36	3.7	30	1.2
DSSF	105-AN	1129	12	0.16	1.41E-04	85106	75	38	400	3000	120	7	0.38	4	30	1.2
DSSF'	105-AP	821	6.35	0.86	7.16E-05	88687	7	25	170	1000	120	7	0.25	1.7	10	1.2
CC	107-AN	1066	9.15	ND	1.00E-04	91500	ND	38	400	3000	120	7	0.38	4	30	1.2
CC	103-SY	743	11.4	0.11	1.72E-04	66279	104	37	380	3000	120	7	0.37	3.8	30	1.2
CC	102-AN	1097	10	0.053	1.03E-04	97087	189	38	400	3000	120	7	0.38	4	30	1.2
DSS	103-AN	954	14.6	0.39	1.70E-04	85882	37	38	400	3000	120	7	0.38	4	30	1.2
ESW (ave)	–	6.40E+08	5	0.06	2.15E-05	232558	83	60	750	4000	120	5	0.6	7.5	40	1.2
Low Cs	–	–	5	0.06	1.00E-05	500000	83	65	900	4000	120	5	0.65	9	40	1.2

Waste	Tank	Required waste Volume, L of feed to colum One loading cycle/3 column series, L CS-100	R-F	CST's	superlig	Required waste Volume, L of feed to column 5 loading cycles/3 column series (except CST' CST's are a 5 column series CS-100	R-F	CST's	superlig	Required in-tank volume L CS-100	R-F	CST's	superlig	sodium concentration feed to column mole/L	Total volume in-tank L
NCAW	101-AZ	0.9	5.4	120	3.6	4.5	27	200	18	4.50	27.00	200.00	18.00	5	250
DSSF	101-AW	0.75	5.1	30	3.6	3.75	25.5	50	18	2.63	17.85	35.00	12.60	7	68
DSSF	104-AN	1.08	11.1	90	3.6	5.4	55.5	150	18	3.15	32.38	87.50	10.50	7	134
DSSF	105-AN	1.14	12	90	3.6	5.7	60	150	18	3.33	35.00	87.50	10.50	7	136
DSSF	105-AP	0.75	5.1	30	3.6	3.75	25.5	50	18	4.13	28.11	55.12	19.84	7	107
CC	107-AN	1.14	12	90	3.6	5.7	60	150	18	4.36	45.90	114.75	13.77	7	179
CC	103-SY	1.11	11.4	90	3.6	5.55	57	150	18	3.41	35.00	92.11	11.05	7	142
CC	102-AN	1.14	12	90	3.6	5.7	60	150	18	3.99	42.00	105.00	12.60	7	164
DSS	103-AN	1.14	12	90	3.6	5.7	60	150	18	2.73	28.77	71.92	8.63	7	112
ESW (ave)	–	1.8	22.5	120	3.6	9	112.5	200	18	9.00	112.50	200.00	18.00	5	340
Low Cs	–	1.95	27	120	3.6	9.75	135	200	18	9.75	135.00	200.00	18.00	5	363

by DE Kurath Page 1

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APPENDIX B

HOT TESTING ISSUE DEFINITIONS AND GROUPING

LIST OF TABLES

Table B-1. Issue Group Definitions. (3 sheets)

Technology	Case #	Group #	Issue #	Description
Ion Exchange	1	1	C10.1.D	This issue concerns the effect of swelling/shrinking on the performance of ion exchange resins
			C10.3.A	This issue concerns the formation of precipitates after ion exchange due to solution chemistry instability in batch testing
			C10.3.B	This issue concerns the formation of precipitates after ion exchange due to solution chemistry instability column testing
			C10.4.C	This issue concerns loading capacity of IX resins as a function of processing conditions in lab testing
			C10.4.D	This issue concerns loading capacity of IX resins as a funclin of processing conditions in column testing.
			C10.5.C	This issue concerns the elution characteristics of the IX resins as a function of processing conditions
			C10.10.B	This issue concerns IX resin safety considerations
			C10.11.B	This issue concerns IX resin shelf life characterization
			C10.12.C	Thisissue concerns the effects of organics on IX resins performance
			C10.13.C	This issue concerns the IX kinetics
	1	2	C11.1.A	This issue concerns Chelated Tc, Sr Ion exchange
			C11.1.B	This issue conecems Colloidal Tc, Sr Ion Exchange
			C11.1.C	This issue concerns Soluable Tc, Sr Ion Exchange
			C11.2.A	
	2	1	C10.1.D	This issue concerns the effect of swelling/shrinking on the performance of ion exchange resins
			C10.3.A	This issue concerns the formation of precipitates after ion exchange due to solution chemistry instability in batch testing
			C10.3.B	This issue concerns the formation of precipitates after ion exchange due to solution chemistry instability in column testing
			C10.4.C	This issue concerns loading capacity of IX resins as a function of processing conditions in the lab.
			C10.4.D	This issue concerns loading capacity of IX resins as a funclin of processing conditions in column testing
			C10.5.C	This issue concerns the elution characteristics of the IX resins as a function of processing conditions

Table B-1. Issue Group Definitions. (3 sheets)

Technology	Case #	Group #	Issue #	Description
			C10.12.C	This issue concerns IX resin safety considerations
			C10.13.C	This issue concerns IX resin shelf life characterization
			C10.10.B	Thisissue concerns the effects of organics on IX resins performance
			C10.11.B	This issue concerns the IX kinetics
Filtration		1	C4.1.B	This issue concerns cross flow filtration filter efficiency
			C4.3.A	This issue evaluates filter types, measures solids capacities, and the effect of precoats at lab scale.
			C4.3.D	This issue evaluates filter types, measures solids capacities, and the effect of precoats at the functional pilot plant scale.
		2	C4.2.A	This issue conems the demonstration of a TRU and other solids loading instrumentation
		3	C4.4.A	This issue evaluates long term plugging/blinding due to solids formation of cross flow filter elements at the functional pilot plant scale.
			C4.4.B	This issue evaluates the conditions that may cause plugging/blinding due to solids formation in cross flow filter elements
			C4.5.C	This issue concerns plugging/blinding due to residual solids from decanting operations
			C4.5.D	This issue concerns chemical cleaning techniques for plugging/blinding due to residual solids from decanting operations
			C4.7.A	This issue measure filtrate and cake properties.
			C4.7.B	This issue evaluates flocculents and filter aids
Sludge Washing		1	C2.2A	This issue measure the solubility of components in enhanced sludge washing with caustics.
			C2.3.B	This issues measure the rate of dissolution of components in caustic leaching with caustics.
			C3.3.A	This issue measures the solubility of components in wlsudge washing with water.
			C3.4.B	This issue measure the rate of dissolution ov components in water washing.
		2	C3.2.A	This issue measure when peptized solutions form.
			C3.2.B	This issue measure if peptized solutions can be reversed.

Table B-1. Issue Group Definitions. (3 sheets)

Technology	Case #	Group #	Issue #	Description
		3	C11.3.A	This issue measure the concentration of technetium and its valence states in tank wastes.
		4	C11.5.A	This issue evaluate the form of Sr in the waste
			C11.5.B	This issue evaluate the Sr variablity in tank wastes.
			C11.5.C	This issue evaluate a Sr removal by preciplation processes.
			C11.5.D	This issue evaluate whether Sr removed by preciptation process will re-dissolve.
			C11.5.E	This issue evaluate processing parameters for Sr removal by preciptation process
Centrifugation		1	C5.1.A	This issue measure the properties of centrifuge cake
			C5.2.B	This issue evaluates the influence of flocculents and additives on centrifugation performance
			C5.3.B	This issue measure the performace of centrifuges.
Settling/Decanting		1	C1.1.A	This issue measure settling rates of solids
			C1.1.B	This issue evaluates settling rate instrumentation
			C1.2.A	This issue measures settling rate data.
			C1.2.B	This issue characterizes the solids
		2	C1.3.A	This issue measure the radioactivity as a functionof particle size.
			C1.4.A	This issue measure the changes to particle sizes following tank mixing.
Organic Destruction		1	C7.1.A	This issue performs in-tank hydrolysis for organic destruction
			C8.10.C	This issue performs in-tank hydrolysis and determines changes to TRU/Sr partioning.
			C8.10.D	THis issueperforms scaled-up in-tank hydrolysis for organic destruction

Table B-2. Ion-Exchange 10- to 45-mL COL Case 1.

	Group #1											Group #2			
	C10.1D	C10.3A	C10.3B	C10.4C	C10.4D	C10.5C	C10.5D	C10.12C	C10.13C	C10.10B	C10.11B	C11.1A	C11.1B	C11.1C	C11.2A
Hot Cell Size	25 sq ft X 10' hi	——————>						25 sq ft	——————>		N/A	25 sq ft	——————>		39 sq ft
Equip Access Size (Min)	2' X 2'	——————>						4' X 4'	——————>		N/A	4' X 4'	——————>		2' X 2'
Service Access Needed	2-6"‡	——————>									N/A	2-6"‡	——————>		6"‡
Ci Loading Req'd	<360 Ci	——————>									N/A	5 Ci	——————>		<0.5 Ci
Cell Availability															
Start	03/95	——————>						07/95	——>	06/95	——>	01/95	——————>		06/95
Finish	06/98†	——————>						01/97†	——>	06/96	01/97	12/97‡	——————>		12/97
Special Analytical Capability	None	——————>								PSC, TGA, GC-MS, NMR Thermal Conduct.	N/A 13C-NMR IR, gamma rad	std hard	——————>		
Hot Hood	Y	N	N	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
Sample Size/Test	-180 L†	——————>						<150 ml	-180 L	<1L	<100 ml	15L	——————>		150 ml
No Tests	3-9	——————>						6 @ 150 mL 3-9 @ 180 L	3-9	-1		10	——————>		4

Notes:

† - AE information will be delayed about 19 months due to site limits on retrieving and transporting large samples. The LR 56 transporter is expected to be operational by 10/96.

‡ - AE information will be delayed about 15 months pending availability of the 25L sampler system.

Table B-3. Ion-Exchange 200-mL COL Case 2.

	Group #1										
	C10.1D	C10.3A	C10.3B	C10.4C	C10.4D	C10.5C	C10.5D	C10.12C	C10.13C	C10.10B	C10.11B
Hot Cell Size	150-200 sq ft X 10' hi	------------>						25 sq ft	------------>		N/A
Equip Access Size (Min)		------------>						4' X 4'	------------>		N/A
Services Access Needed	2-6"†	------------>						2-6"†	------------>		N/A
Ci Loading Req'd	<7500 Ci	------------>									N/A
Cell Availability											
Start	03/95	------------>								06/95	------------>
Finish	06/98†	------------>						01/97	------------>	06/96	01/97
Special Analytical Capability	None	------------>								PSC, TGA GC-MS, NMR Thermal Conduct	N/A 13C-NMR IR, gamma rad
Hot Hood	Y	N	N	Y	Y	Y	Y	N	N	Y	Y
Sample Size/Test	3600 L†	------------>						<150 ml	3600 L	<1L	<100 ml
No Tests	3-9	------------>						6 @ 150 ml 3-9 @ 3600 L†	3-9	~1	

Notes:
† - AE information will be delayed about 19 months due to site limits on retrieving and transporting large samples. The new LR 56 transporter, is expected to be operational by 10/96.

Table B-4. Sludge Wash.

Issue	Group #1				Group #2		Group #3	Group #4				
	C2.2A	C2.3B	C3.3A	C3.4B	C3.2A	C3.2B	C11.3A	C11.5A	C11.5B	C11.5C	C11.5D	C11.5E
Hot Cell Size	12 sq ft	12 sq ft	12 sq ft	———>	N/A	N/A	4 sq ft‡	15 sq ft	———————————>			
Equip Access Size (Min)	1' X 2'	1' X 2'	1' X 2'	———>	N/A	N/A	1' X 2'	1' X 2'	———————————>			
Services Access Needed	2-6"†	2-6"†	2-6"†	———>	N/A	N/A	N/A	2-6"†	———————————>			
Ci Loading Req'd	<1/4 Ci	———>	<0.2 Ci	———>	<0.2 Ci	———>	<1/2 Ci	<1 Ci	<1/2 Ci	———————————>		
Cell Availability												
Start	01/95	01/95	01/95	01/95	10/94	10/94	12/94	12/94	12/94	12/94	12/94	12/94
Finish	09/97	09/97	09/97	12/97	02/96	02/96	12/97	03/95	03/95	07/95	07/95	09/95
Special Analytical Capability	SEM/TEM	SEM/TEM	SEM/TEM	SEM/TEM	ZETA	———>	XAS*,	XAS*		Lab	———————>	
					Size Dist.,	———>	ES-MS‡			Centrifuge	———————>	
					Rheology	———>						
Hot Hood	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sample Size/Test	40 gr	———————————>					10 ml	20 ml	———————————>			
No Tests	30	———————————>					18	18	———————————>			

Notes:
† - Sample storage & prep.
* - Only available at Stanford University.
‡ - Capability at LANL & PNL only.

Table B-5. Organic Destruction.

	Group #1		
	C7.1A	C8.10C	C8.10D
Hot Cell Size	9 sq ft	12 sq ft	10 sq ft
Equip. Access Size (Min)	1' X 2'	1' X 2'	1' X 2'
Services Access Needed	1-6" ϕ	2-6 ϕ	2-6 ϕ
Ci Loading Req'd	<5 Ci	<1 Ci	<10 Ci
Cell Availability			
Start	10/94	04/95	06/96
Finish	09/95	12/96	03/97
Special Analytical Capability	None	———————	———————>
Hot Hood	Y	Y (2' X 7')	Y
Sample Size/Test	1 @ 5L	2-4 L	
	7 @ 0.1L	100 ml	10 L
No Tests	8	7	1

Table B-6. Settle/Decant.

Issue	Group #1				Group #2	
	C1.1A	C1.1B	C1.2A	C1.2B	C1.3A	C1.4B
Hot Cell Size	36 sq. ft²	———	———>	N/A	———	———>
Equip. Access Size (Min.)	2' X 2'	———	———>	N/A	———	———>
Services Access Needed	2-6" ⊃	———	———>	N/A	———	———>
Ci Loading Req'd.	12 Ci	———	———>	N/A	———	———>
Cell Availability						
Start	10/94	01/95	in progress	06/94	01/97	04/95
Finish	12/96†	12/96†	01/98‡	06/98	06/98	06/95
Special Analytical Capability	None	None	SEM, ZETA, Size Dist. Rheology		SEM/ TEM	
Hot Hood	Y	Y	Y	Y	Y	Y
Sample Size/Test	2-4 L	———	———	———	———	———>
No Tests	5	———	———	———	———	———>

Notes:
† - Preliminary test data may be available by AE information need date of 06/95.
Testing of 5 selected tank wastes would not be complete until about 09/96.

‡ - Function is hot lab work to characterize dip samples taken at varying stages of in-tank settling to measure settling progress.

Table B-7. Filtration.

Issue	Group #1			Group #2	Group #3					
	C4.1B	C4.3A	C4.3D	C4.2A	C4.4A	C4.4B	C4.5C	C4.5D	C4.7A	C4.7B
Hot Cell Size	20 sq. ft	40 sq. ft	------>	64 Sq. ft. X 12 ' hi	80 sq ft	------------------------>			80 sq ft	------>
Equip Access Size (Min.)	1' X 2'	4' X 4'	------>	6' w X 6' h or	4' X 4'	------------------------>			4' X 4'	------>
			------>	6' w X 6' l						
Services Access Needed	2-6"‡	2-6"‡	------>	440 VAC, D.I.	2-6"‡	------------------------>			2-6"‡	------>
			------>	Steam, HNO3, 2-6"‡						
Ci Loading Req'd.	<2 Ci	<30 Ci	------>	3000 Ci	<100 Ci	------>	100-500 CI	------>	100 Ci	------>
Cell Availability										
Start	01/95	07/96	------>	10/96	07/96	------>	10/95	------>	08/95	------>
Finish	12/95	05/97	06/98	12/97†	12/97†	------>	10/97†	------>	12/97*	------>
Special Analytical Capability	Size Dist		------>	None	TEM/SEM	------>	TEM/SEM	------>	TEM/SEM	------>
	Rheology		------>	None	Size Dist				Size Dist.	------>
									Rheology	------>
Hot Hood	N	Y	------>	N	Y	Y	Y	Y	N	
Sample Size/Test	1L	25L	------>	400-4000L	100 L†	------------------------>			20-25 L *	
No Tests	5	5	------>	1	5	------------------------>			5	

Notes:

† - AE need date for the test information of 10/97 & 12/97 will probably not be met due to current lack of infrastructure to obtain and handle larger (100L) samples. A new system for collecting 100L samples would be operational by 10/96.

Group #2 is the TRU Monitor Test.

* - AE need date for the test information of 12/97 will probably not be met due to current lack of infrastructure to obtain and handle larger 25L samples. A new system for collecting 25L samples would be operational by 07/96.

Table B-8. Centrifugation.

	Group #1		
Issue	C5.1A	C5.2B	C5.3B
Hot Cell Size	N/A	100 sq ft	———>
Equip. Access Size (Min.)	N/A	4' X 4'	———>
Services Access Needed	N/A	2-6ϕ	———>
Ci Loading Req'd.	<3 Ci	<500 Ci	———>
Cell Availability			
Start	10/95	01/96	10/95
Finish	12/96	12/96†	03/98
Special Analytical Capability	TEM/SEM	TEM/SEM	
	Densities	Densities	
	Size Dist.	Size Dist	
		Rheology	
Hot Hood	Y	Y	N
Sample Size/Test	100 ml	100-500 L†	———>
No Tests	30	4	4

Notes:
† - AE information date shown will be delayed 19 months due to site limits on retrieving & transporting the specified test sample sizes. The new LR 56 transporter should be operational by 10/96 for the large test samples.

APPENDIX C

SAMPLE RETRIEVAL AND HANDLING EQUIPMENT

CONTENTS

LIST OF FIGURES

APPENDIX C1

3- AND 25-L SAMPLER CONFIGURATION

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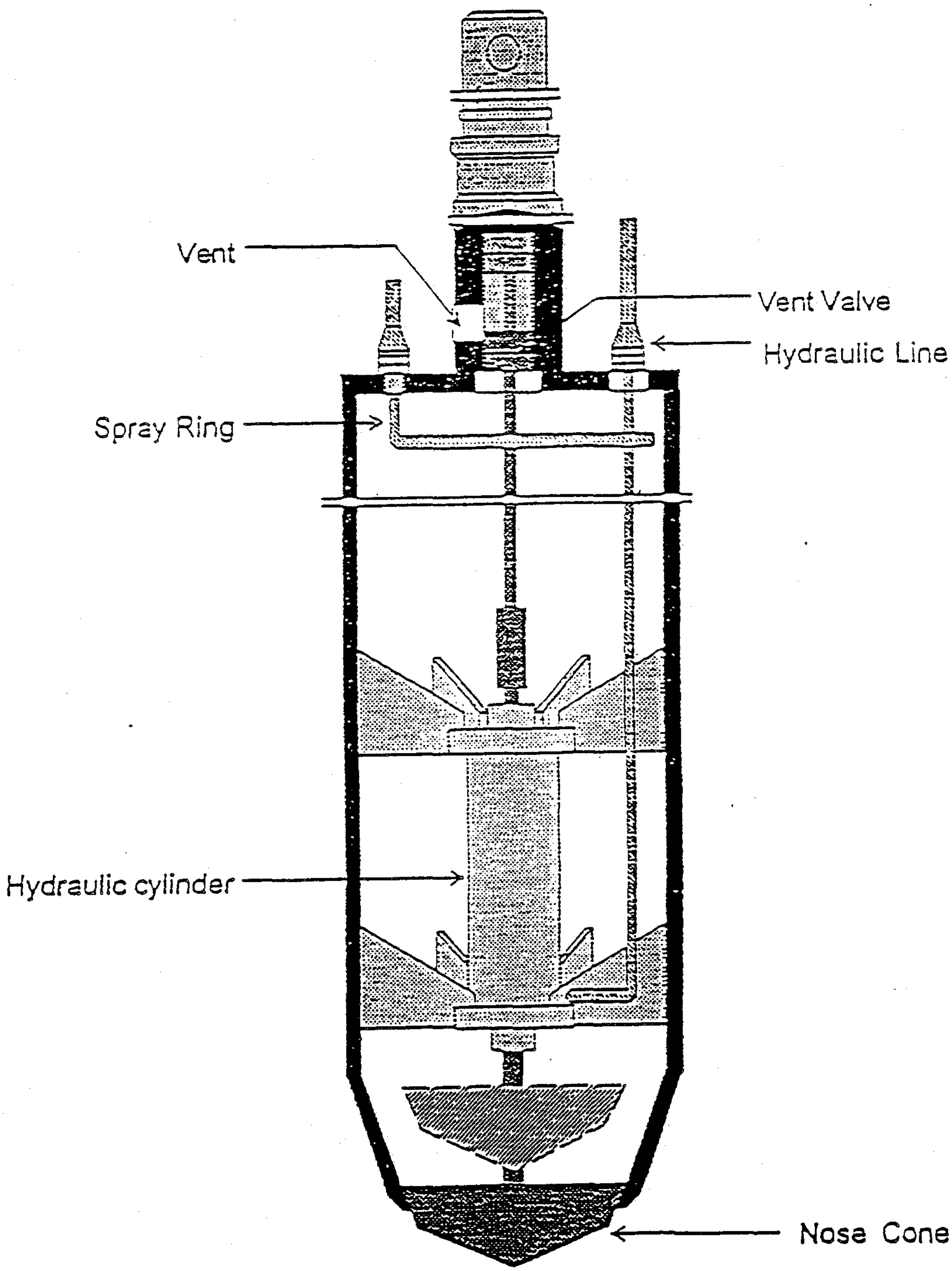
Figure C-1. Savannah River Site 3- and 25-L Sludge Collector Concept.



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APPENDIX C2

25-L SAMPLER TANK RISER HANDLING INTERFACES

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Figure C-2. Mobile Waste Tank Riser 3- and 25-L Sampler Interface Concept.

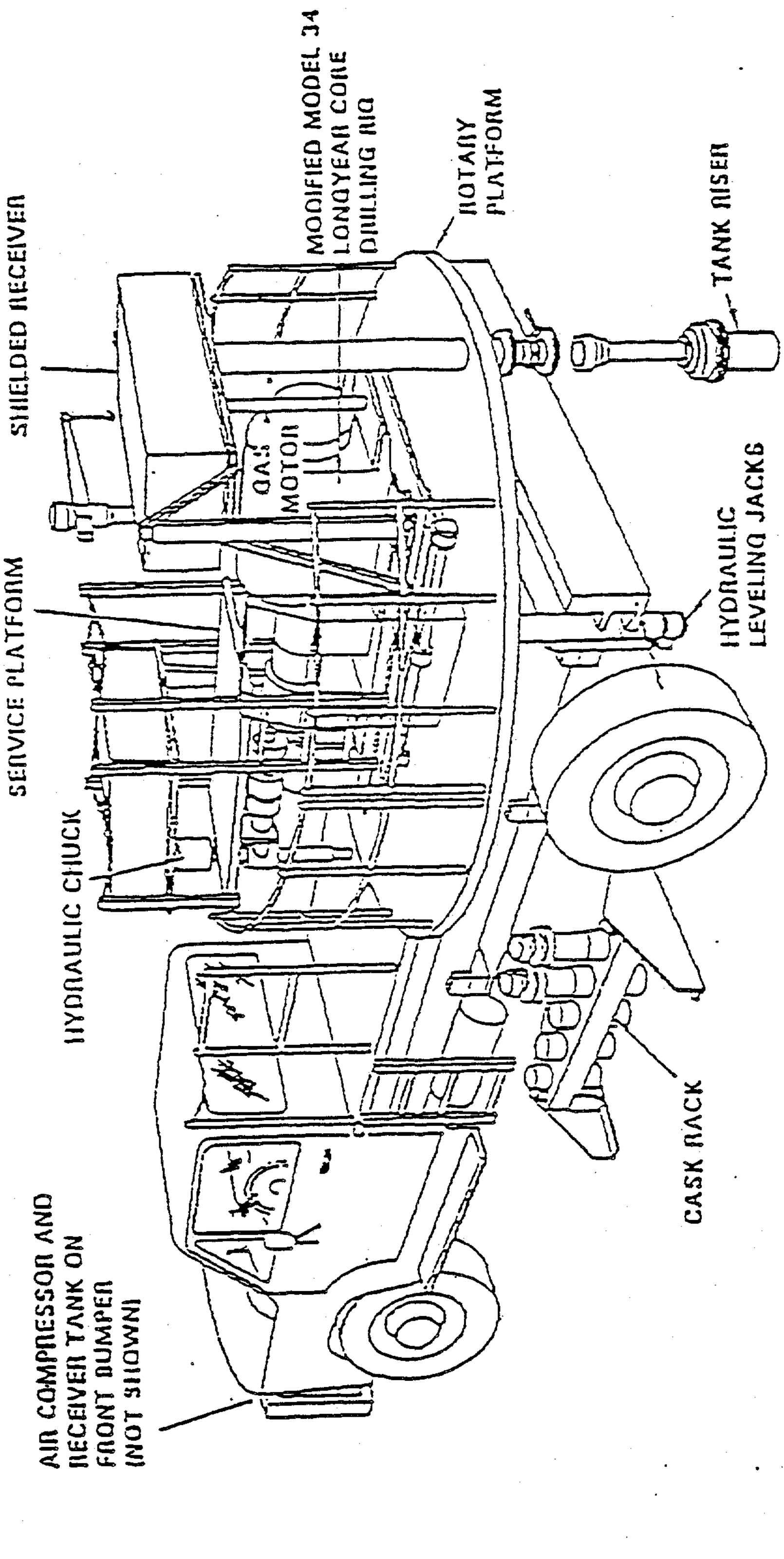
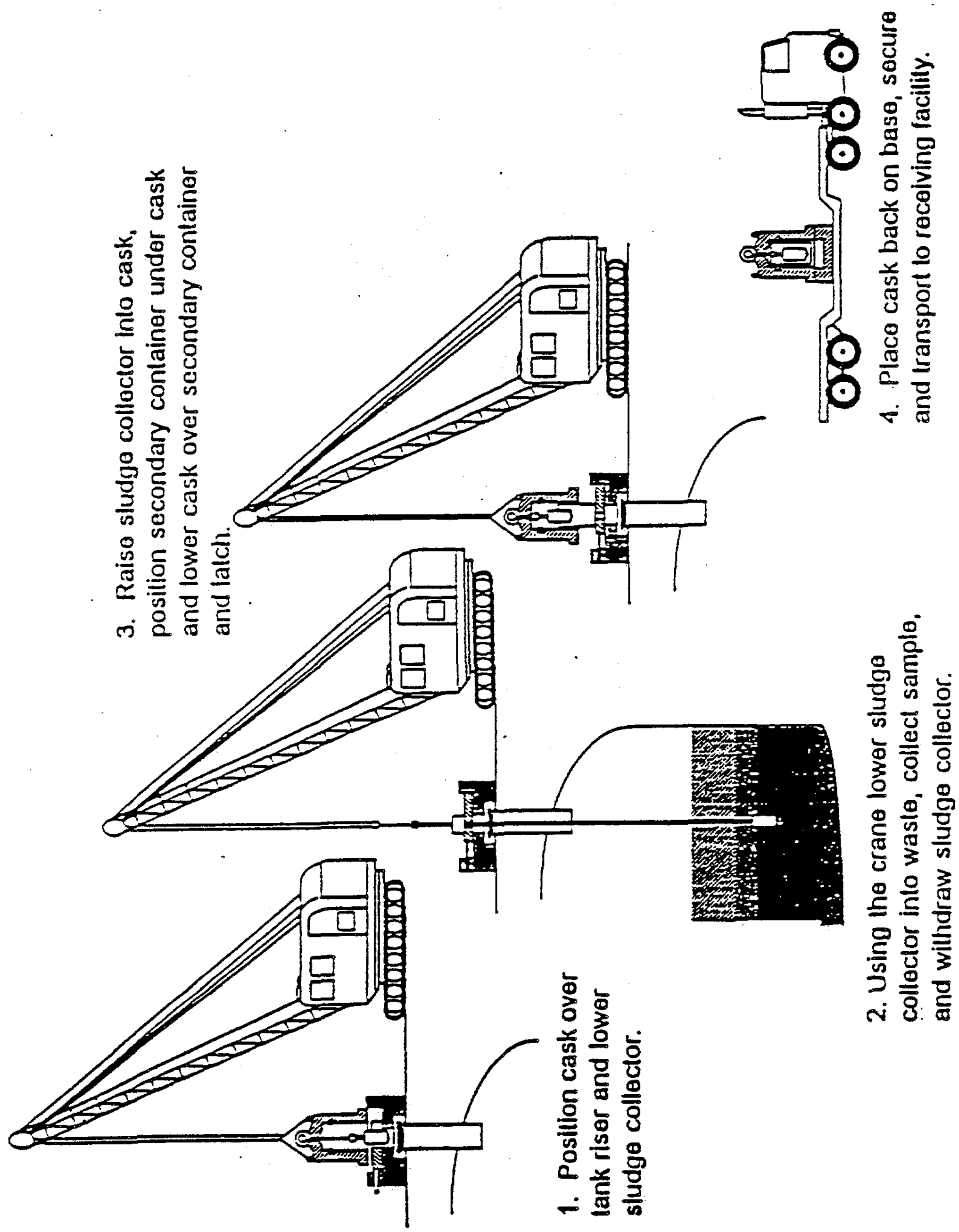


Figure C-3. Savannah River Site 25-L Sampler Waste Tank Interface.



APPENDIX C3

LR-56 SHIELDED LIQUID WASTE TRANSPORTER

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Figure C-4. LR-56 Unit for the Transportation of Radioactive Liquids.

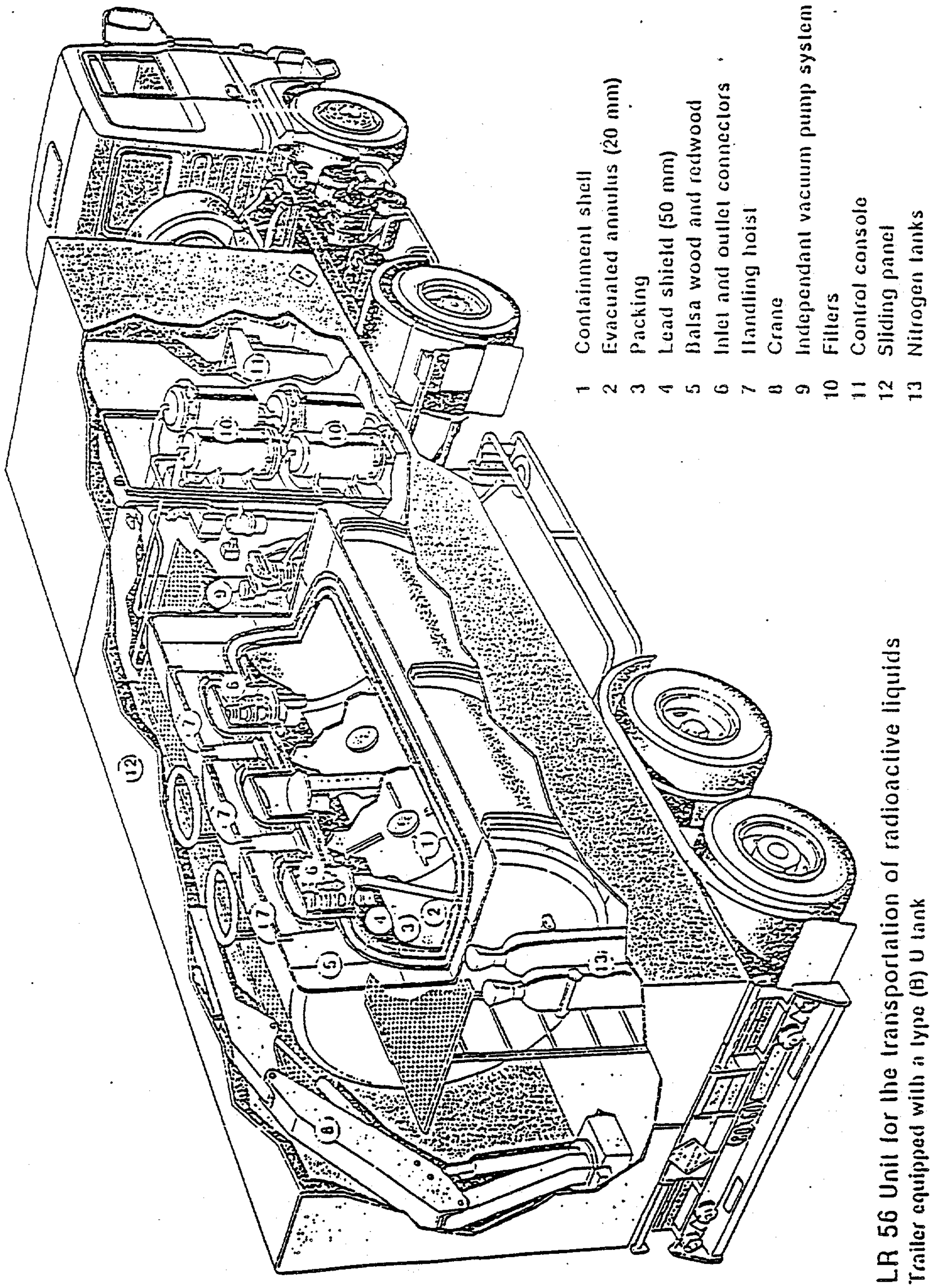


Figure C-5. LR-56 Transporter Shielded Tank.

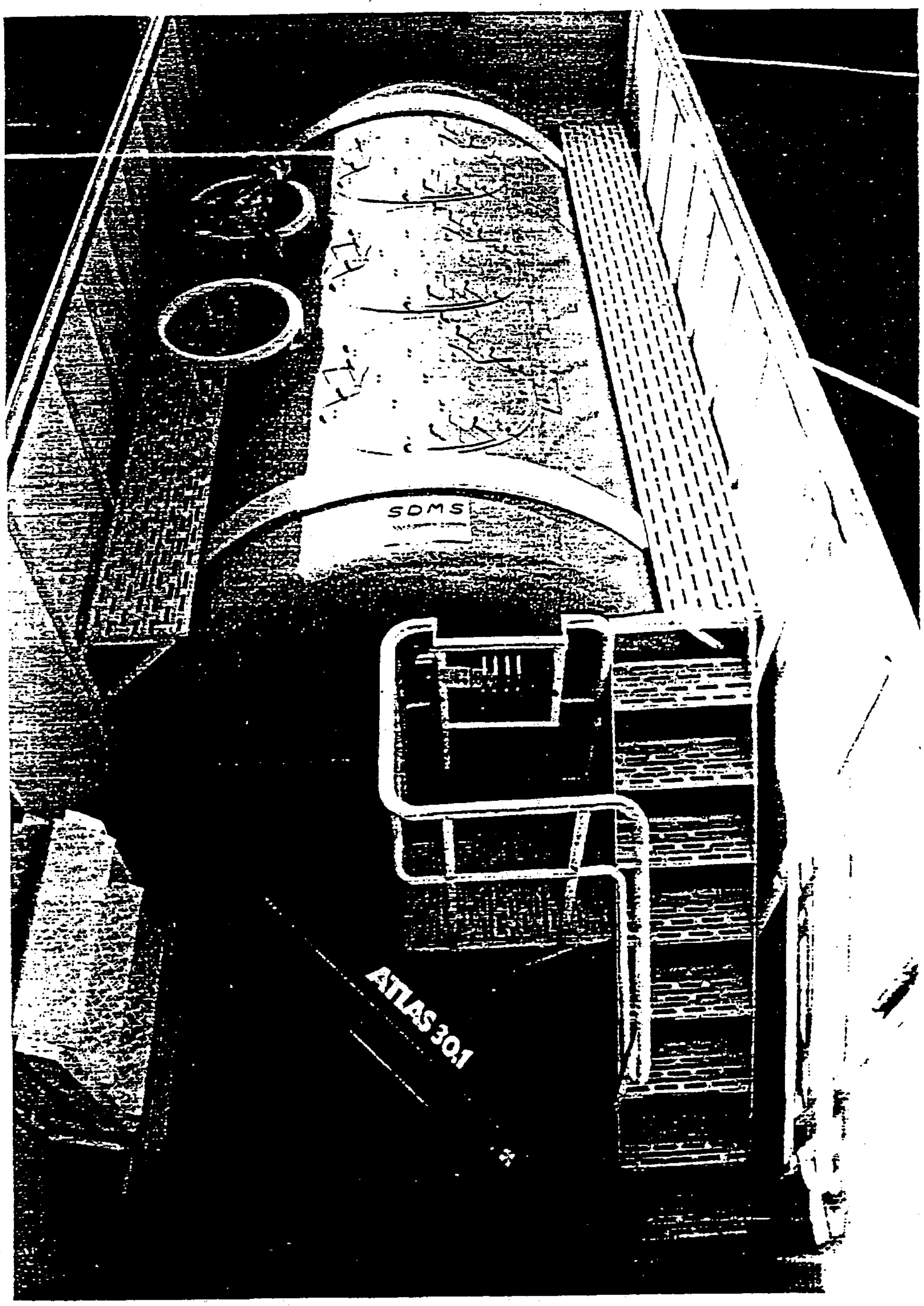


Figure C-6. LR-56 Transporter Load/Unload Port.

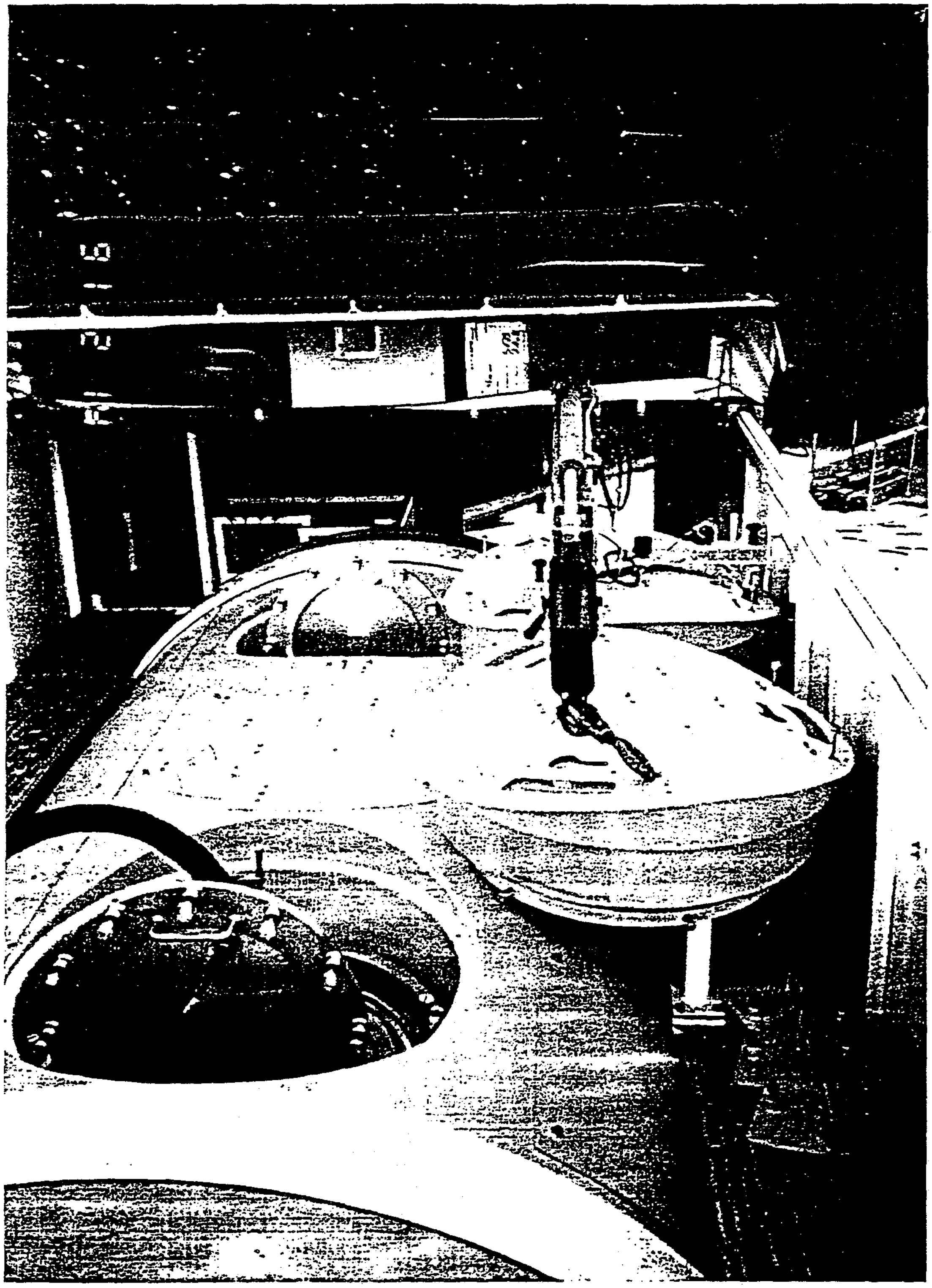
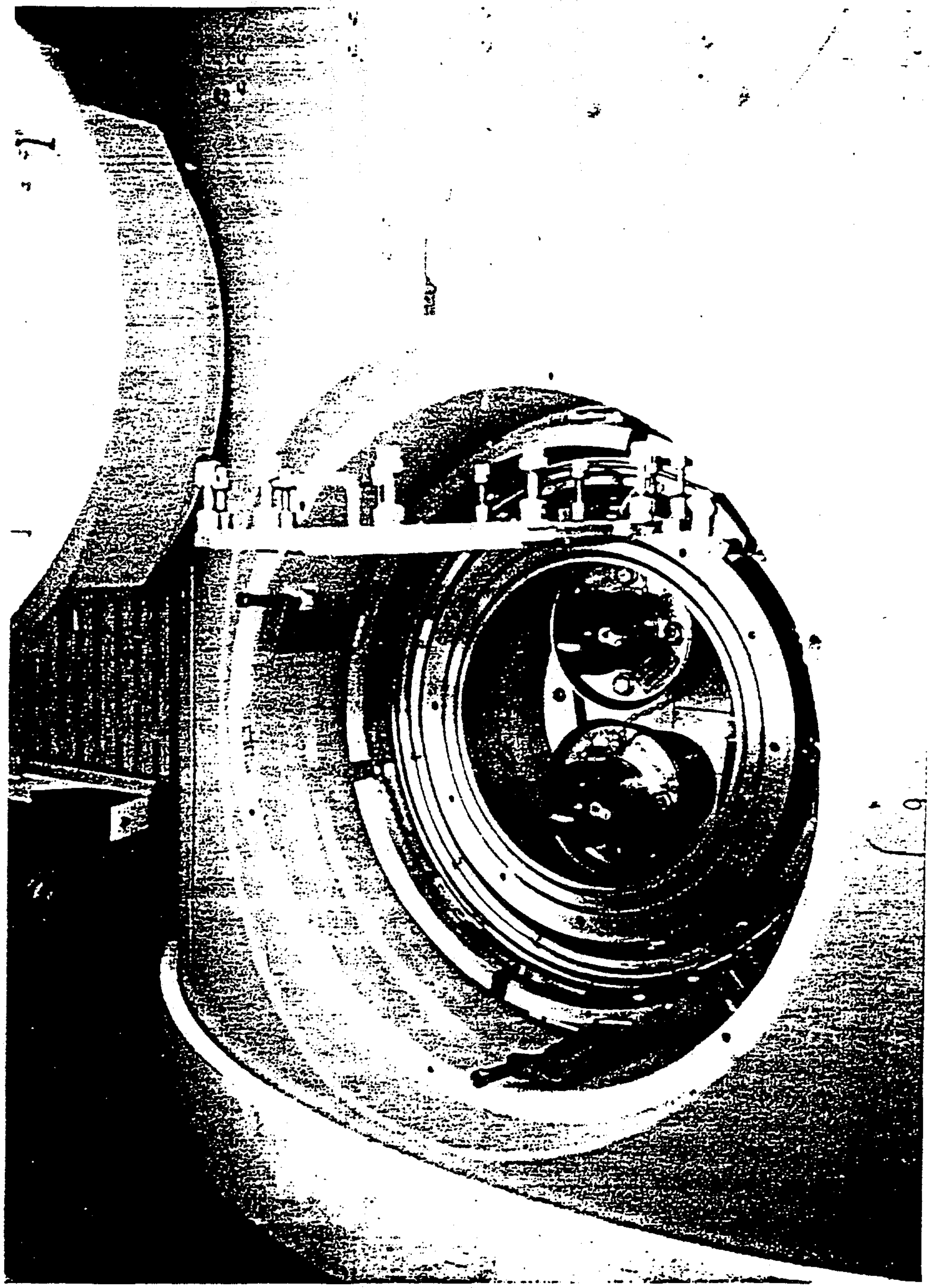


Figure C-7. LR-56 Transporter Load/Unload Connections.



APPENDIX C4

PAS-1 CASK

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Figure C-8. NuPAC PAS-1 Shielded Transportation Package.

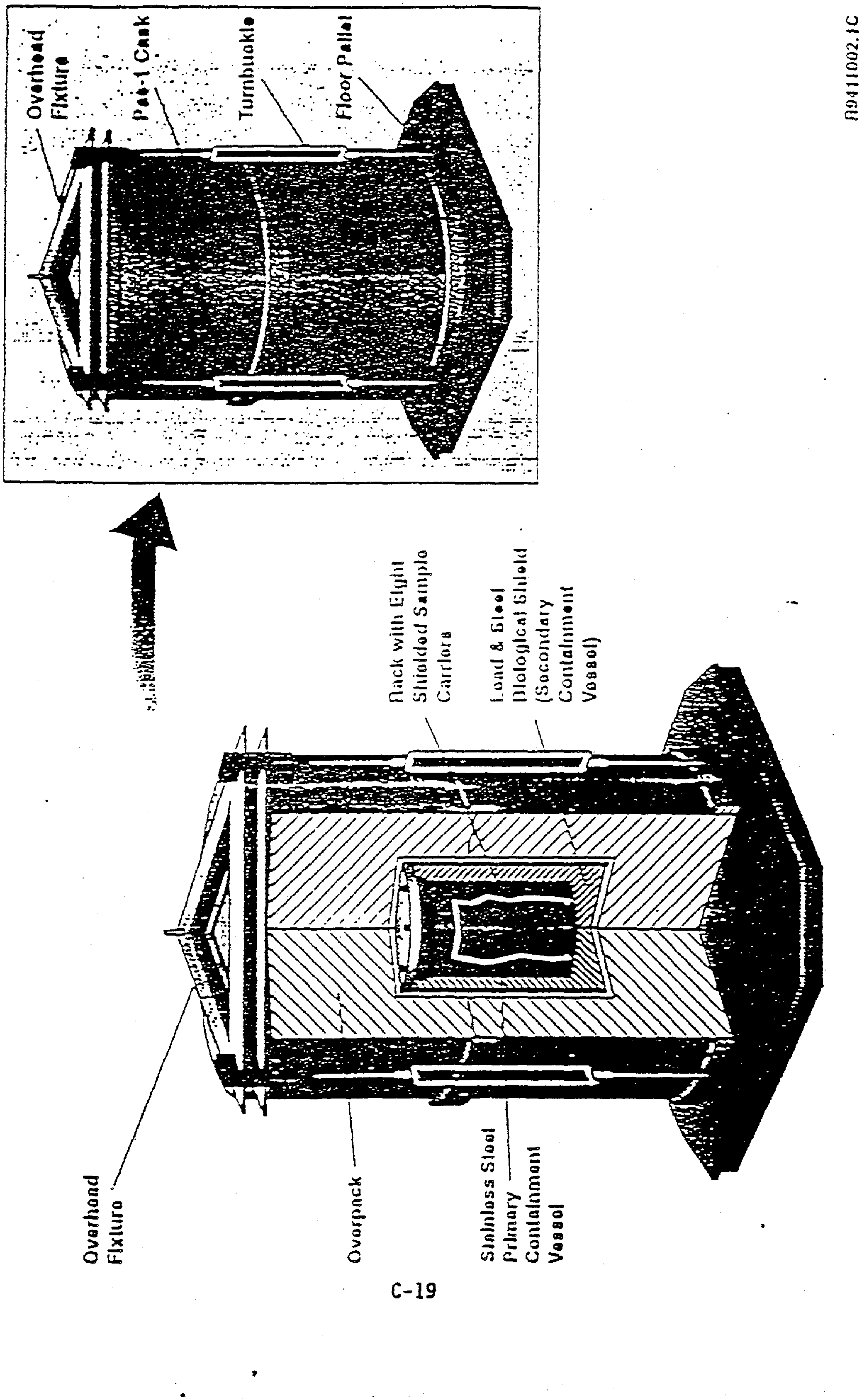

Figure C-9. PAS-1 Cask.

- Double containment with double O-ring seals
  - Bore seal on primary vessel (8, 3/8 in. bolts)
  - Face seal on secondary vessel (8, 1 in. bolts)

- Leak testable to 10^{-7} atm-cc/sec (defined as "leak-tight" by ANSI).

- Shielding - 5.1 in. lead and 0.75 in. steel

- Foam filled overpack secured with 8, 3/4 in. bolts

- Maximum gross weight of 13,000 lbs.
  - Sample cask weighs up to 1,375 lbs.

APPENDIX D

SITE SURVEYS

CONTENTS

LIST OF FIGURES

LIST OF FIGURES (cont)

LIST OF TABLES

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APPENDIX D1

PRELIMINARY SITE CONTACTS AND RESPONSES

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Table D-1. Preliminary Hot Test Siting Evaluation.

	A	B	C	D	E	F	G	H	I	J
Sites	Hot Cells Available	Hot Labs Available	Curie Loading Acceptable	Facility SAR	Analytical Capability	Staff Available	Hot Lab Interest	Process Dev./ Testing Interest	HEPA Bounded	Primary Site Contacts
LANL	1	1	1	1	1-7	1,3	1	1	Yes[x]	Bob Villarreal
*ANL-E	1	1	1	1	1-7	3	1?	1?	No	David Green Don Graczyk
*ANL-W	1?	1	1	1	1,2,3,6,7	3	1	1	No	John Krsul
*LITCO	2	1	2	1	1-7	1	1	1	Yes[x]	Leroy Lewis Charlie Heggert-DOE
*ORNL	2	1?	1	1	1-7	3	1?	1	No	Jim Stokely/Bill Wilkins Brad Patton
+SRS	3	2	--	--	--	--	2	2	--	Tom French
+LLNL	3	--	--	--	--	--	--	2	--	Price Russ
+SNL	--	--	--	--	--	--	2	2	--	Larry Bustard
Hanford 324	1 SMF 3 RCE	3	1? 1	2	8 8	2,3 3	2 2	1 1	No	Jim Jarrett Paul Carter-DOE
Hanford 325	1	1	2?	1	1-7	1	1	1	Yes	Kurt Silvers Paul Carter-DOE
Hanford 327	1, 2	3	1	2	5,6	1	2	1	No	Jim Jarrett Paul Carter-DOE
Hanford 222-S	1	1	2	1	1-7	1	1	1	Yes	Dave Dodd Paul Carter-DOE
Hanford WESF	2?	3	1	1?	8	3	2	1?	No	Kent Smith

* No survey/responses received as of November 10, 1994 data preliminary.
+ Telephone call with C. Stroup and G. Howden
x Requires review of existing EH&S questionnaire to determine need for additonal NEPA actions.

11/11/94/GFH

Table D-2. Preliminary Site Evaluation Legend. (2 sheets)

PRELIMINARY SITE EVALUATION LEGEND

(Circle Number Most Representative Of Your Capability)

Site: ____________________ Contact: ____________________ Phone: __________

Building: ____

Column A

1 Hot cells available beginning January 1995 through 1998
2 Hot cells available beginning January 1996 through 1998
3 Hot cells are not available
4 No hot cells in building

Column B

1 Hot lab capabilities available beginning January 1995 - 1998
2 Hot lab capabilities available beginning January 1996 - 1998
3 Hot lab capabilities not available
4 No hot lab capability in building

Column C

1 Cells capable of up to 2000 Ci/cell
2 Cells capable of up to 200 Ci/cell
3 Cells capable of up to 10 Ci/cell
4 Building limit: ____________________

Column D

1 SAR Documentation for up to 2000 Ci/cell
2 SAR Documentation for up to 200 Ci/cell
3 SAR Documentation for up to 10 Ci/cell
4 Building SAR limit: ____________________

Column E

1 Analytical equipment for gamma radionuclides
2 Analytical equipment and methodology for Sr and TC
3 Analytical equipment and methodology for particle size
4 Analysis of ion exchange resin for deformation and degradation
5 Total organic carbon (TOC), semi-volatile organic and complexant organic analysis instruments, standards and methodology
6 Metals analysis, including ICP/AES and ICP/MS
7 Ion chromatography for anions
8 None of the above available in this building. Available Bld: ______________________________

Column F

1 Staff available to support work beginning January 1995
2 Staff available to support work beginning July 1995
3 New staff hiring and training required
4 Staff not available

Table D-2. Preliminary Site Evaluation Legend. (2 sheets)

<u>Column G</u>

1	Can support hot lab work with staff and facilities
2	Cannot support hot lab work

<u>Column H</u>

1	Can support process development testing with staff and facilities
2	Cannot support process development work

<u>Column I</u>

Y	Candidate facility has existing NEPA documentation that would bound this added work scope
Yx	Candidate facility has NEPA documentation that would probably cover the scope of work. Would need EH&S questionnaire review to confirm
N	Existing NEPA documentation would not cover this work. Revised NEPA would be required.

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APPENDIX D2

SITE ASSESSMENT DATA

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Hot Cell/Site Evaluation

Site 222-S

Building number:				11A	
Number of cells:	1A	1E1	1F	Pods (2)	1E2
Attribute					
Hot cell size	5' x 5'	6' x 6'	5' x 18'	5' x 6'	5' x 8'
Equipment access	3' x 3'	2.5' x 5'	5' x 8'	3' x 3'	2' x 3'
Service access	4 @ 4" ϕ	9" x 17" 3 @ 4" ϕ	9" x 17" 6 @ 6" ϕ	9" x 17" 1 @ 12" ϕ; 1 @ 6" ϕ	9" x 17" 4 @ 4" ϕ
Ci loading capability	≤2,000 Ci	≤2,000 Ci	≤2,000 Ci	≤2,000 Ci	≤2,000 Ci
Cell availability dates: Start End	1/95 6/98	1/96 6/98	3/95 6/98	1/95 6/98	1/96 6/98
Special analytical equipment in facility*					
Hot hoods	Yes	Yes	Yes	Yes	Yes
Onsite waste disposal: Primary Secondary	Back to tank Lab pack (organics)	Back to tank Lab pack (organics)	Back to tank Lab pack (organics)	Back to tank Lab pack (organics)	Back to tank Lab pack (organics)
Estimated cost for cell cleanout and commissioning	$50K	$500K	$50K	$0K	$500K?

NOTE: To convert inches to centimeters, multiply by 2.54.
To convert feet to meters, multiply by 0.3048.

*Special analytical equipment needed with a value of more than $100K and a 4-month procurement time.

Figure D-1. 222-S Floor Plan.

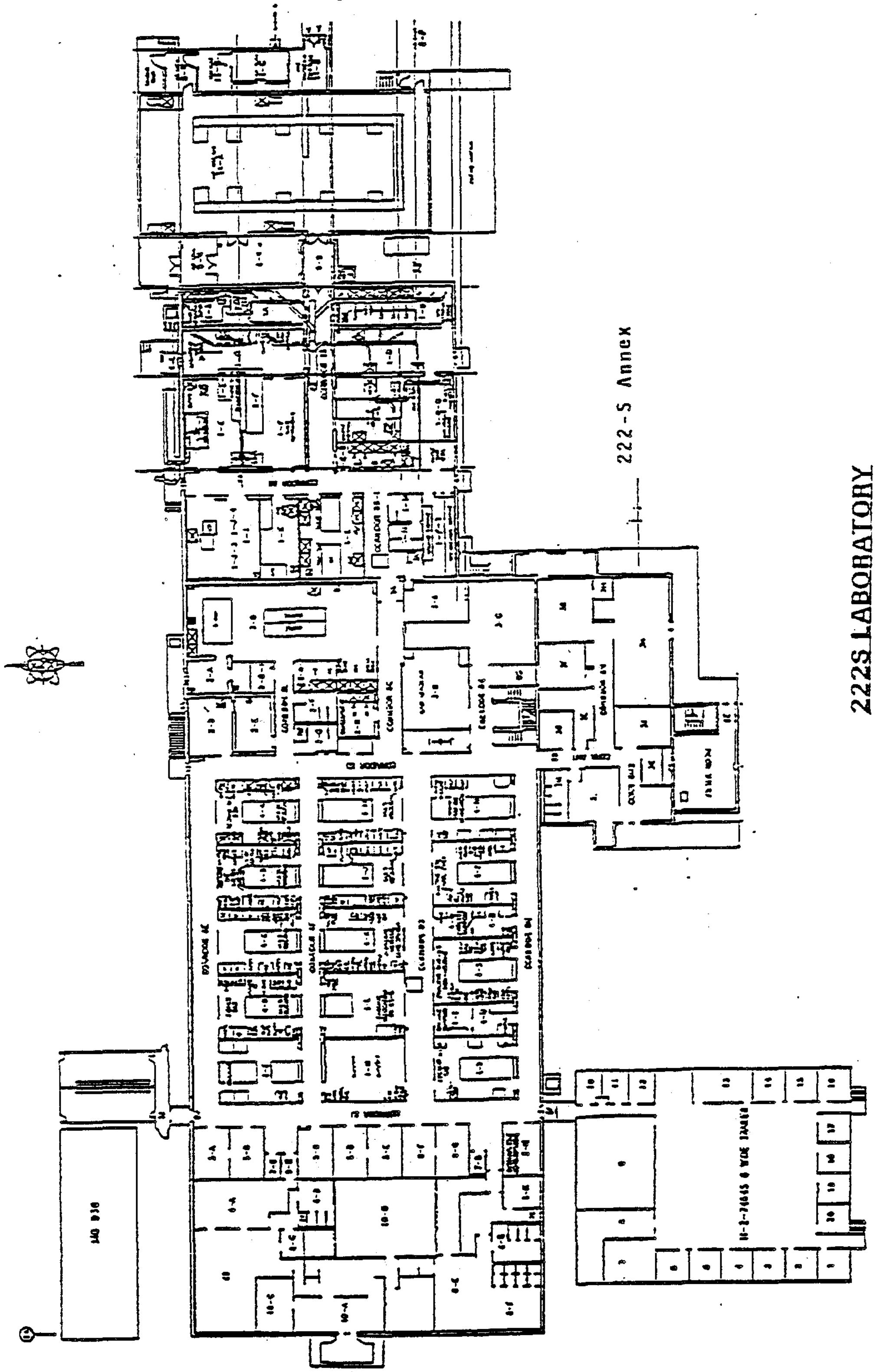
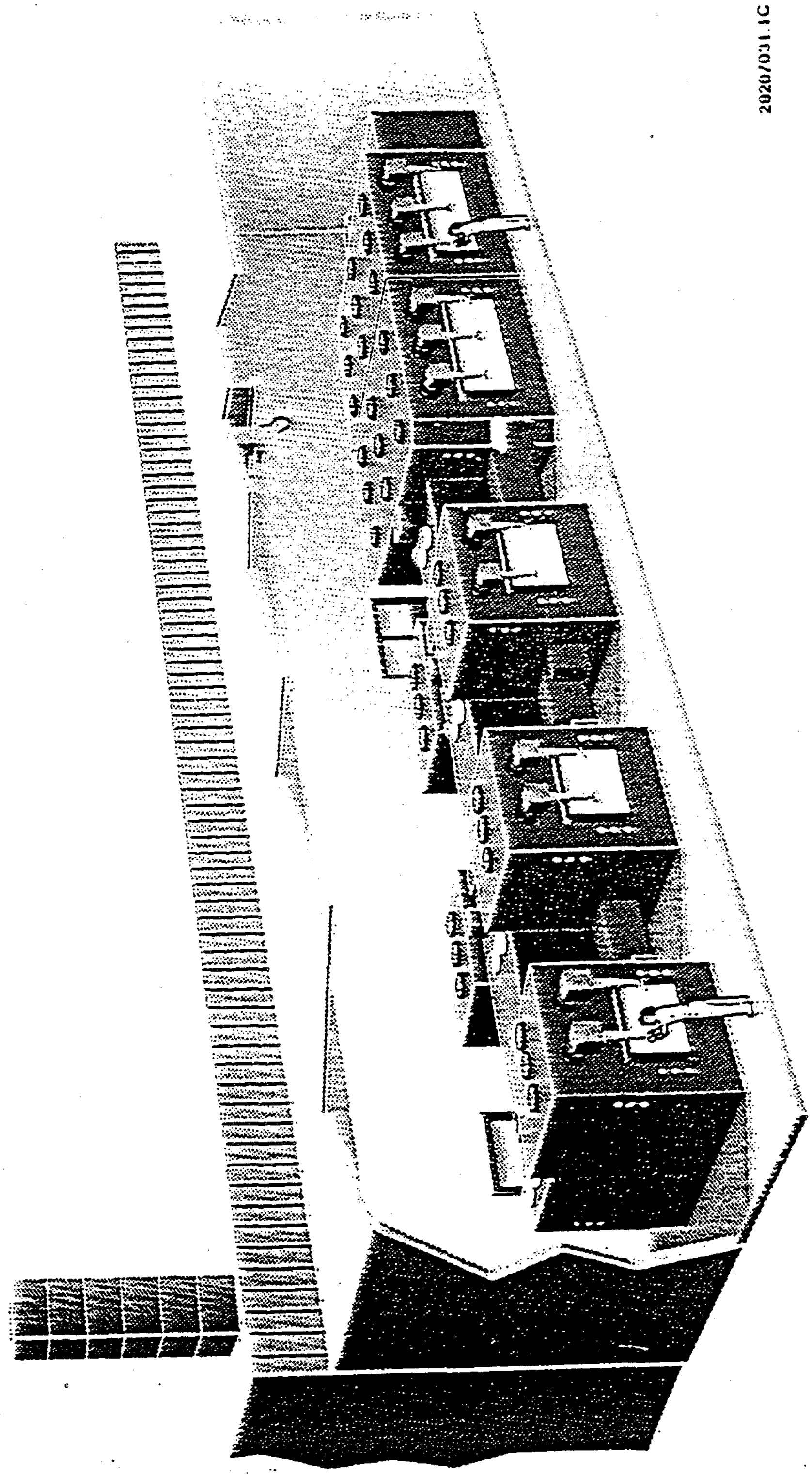


Figure D-2. 222-S Environmental Hot Cell Expansion.



Hot Cell/Site Evaluation

Site ANL-East

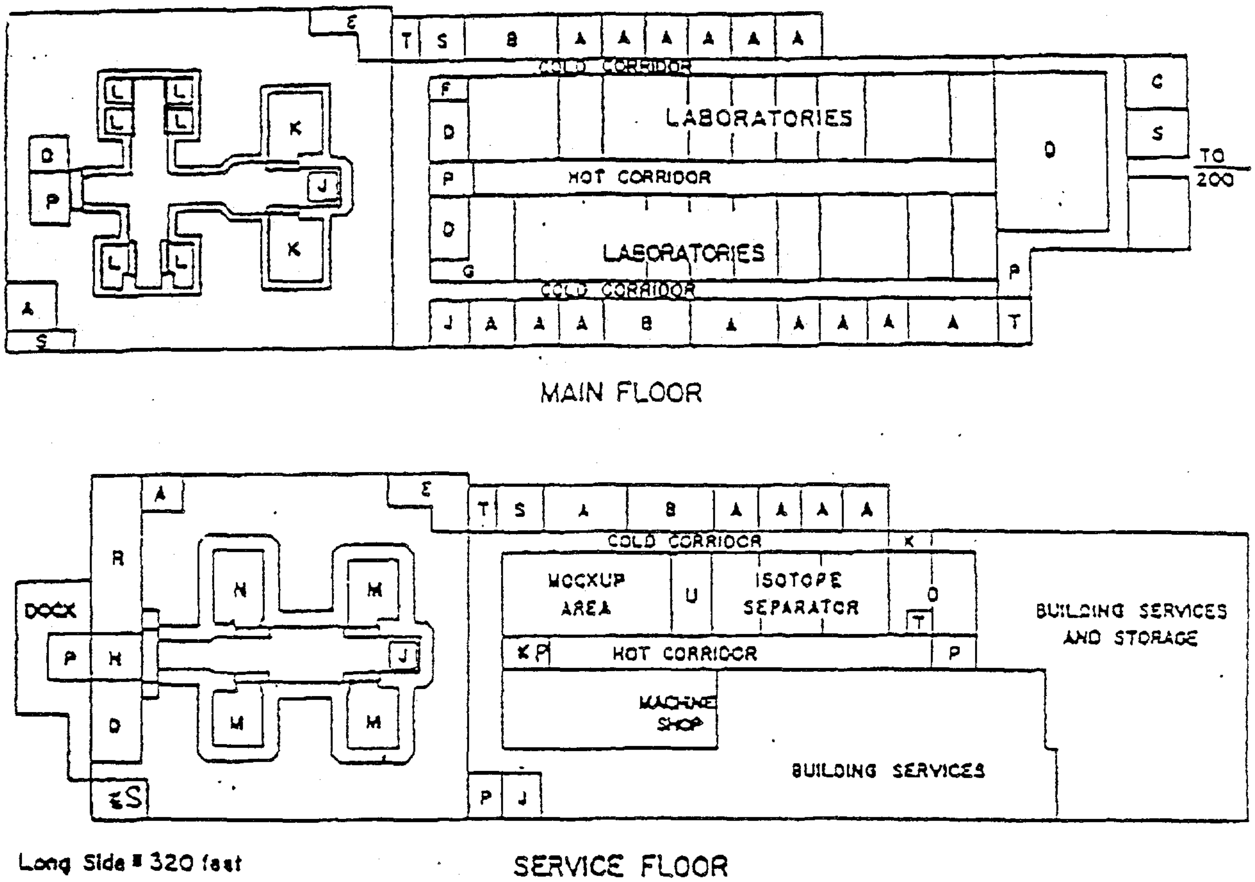
Building number:	200	200	200
Number of cells:	2 Analytical	2 Kilo Curie	Mega Curie
Attribute			
Hot cell size	#1 12' x 7' #2 7' x 7'	#1 14' x 14' #2 7' x 12'	~ 10' x 10'
Equipment access	7' x 7'	7' x 7'	7' x 7'
Service access	?	?	?
Ci loading capability	30 Ci	100 Ci	≤1 M Ci
Cell availability dates: Start End	#1 1/95 #2 1/95	#1 1/95 #2 1/95	#1 1/96 #2 1/96
Special analytical equipment in facility*	SEM/TEM	SEM/TEM	SEM/TEM
Hot hoods	Yes	Yes	Yes
Onsite waste disposal: Primary Secondary	Ship to Hanford Ship to Hanford	Ship to Hanford Ship to Hanford	Ship to Hanford Ship to Hanford
Estimated cost for cell	$0K	$0K	$0K

NOTE: To convert inches to centimeters, multiply by 2.54.
To convert feet to meters, multiply by 0.3048.

*Special analytical equipment needed with a value of more than $100K and a 4-month procurement time.

SEM/TEM = Scanning electron microscope/transmission electron microscope

Figure D-3. ANL-East Building 200.



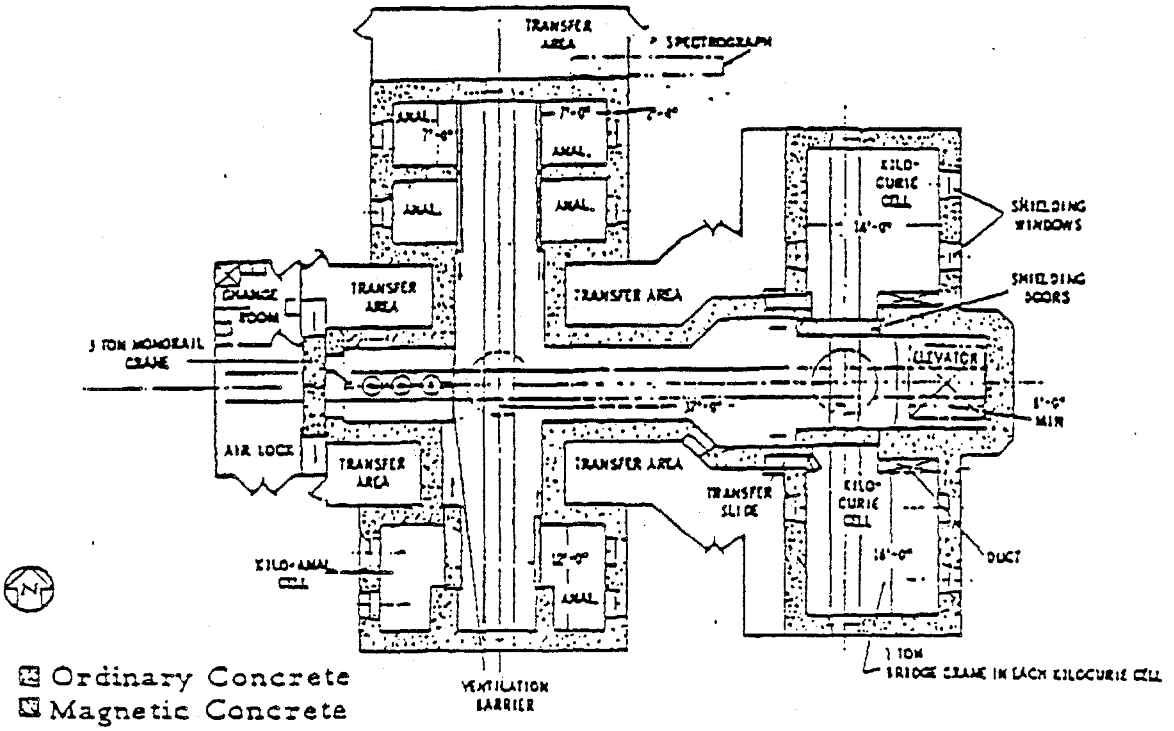
Long Side = 320 feet
Width in Cave Section = 95 feet

KEY:

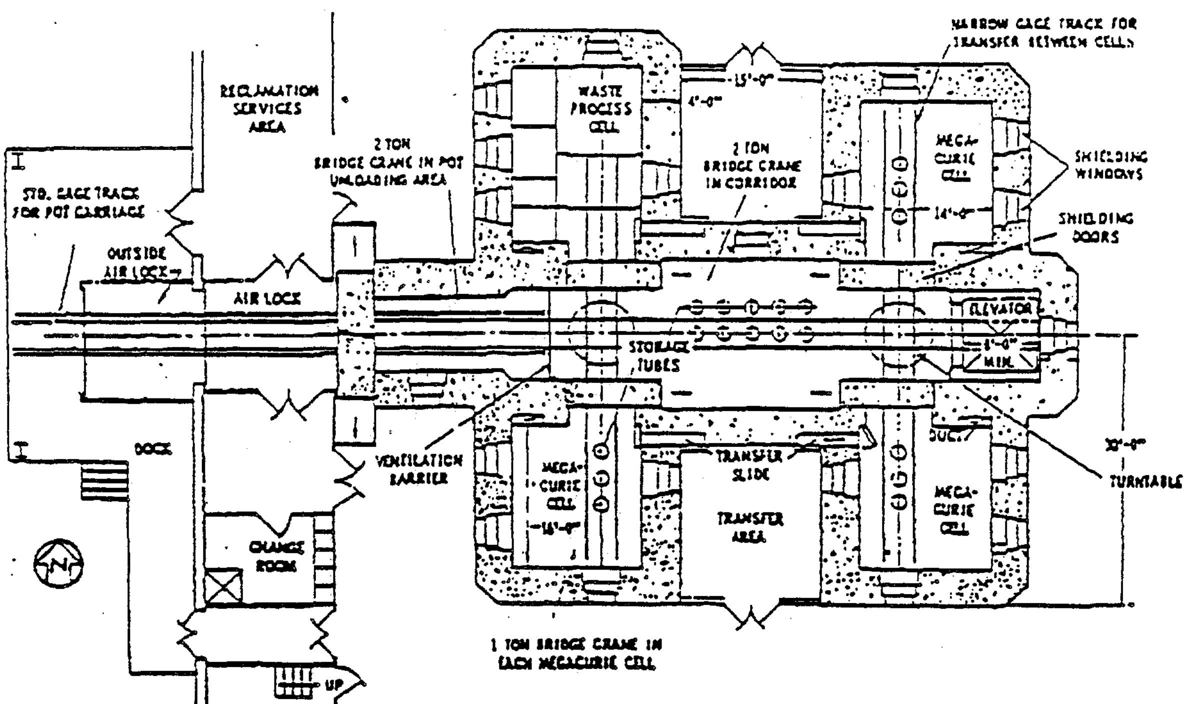
A – Offices	G – Decontamination (a)	N – Decontamination Cell
B – Counting Rooms	H – Radiation Lock	P – Air Lock
C – Conference Room	J – Elevator	R – Reclamation Area
D – Change Rooms	K – Kilocurie Cells	S – Stairs
E – Radiation Safety	L – Analytical Cells	T – Janitor Closet
F – Stockroom	M – Megacurie Cells	U – Laboratory

Fig. A-1. Floor Plan of Shielded-Cell Facility

Figure D-4. ANL-East Building 200 Hot Cells.



Main Floor



Service Floor

Fig. A-2. Floor Plan of Cave Complex in Shielded-Cell Facility

Hot Cell/Site Evaluation

Site Hanford - 300 Area

Building number:	324 RCE	324 SMF	325-A	325-B	327
Number of cells:	1 - C cell 1 - D cell	1 w/8 sta. 1 w/11 sta.	1 w/2 sta. 2 w/1 sta.	6	5
Attribute					
Hot cell size	C - 12' x 19.3' x 15' h D - 13' x 21' x 17' h	16' x 23' x 18' h 16' x 50' x 18' h	A - 6.5' x 15' x 15' h B&C - 6.5' x 5.8' x 15' h	6' x 5.5' x 6.25' h	4 @ 6' x 4.5' x 4.5' h 1 @ 10.25' x 6.3' x 8.3' h
Equipment access	8' x 6' doors	5' x 7' doors	6' x 7' door plus 13" ϕ port/cell	26" x 30" x 42"	7" ϕ port or cell end wall
Service access	4" ϕ 4-6/cell	4" ϕ 4/sta.			7" ϕ 2 or more/cell
Ci loading capability	≤3 M/cell	≤3 M/cell	≤7,000	≤2,000	≤2,000
Cell availability dates: Start End	C - 1/96, D - 1/95 Open	1/95 Open	2/95 Open	1/95 Open	1/95 Open
Special analytical equipment in facility*	None, this bldg. uses 325 Bldg. labs	None, this bldg. uses 325 Bldg. labs	None, this bldg. uses 325 Bldg. labs	ICP-AES	None, this bldg. uses 325 Bldg. labs
Hot hoods	Yes	No	Yes+	Yes	
Onsite waste disposal: Primary Secondary	Ship to 200 Area Ship to 200 Area	Ship to 200 Area Ship to 200 Area	Ship to 200 Area Ship to 200 Area	Ship to 200 Area Ship to 200 Area	Ship to 200 Area Ship to 200 Area
Estimated cost for cell cleanout and commissioning	C ~ $400K D ~ $2,000K	~ $2,000K - south ~ $250K	A - $50K B - $800K C - $0	$50K	

NOTE: To convert inches to centimeters, multiply by 2.54.
To convert feet to meters, multiply by 0.3048.

*Special analytical equipment needed with a value of more than $100K and a 4-month procurement time.
+Small group of hot hoods available in basement.

ICP-AES = Inductively coupled plasma - atomic emission spectrometer
RCE = Radiochemical engineering
SMF = Shielded Materials Facility

Figure D-5. 324 Building Simplified Floor Plans (First Floor).

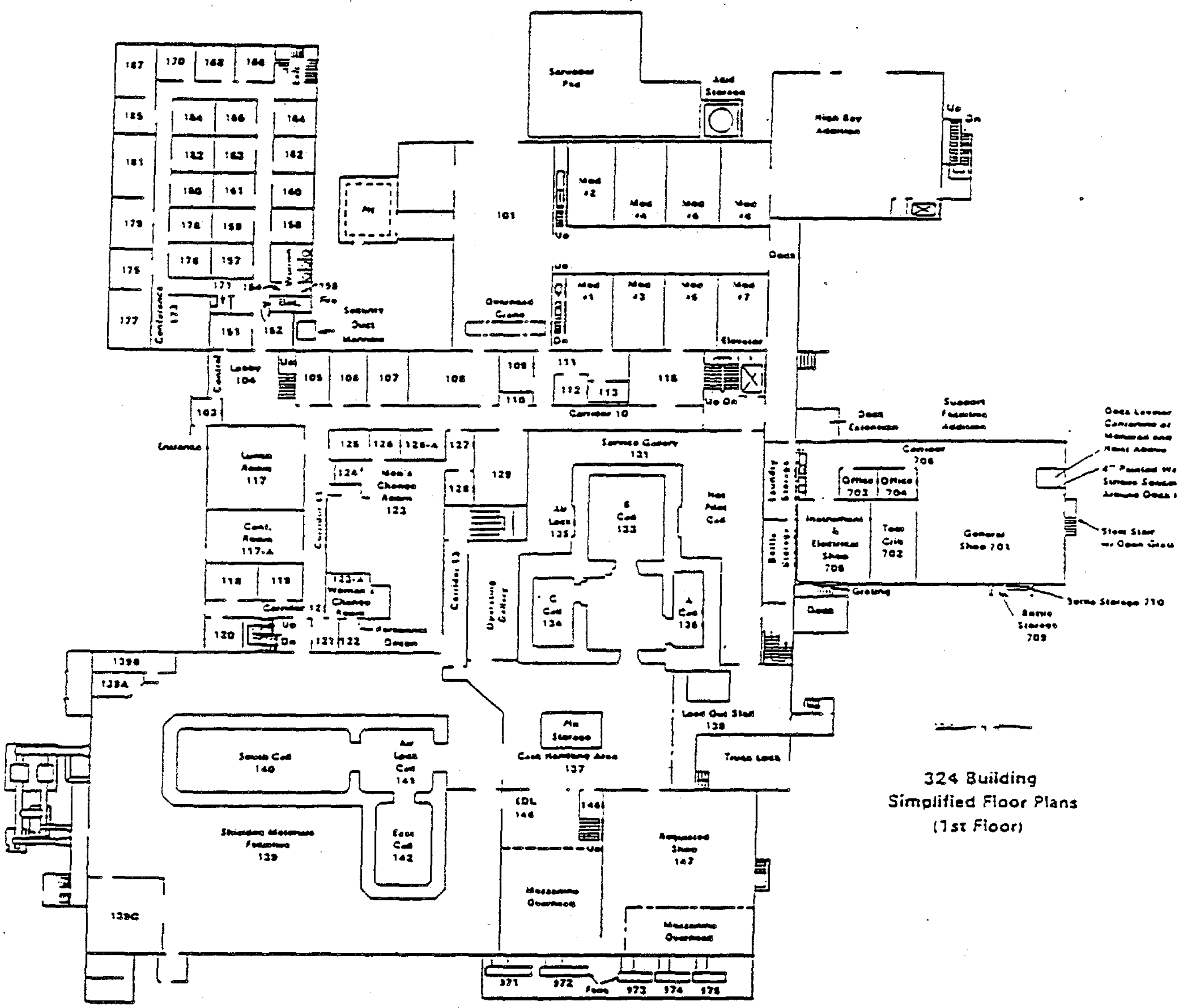


Figure D-6. Radiochemical Engineering Cells.

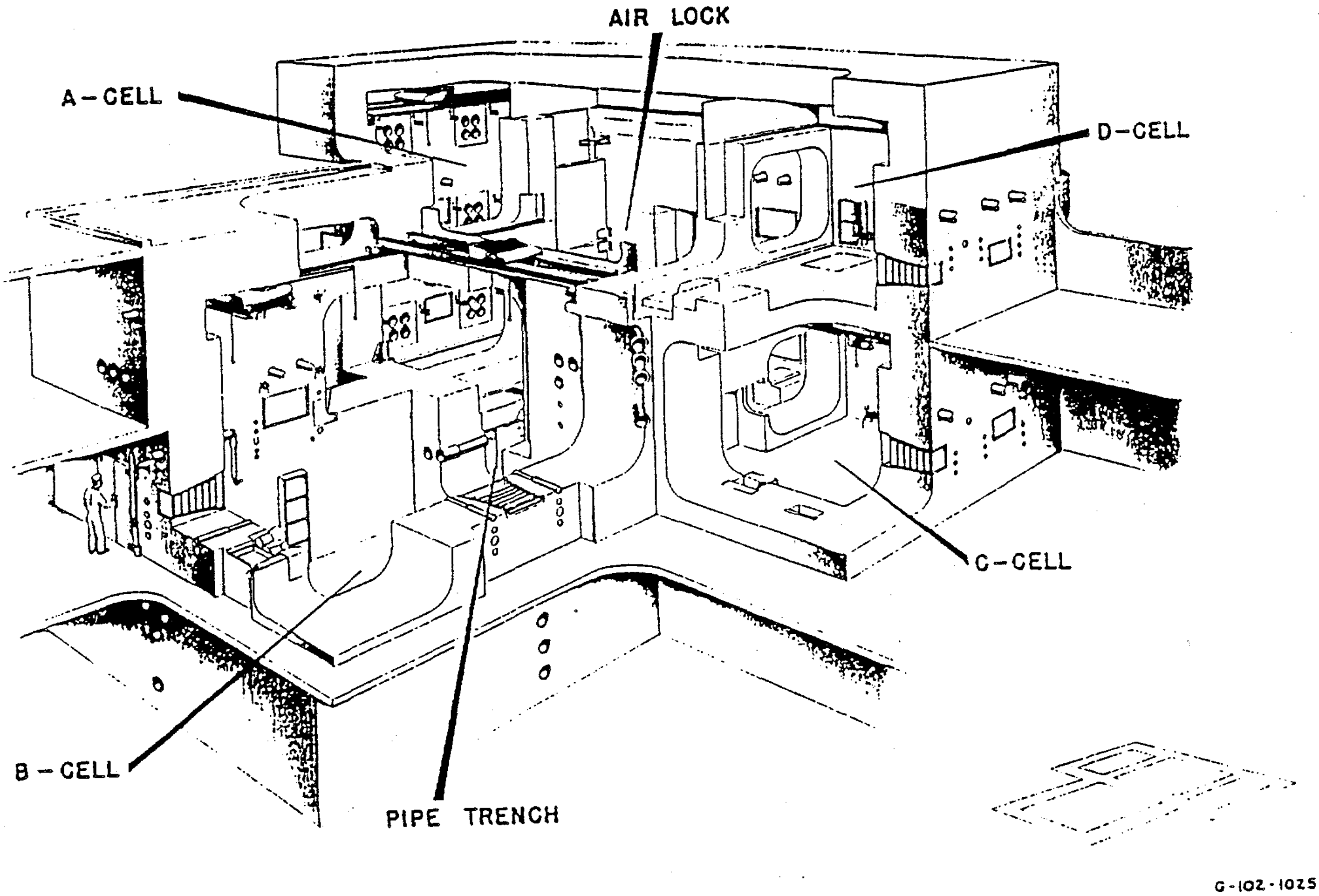


Figure D-7. Shielded Materials Facility.

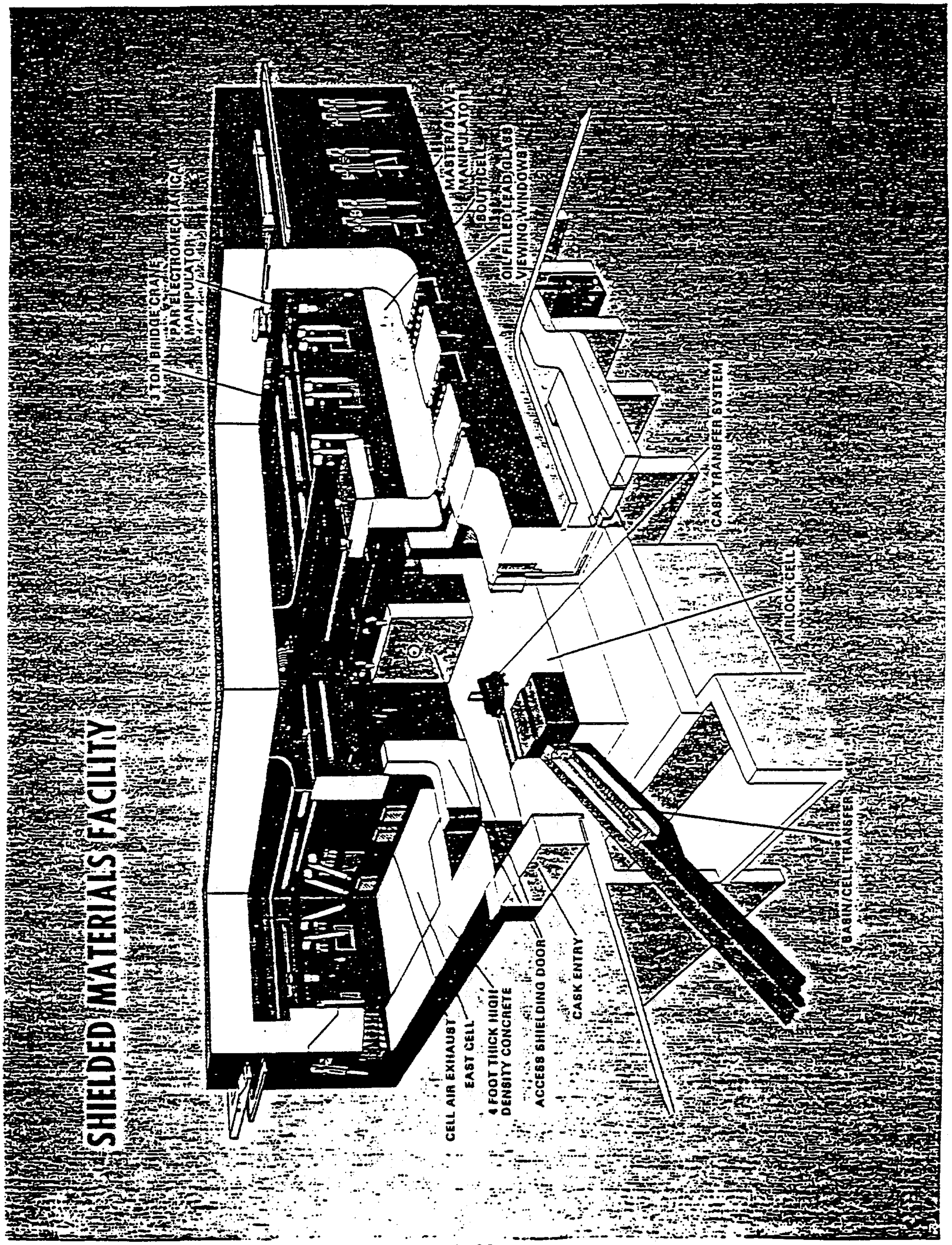


Figure D-8. 325-A Building Floor Plan.

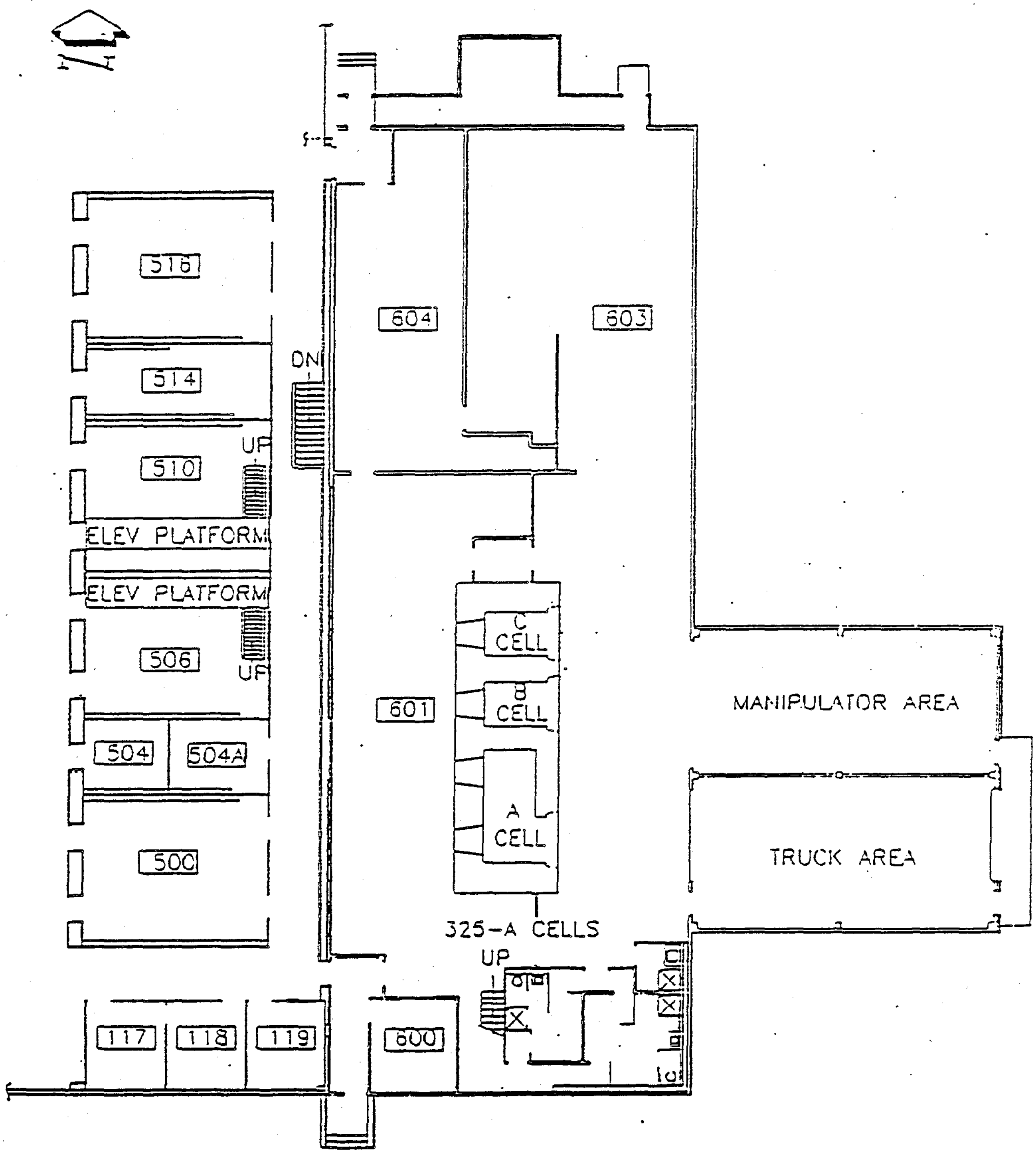


Figure D-9. 325-A Hot Cells.

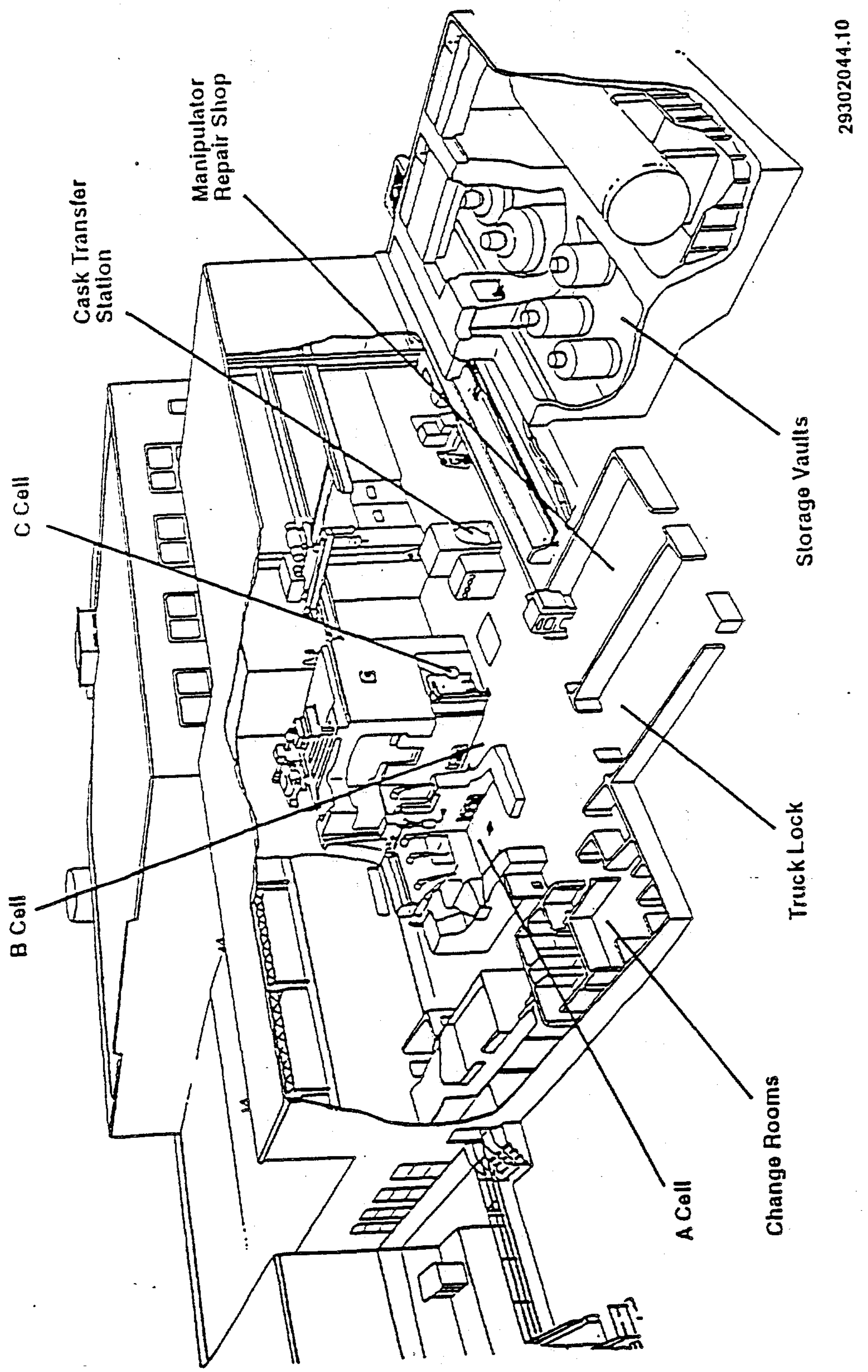


Figure D-10. 325-B Hot Cells.

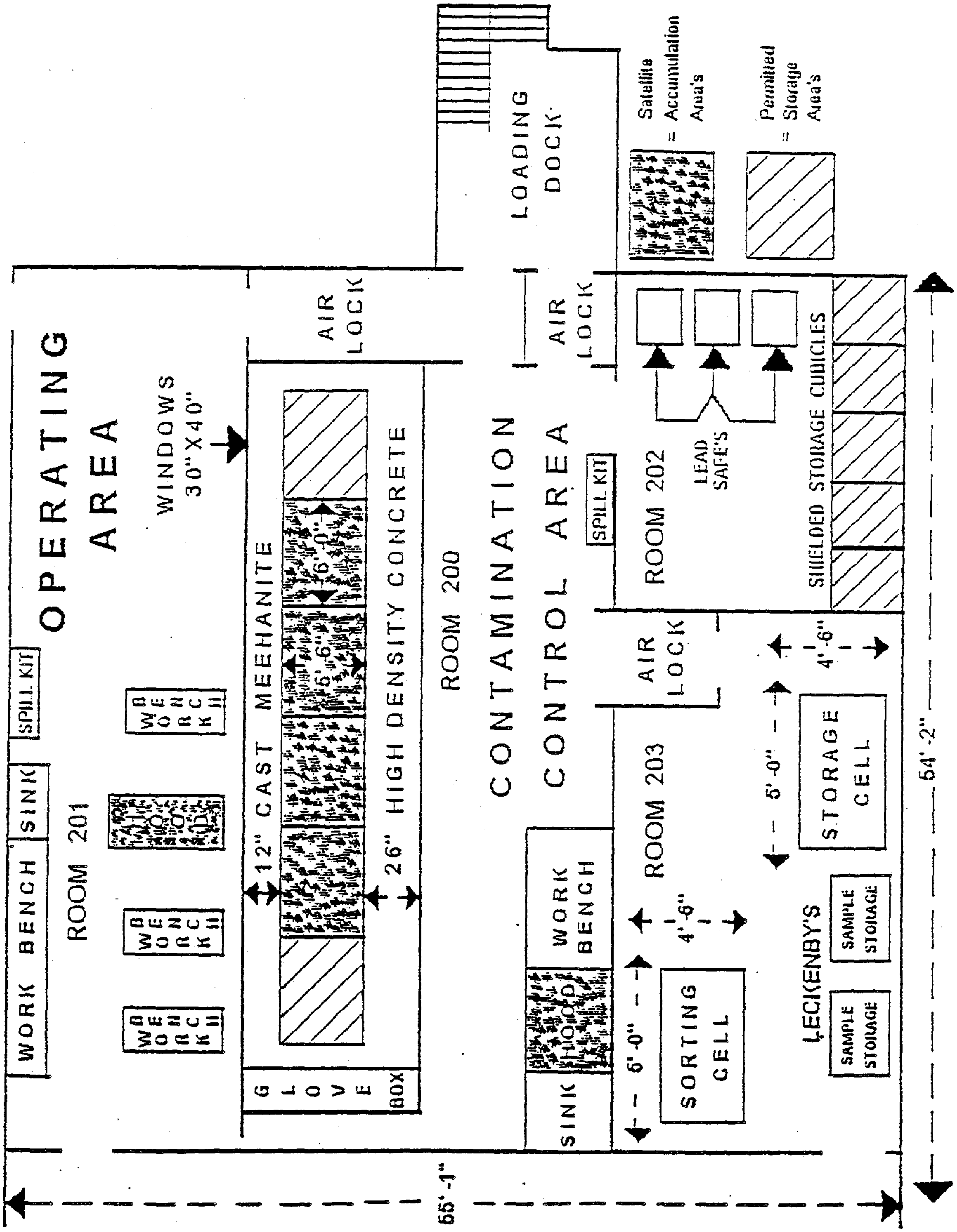
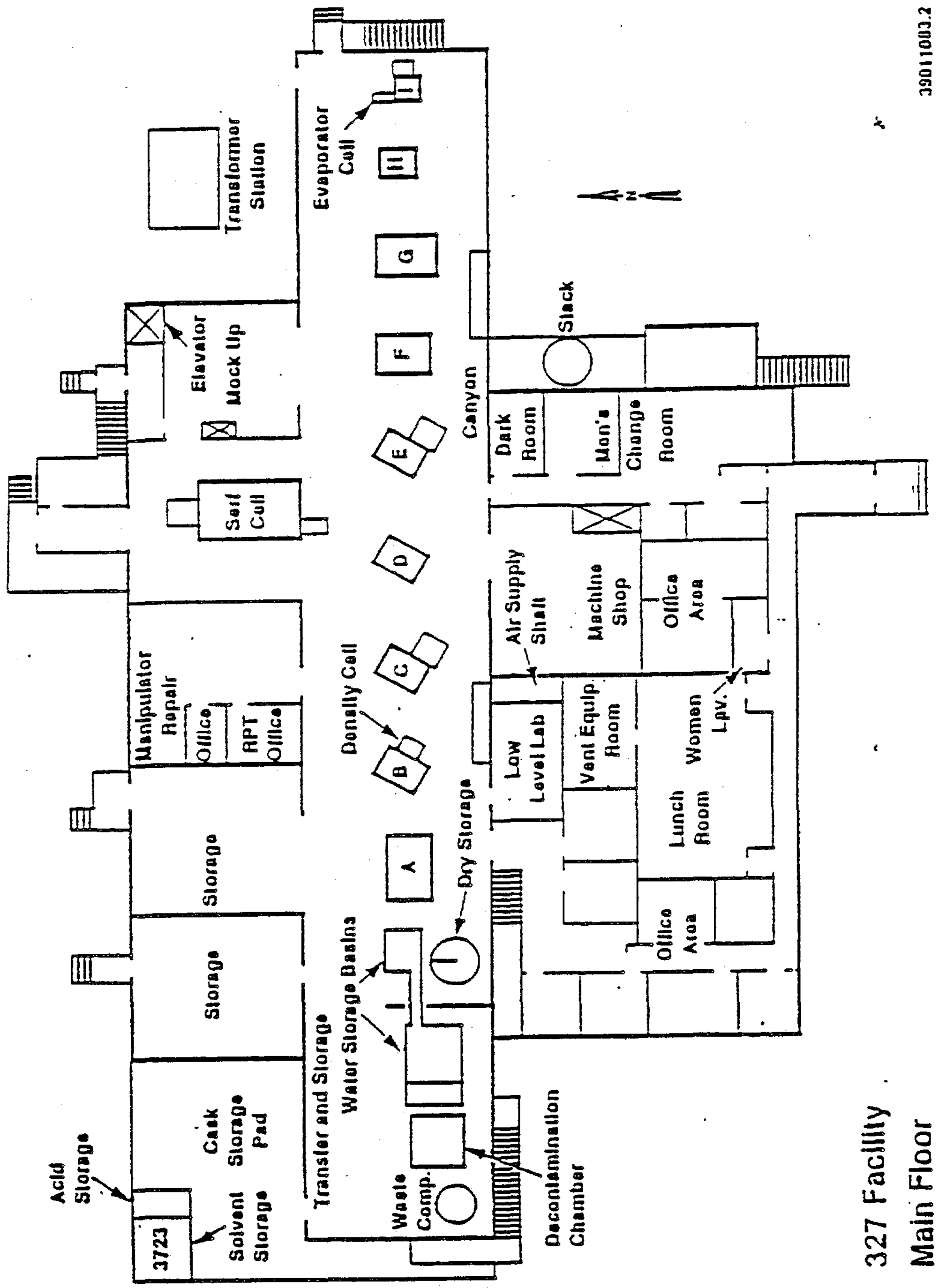


Figure D-11. 327 Building Postirradiation Testing Laboratory.



Hot Cell/Site Evaluation

Site Hanford - WESF

Building number:	WESF	WESF
Number of cells:	B and C	D and E
Attribute		
Hot cell size	8' x 8'x 12.8' h	8' x 18.7' 12.8' h
Equipment access	8' x 8'	8' x 16'
Service access	4 - 4" ϕ	8 - 4" ϕ
Ci loading capability	<100K	<100K
Cell availability dates: Start End	 2/96 Open	 2/96 Open
Special analytical equipment in facility*	None in building. Use 222/325 labs.	None in building. Use 222/325 labs.
Hot hoods	No	No
Onsite waste disposal: Primary Secondary	 Yes Yes	 Yes Yes
Estimated cost for cell cleanout and commissioning	7.8 M for B, C, D, and E	

NOTE: To convert inches to centimeters, multiply by 2.54.
To convert feet to meters, multiply by 0.3048.

*Special analytical equipment needed with a value of more than $100K and a 4-month procurement time.

WESF = Waste Encapsulation and Storage Facility

Figure D-12. Waste Encapsulation and Storage Facility Cell Area Arrangement.

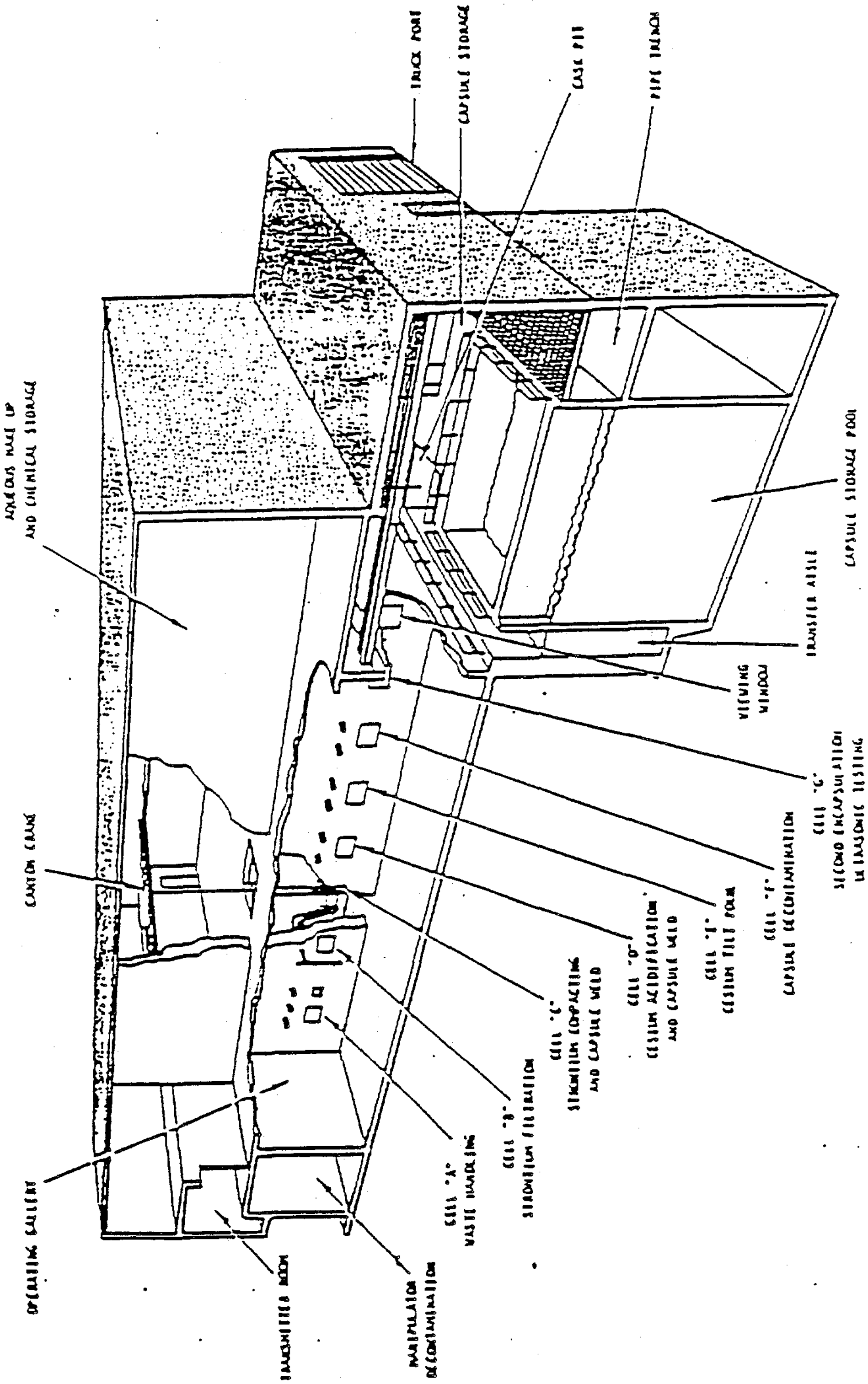


Figure D-13. Waste Encapsulation and Storage Facility First and Second Floor Plan.

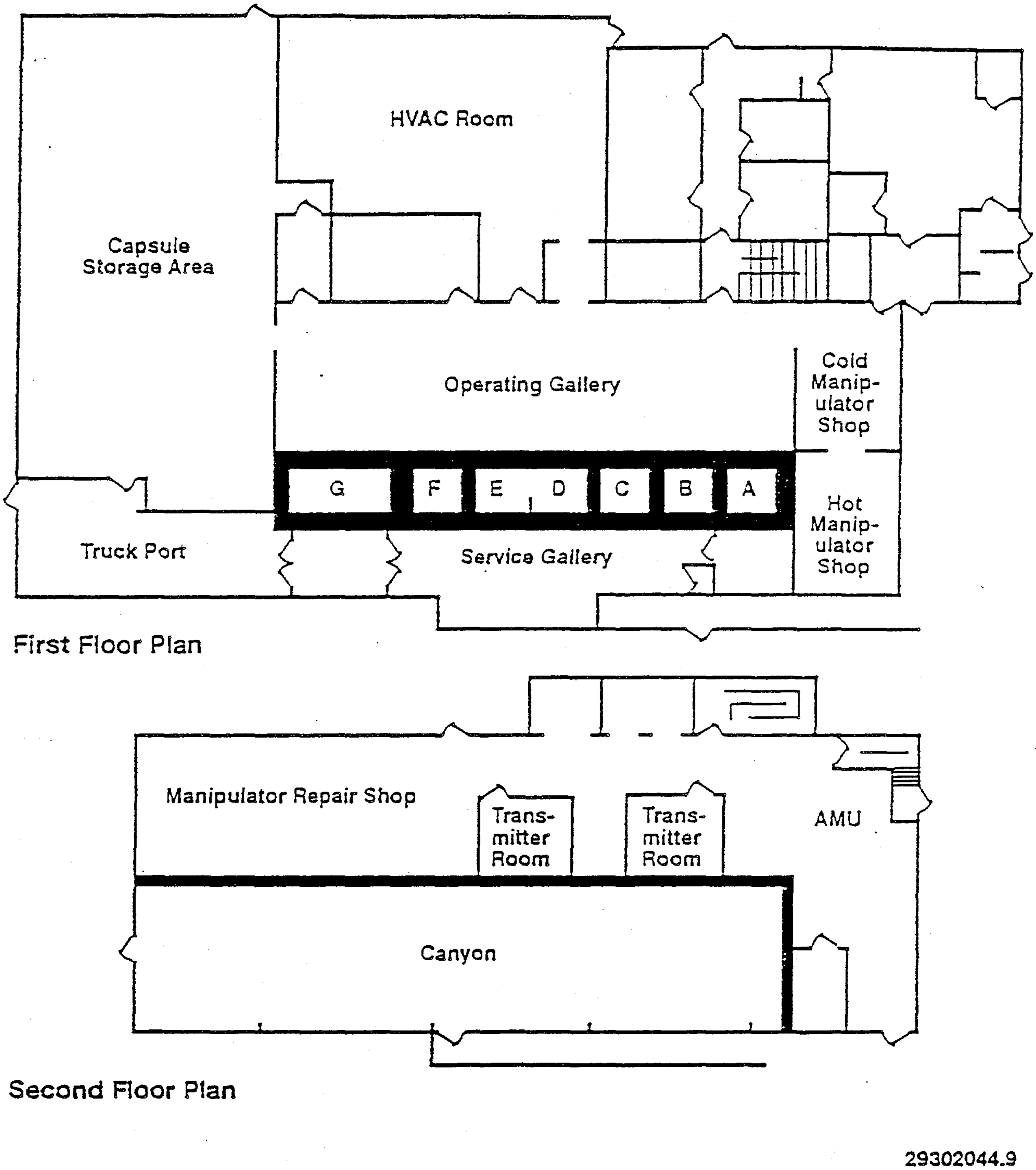
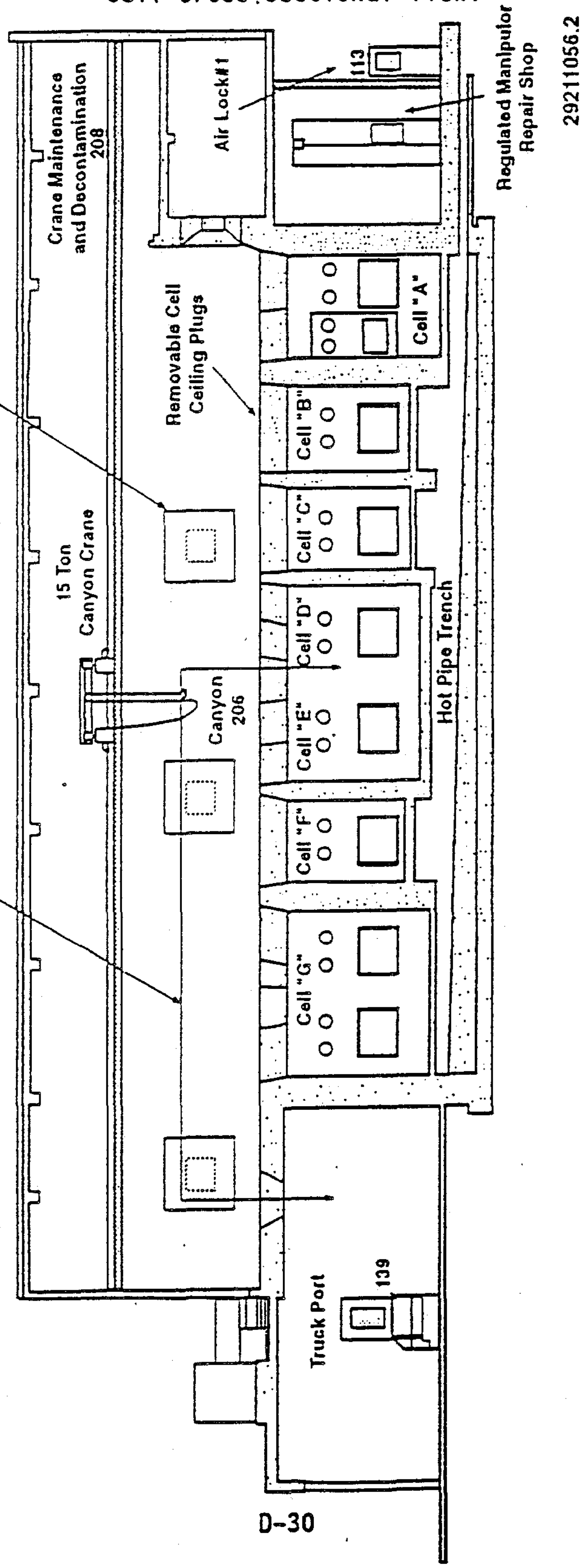


Figure D-14. Waste Encapsulation and Storage Facility Cell Cross-Sectional View.



Hot Cell/Site Evaluation

Site Los Alamos National Laboratory

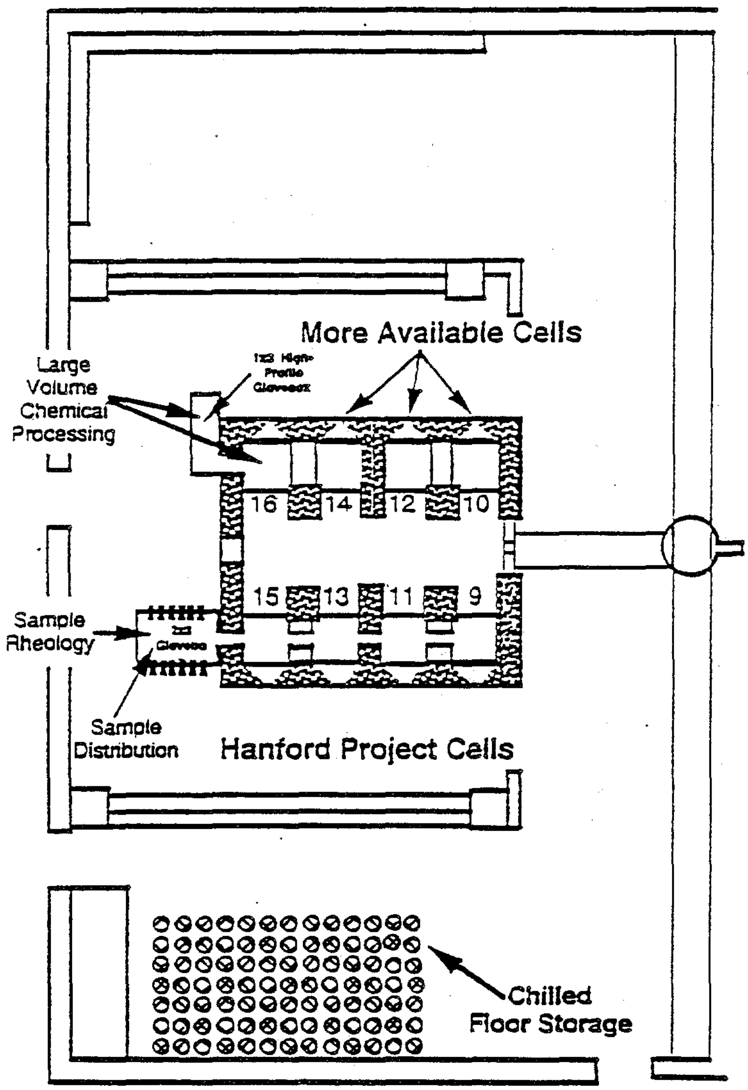
Building number:	CMR Wing D	CMR Wing D
Number of cells:	4 Doubles	8 Singles
Attribute		
Hot cell size	6' x 14'	6' x 6'
Equipment access	65" x 65"	65" x 65"
Service access	4" ϕ 8/cell	4" ϕ 4/cell
Ci loading capability	60,000	60,000
Cell availability dates: Start End	10/94 10/98	10/94 10/98
Special analytical equipment in facility*		
Hot hoods	Yes	Yes
Onsite waste disposal: Primary Secondary	Return to Hanford Yes	Return to Hanford Yes
Estimated cost for cell cleanout and commissioning	$0	$0

NOTE: To convert inches to centimeters, multiply by 2.54.
To convert feet to meters, multiply by 0.3048.

*Special analytical equipment needed with a value of more than $100K and a 4-month procurement time.

CMR = *Central monitoring room*

Figure D-15. Los Alamos National Laboratory MST-5 Hot Cell Facility.



Expandable to 15' hi;
Currently 12' hi

Hot Cell/Site Evaluation

Site Hanford - FMEF

Building number:	427	427	427	427	427	427	
Number of cells:	7	4	1	1	1	1	1
Number of work sta./cell	1	2	4	4	2	22	14
Attribute							
Hot cell size	6' x 6.5' x 14' h	6' x 13' x 14' h	6' x 26.5' x 14' h	8' x 32' x 28' h	9' x 26' x 33' h	40' x 100' x 50' h	40' x 60' x 25'h
Equipment access	30" ϕ	30" ϕ	30" ϕ	30" ϕ + 1' x 4'	7' x 7' + 30" ϕ	6' ϕ	8' x 10'
Service access	4 min., 6" ϕ	8 min., 6" ϕ	16 min., 6" ϕ	16 min., 6" ϕ	8 min., 6" ϕ	>80, 6" ϕ	>50, 6" ϕ
Ci loading capability+	≤100K	≤100K	≤100K	≤1M	≤1M	≤3M	≤3M
Cell availability dates:Δ Start End	6/96	6/96	6/96	9/96	6/96	6/98	12/97
Special analytical equipment in facility*	Use 222-S and 325 labs	Use 222-S and 325 labs	Use 222-S and 325 labs	Use 222-S and 325 labs	Use 222-S and 325 labs	Use 222-S and 325 labs	Use 222-S and 325 labs
Hot hoods	Space available	Space available	Space available	Space available	Space available	Space available	Space available
Onsite waste disposal: Primary Secondary	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y	Y Y
Estimated cost for cell outfitting and commissioning∇	$200K/cell	$250K/cell	$300K	$2M	$2M	$25M	$20M

NOTE: To convert inches to centimeters, multiply by 2.54.
To convert feet to meters, multiply by 0.3048.

*Special analytical equipment needed with a value of more than $100K and a 4-month procurement time.
+Estimated based on equivalent cells - must be confirmed before using data.
ΔEstimated earliest date outfitted cells could be available for test equipment installation.
∇Added costs for facility support expected dependent on cell combination selected.

FMEF = Fuels and Materials Examination Facility

Figure D-16. Fuels and Materials Examination Facility Arrangement.

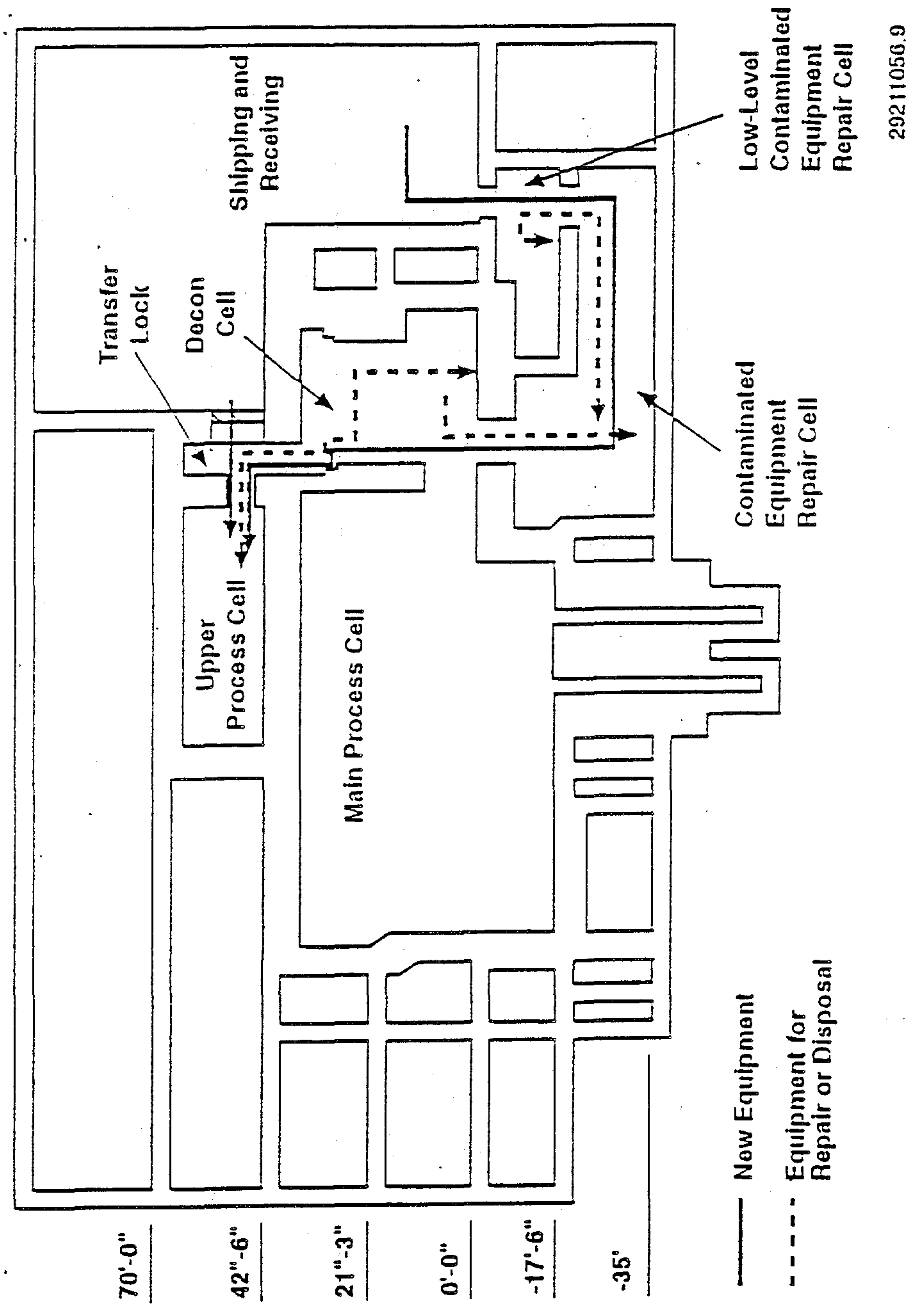


Figure D-17. Fuels and Materials Examination Facility 42-ft 6-in. Level.

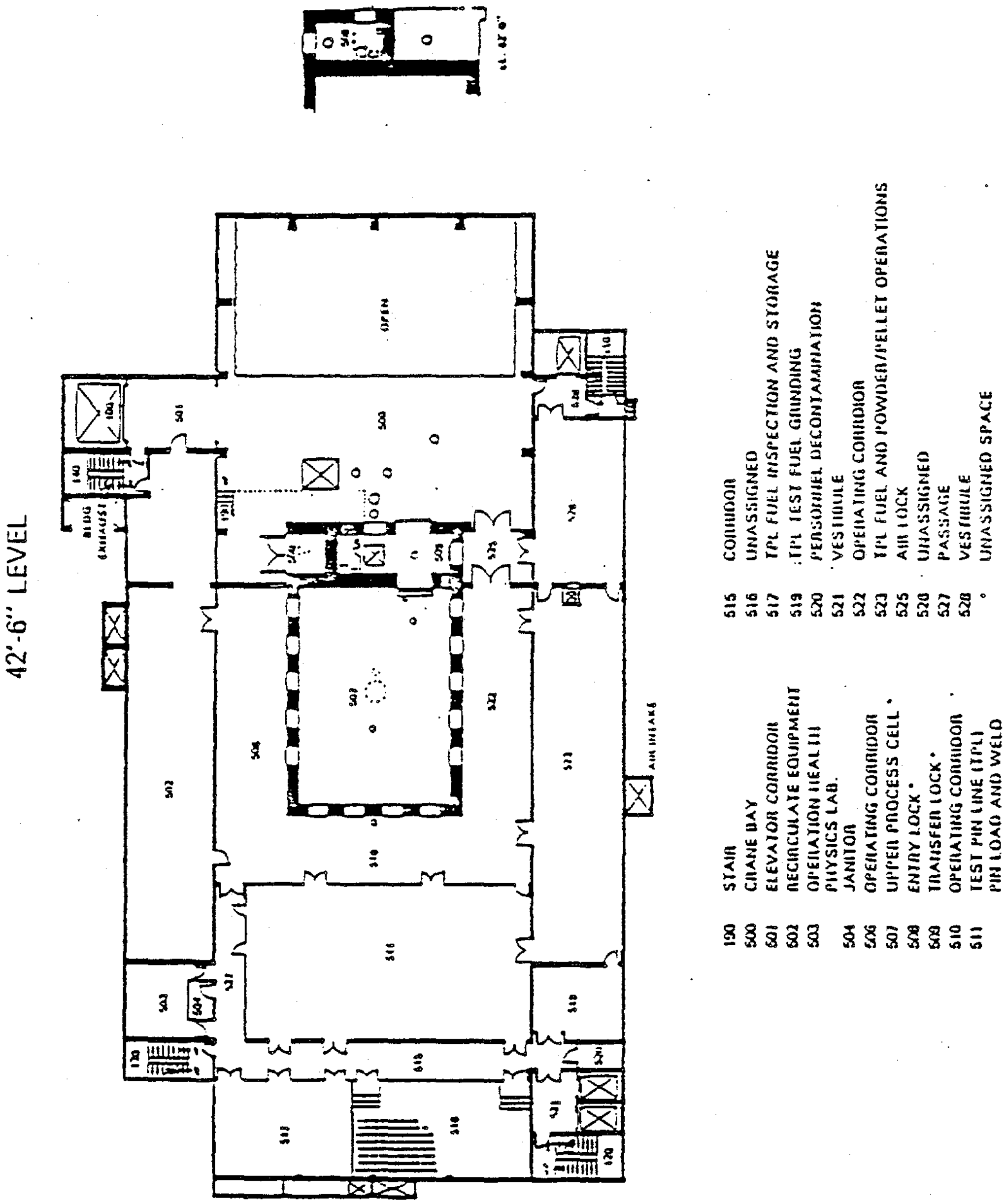


Figure D-18. Fuels and Materials Examination Facility Building Main Floor Plan.

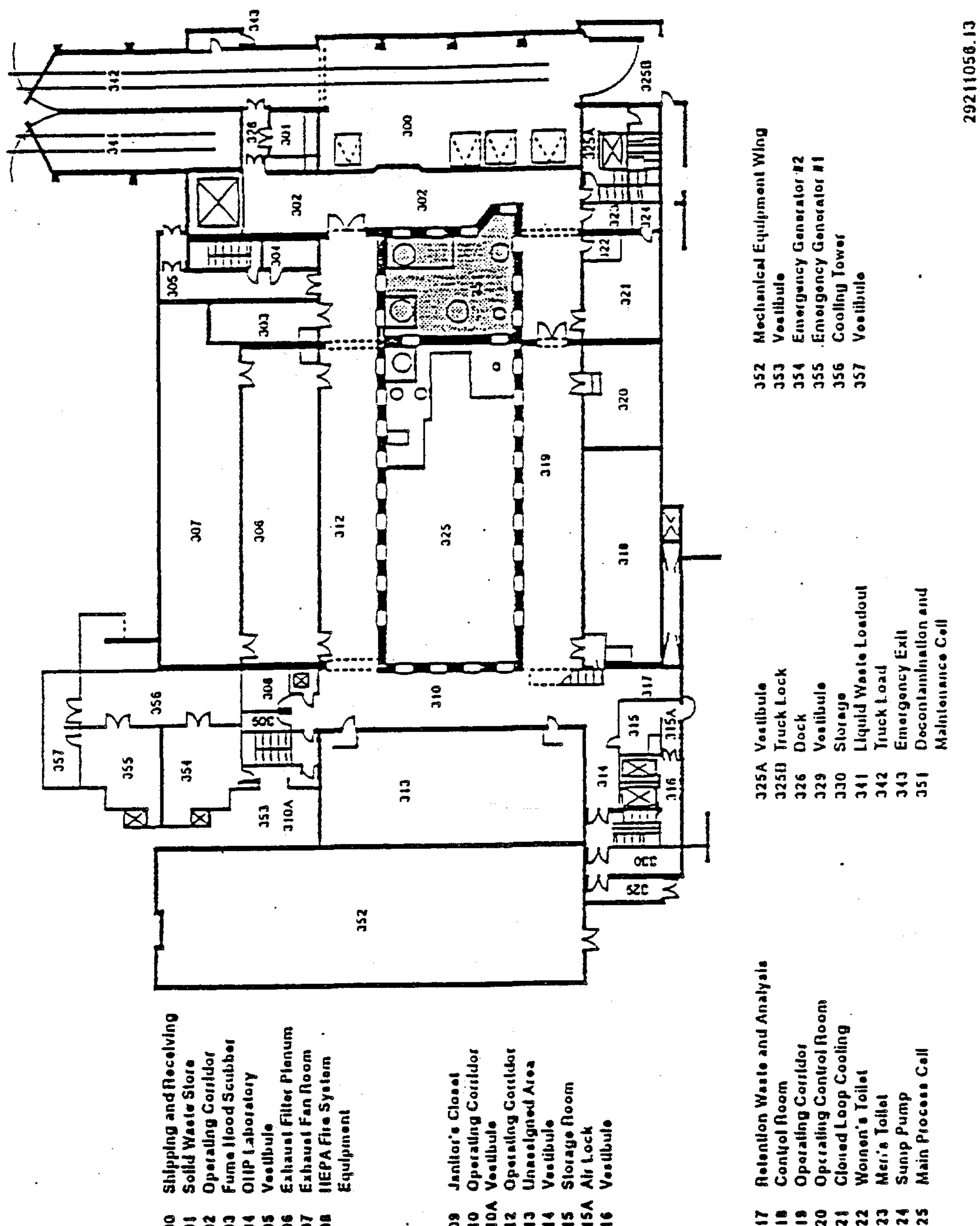


Figure D-19. Fuels and Materials Examination Facility 21-ft 3-in. Level.

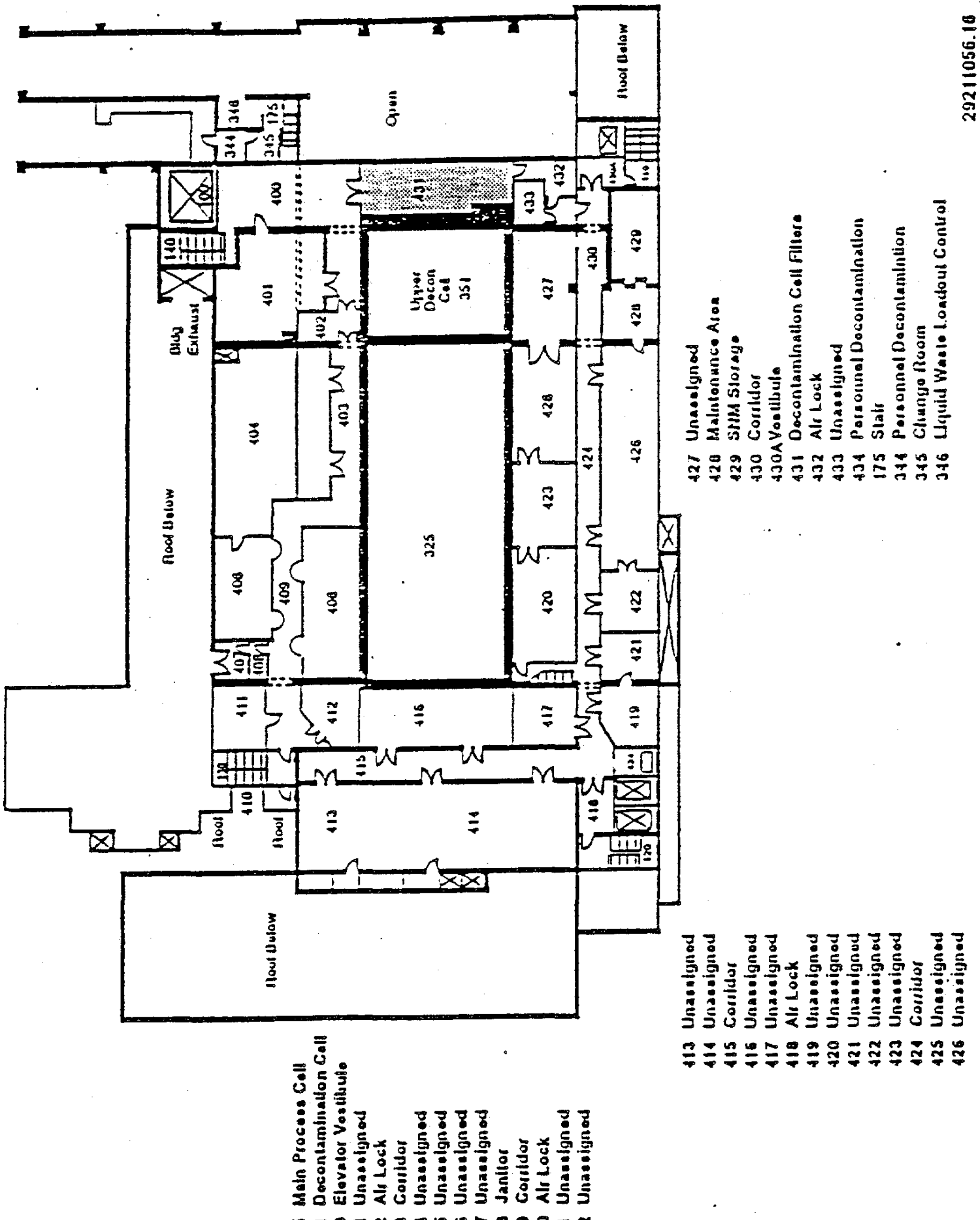
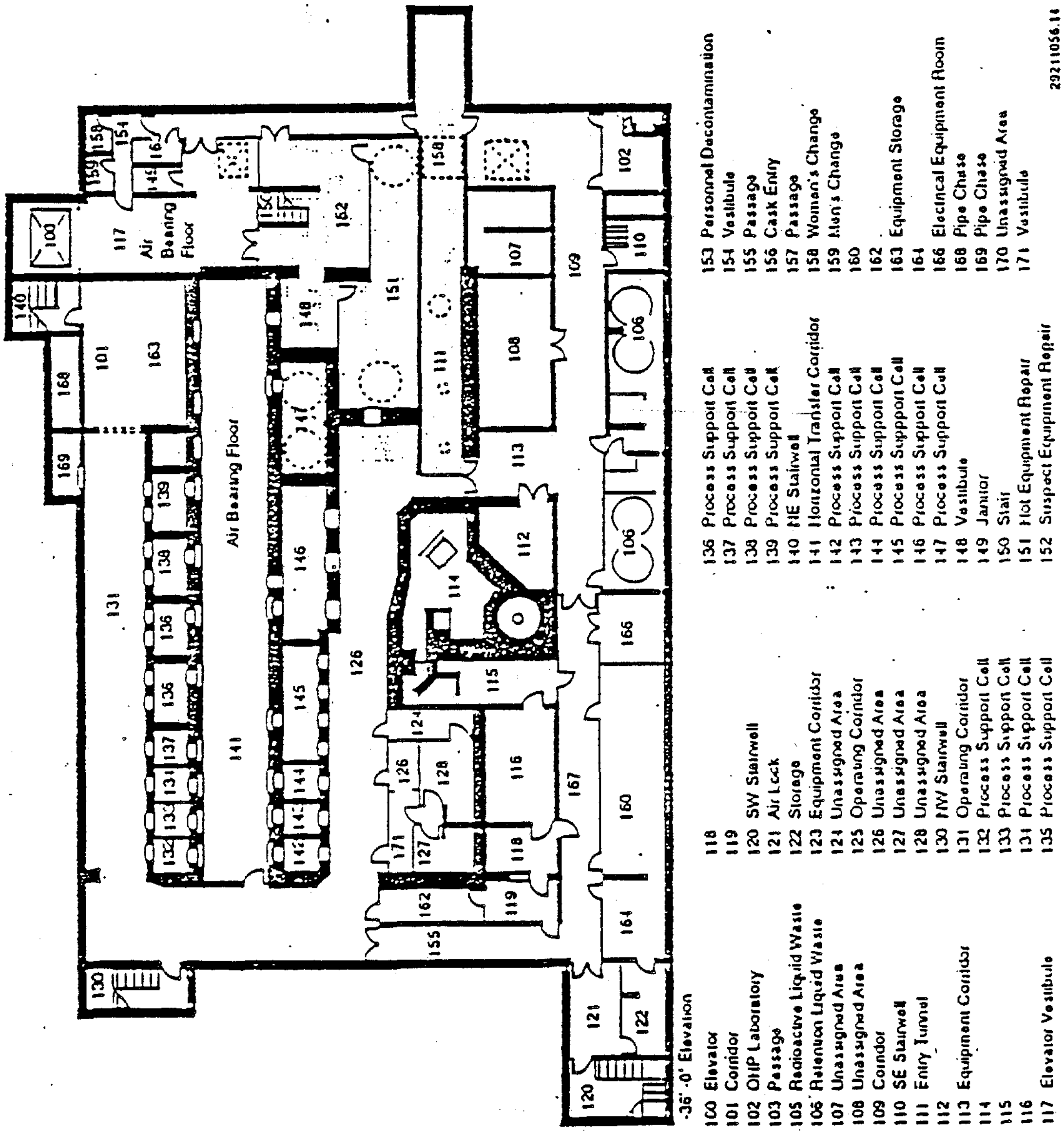


Figure D-20. Fuels and Materials Examination Facility (-)35-ft 0-in. Level.



Hot Cell/Site Evaluation

Site Idaho Falls ANL-W

Building number:	Analytical Lab	HFEF	FCF
Number of cells:	1	2-3 stations	2-3 stations
Attribute			
Hot cell size	5' x' 6.5'	20' x 30'	20' x 25'
Equipment access	3' x 7'	Very large	Very large
Service access	Yes	Yes	Yes
Ci loading capability	2,000 max.	>2,000	>2,000
Cell availability dates: Start End	3/95 Open	1/1/95 Open	1/1/95 Open
Special analytical equipment in facility*+			
Hot hoods	Yes	Use Analytical Lab	Use Analytical Lab
Onsite waste disposal: Primary Secondary	Ship to Hanford Yes	Ship to Hanford Yes	Ship to Hanford Yes
Estimated cost for cell cleanout and commissioning	Clean	Clean	Clean

NOTE: To convert inches to centimeters, multiply by 2.54.
To convert feet to meters, multiply by 0.3048.

*Special analytical equipment needed with a value of more than $100K and a 4-month procurement time.

+Analytical equipment available includes XAS and in-cell ICP, MS, IR, TEM, and SEM.

FCF = Fuel Cycle Facility
HFEF = Hot Fuel Examination Facility
IR = Infrared spectroscopy
MS = Mass spectroscopy
SEM = Scanning electron microscope
TEM = Transmission electron microscope
XAS = X-ray absorbtion spectroscopy

Figure D-21. ANL-W Analytical Laboratory Cells - Plan View.

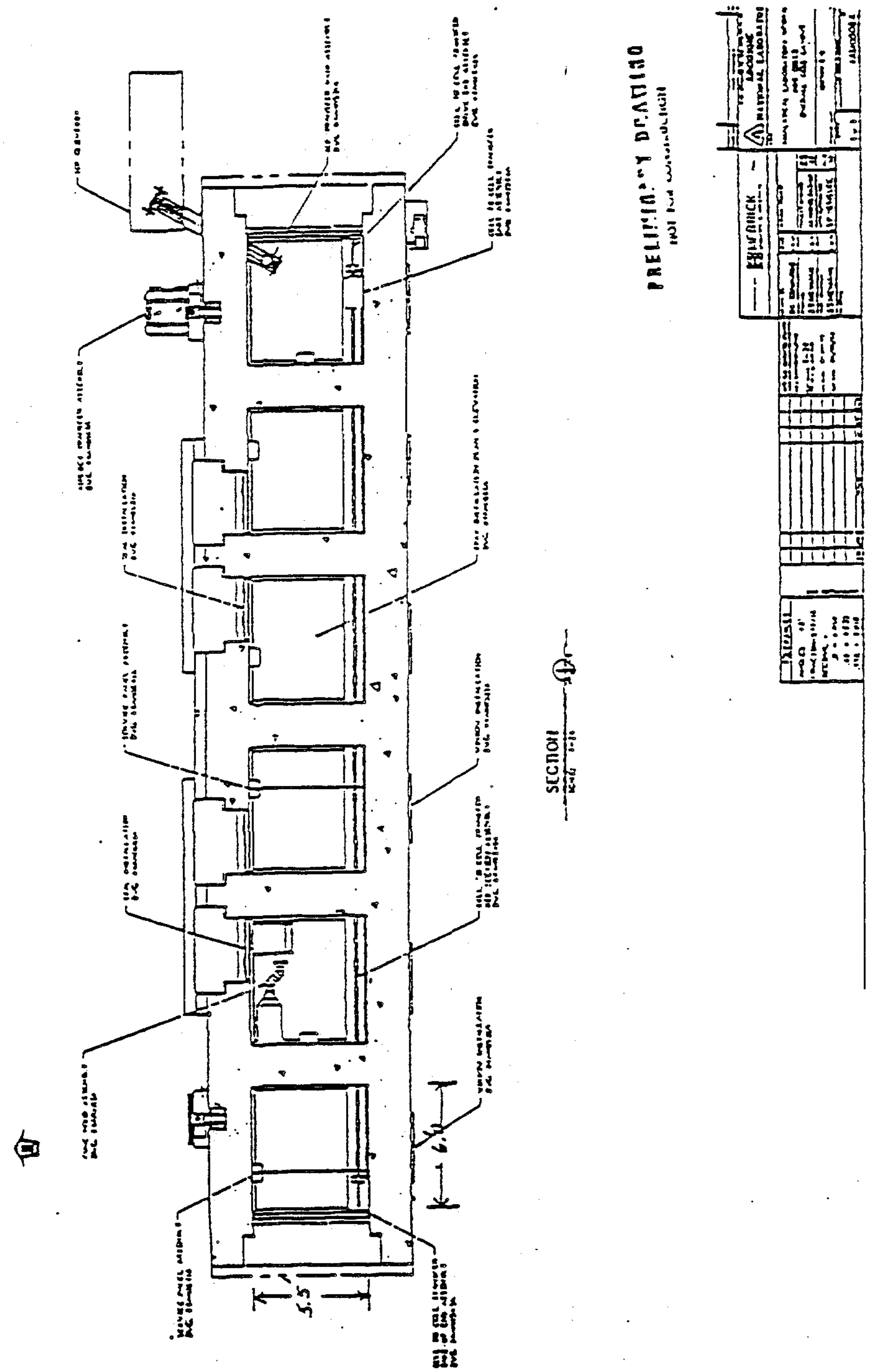


Figure D-22. ANL-W Analytical Laboratory Cell - Elevation View.

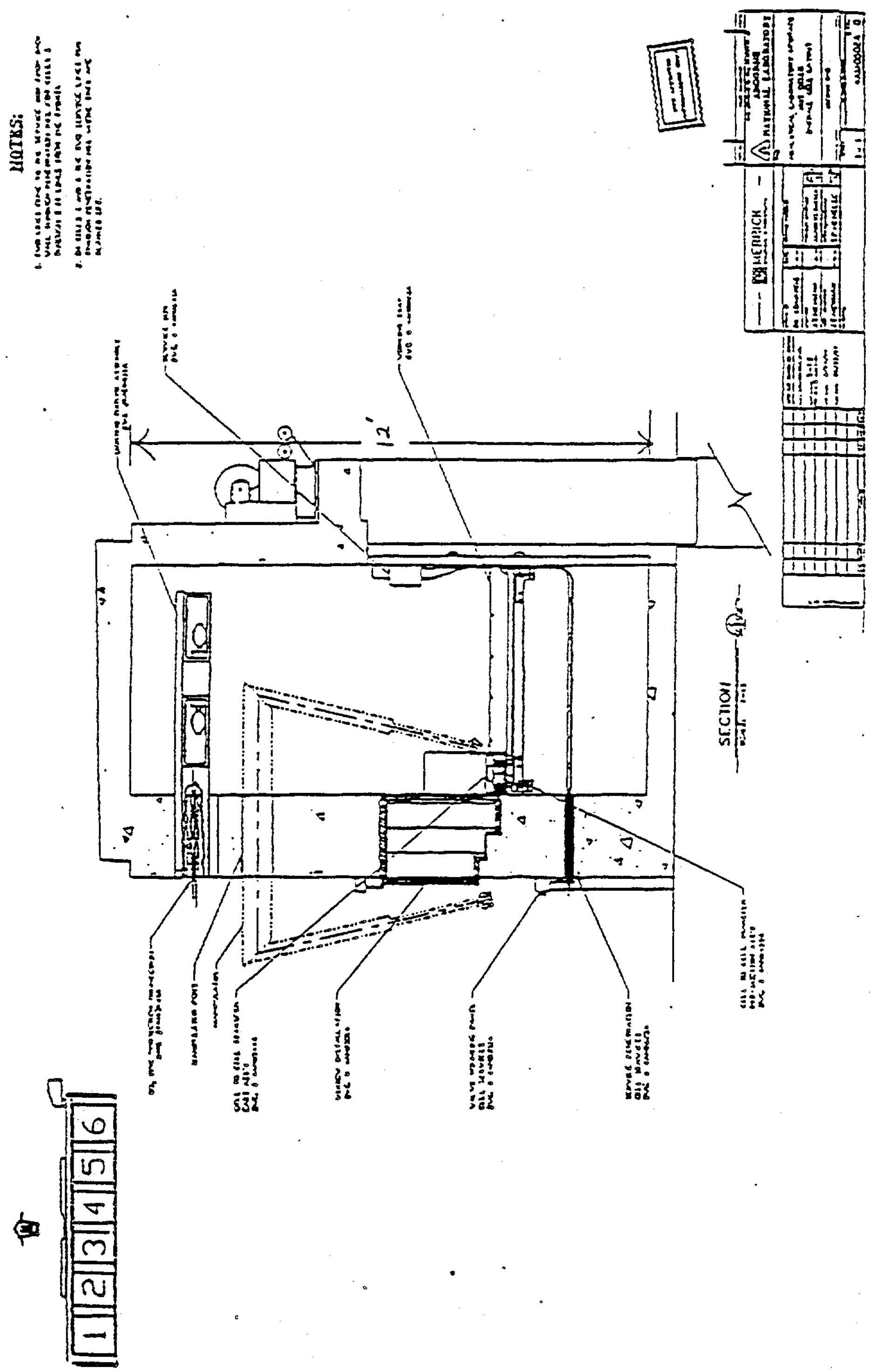


Figure D-23. Hot Fuel Examination Facility Argonne National Laboratory-W.

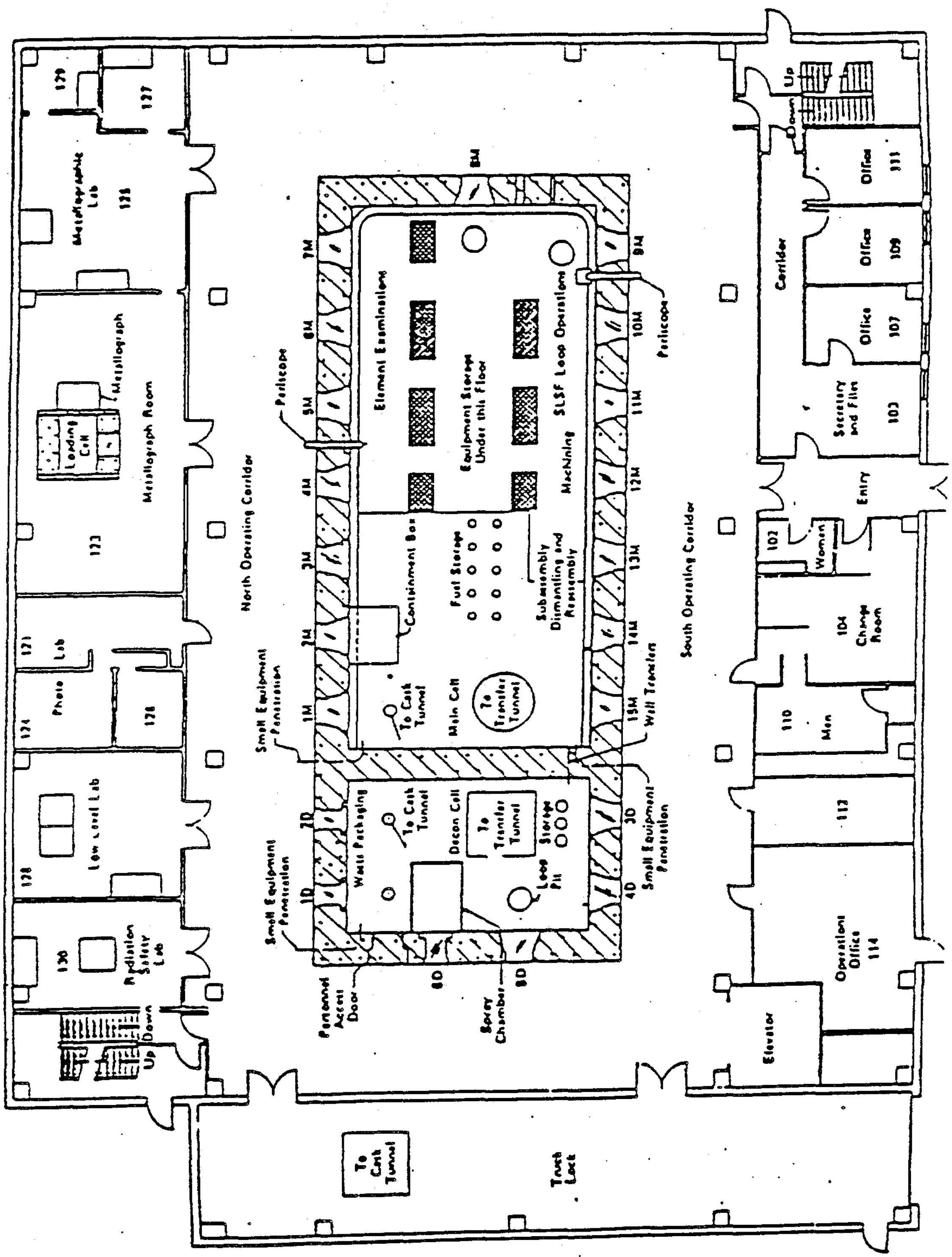
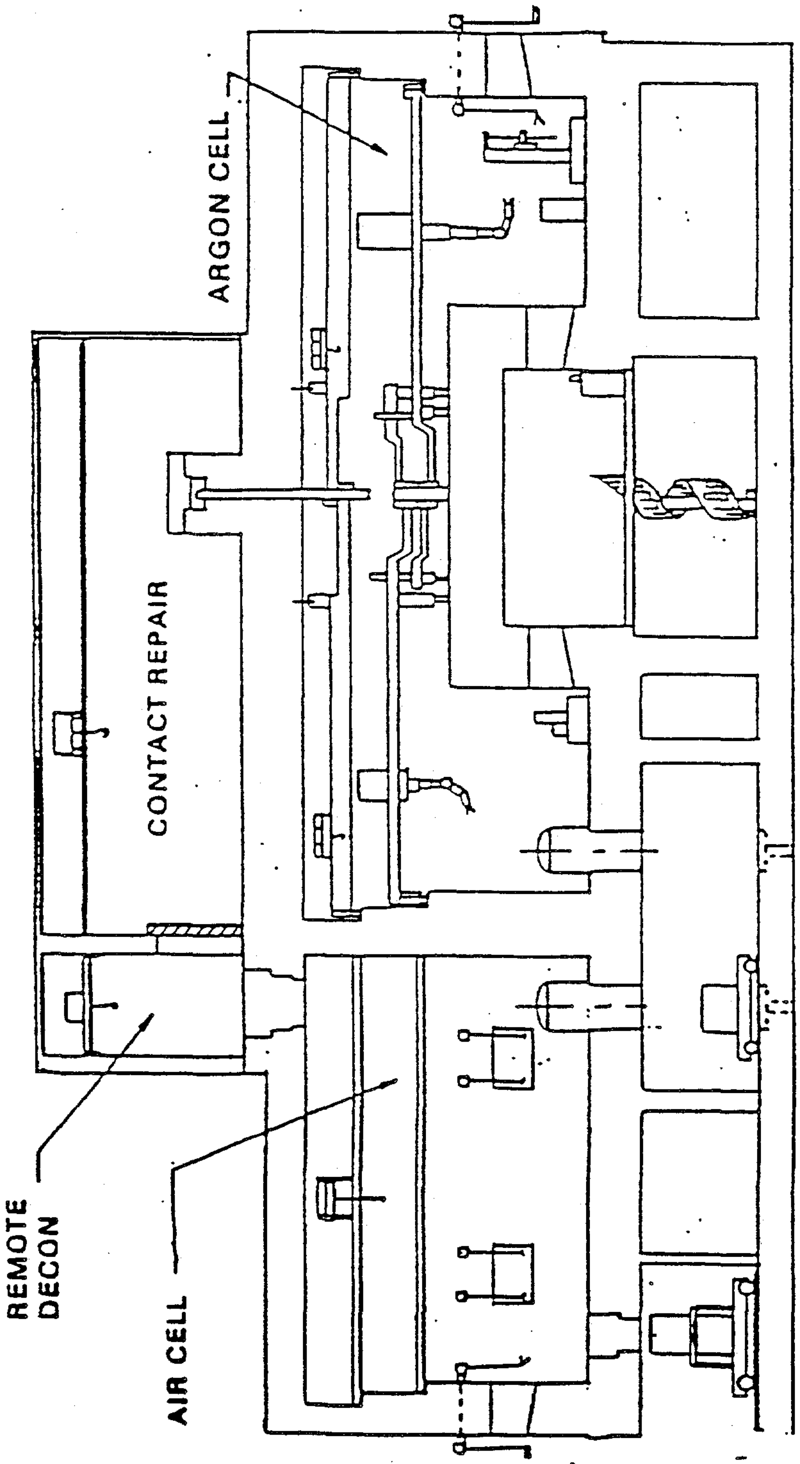


Figure D-24. Fuel Cycle Facility Argonne National Laboratory-W.



Hot Cell/Site Evaluation

Site Idaho Falls - LITCO

Building number:	CPP-G01	CPP-G84	CPP-G66
Number of cells:	3	1	1
Attribute			
Hot cell size	2.5' x 6'	20' x 50'	100' x 20'
Equipment access	2.5' x 3'	4' x 6'	14' x 6'
Service access	Yes	Yes	Yes
Ci loading capability	5' concrete >2,000	3' concrete unknown	>2,000
Cell availability dates: Start End	 1/95 Open	 7/95 Open	 1/95 1/97?
Special analytical equipment in facility*+			
Hot hoods	No	No	No
Onsite waste disposal: Primary Secondary	 Ship to Hanford Yes	 Ship to Hanford Yes	 Ship to Hanford Yes
Estimated cost for cell cleanout and commissioning	Clean	LITCO would pay if any	None expected

NOTE: To convert inches to centimeters, multiply by 2.54.
To convert feet to meters, multiply by 0.3048.

*Special analytical equipment needed with a value of more than $100K and a 4-month procurement time.

+Analytical equipment available - in-cell XAS in CPP-G84 other work done at ANL-W lab.

LITCO = Lockheed Idaho Technology Company
XAS = X-ray absorbtion spectroscopy

Hot Cell/Site Evaluation

Site Oak Ridge National Laboratory

Building number:	4501	2026	3517	3047
Number of cells:	2 (B and D)	6	5	4
Attribute				
Hot cell size	8' x 6' x 20' h	6' x 7' 11' h	2 - 7' x 8' x 11' h 1 - 13' x 8' x 11' h 1 - 9' x 10' x 16' h	2 - 6' x 8' x 13' h 2 - 8' x 8' x 18' h
Equipment access	~ 30" x 30"	~ 7' x 5'	1 - 20' x 8' x 11'+ Full cell ceiling	2 - 6' x 8'+ 2 - 8' x 8'+
Service access	6" ϕ 4/cell	4" ϕ	6" ϕ and 10" ϕ	4" ϕ and 6" ϕ
Ci loading capability	≤20,000	≤20,000	≤40,000	≤20,000
Cell availability dates: Start End	B** 4/95 Open D 6/95 Open	9/96 Open	1/96 12/98	1/95 Open
Special analytical equipment in facility*	Bldg. 4501 anal. equip. (gamma, ICP-AES, ICP-MS, SEM, TEM)	Bldg. 2026 anal. equip. (gamma, Sr and Tc, particle size TOC, ICP-AES, ICP-MS, ion chro.)	None, this building use adjacent labs. Bldg. 2026, 4501	None, this building uses adjacent labs. Bldg. 2026, 4501
Hot hoods	Yes	Yes	No	No
Onsite waste disposal: Primary Secondary	Yes - onsite Yes - onsite	Yes Yes	Yes Yes	Yes Yes
Estimated cost for cell cleanout and commissioning	B $250K D $350K	NA	$5 M	$0

NOTE: To convert inches to centimeters, multiply by 2.54.
To convert feet to meters, multiply by 0.3048.

*Special analytical equipment needed with a value of more than $100K and a 4-month procurement time.
**Could use part of A cell until B cell C/O is completed.
+Ceiling

ICP-AES = Inductively coupled plasma - atomic emission spectrometer
ICP-MS = Inductively coupled plasma - mass spectrometer
SEM = Scanning electron microscope
TEM = Transmission electron microscope
TOC = Total organic carbon

Figure D-25. Building 4501 - First Floor Plan
(Cross-Hatched Areas Radiation Zones).

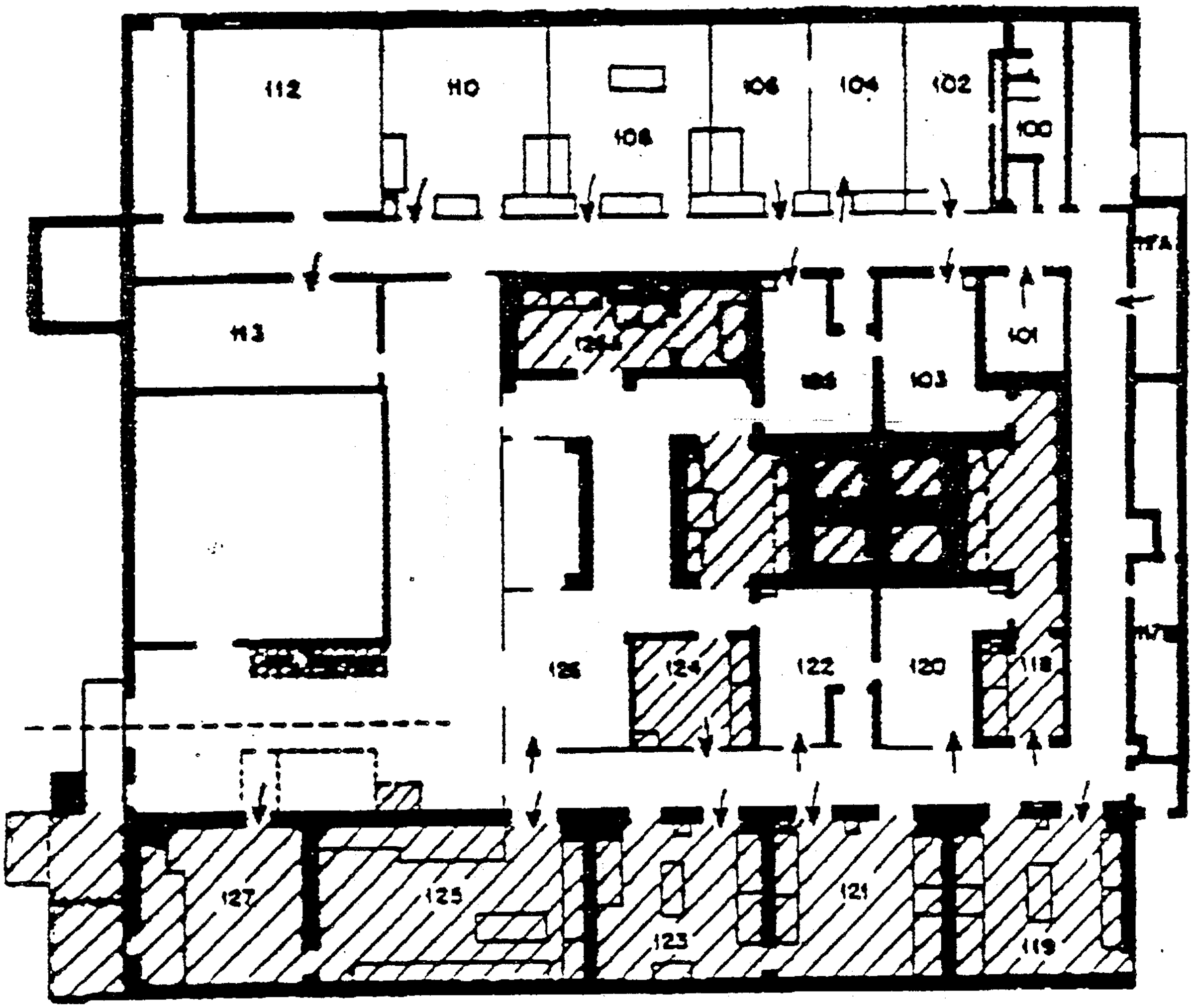


Figure D-26. Building 2026 - Plan of Oak Ridge National Laboratory High-Radiation-Level Analytical Laboratory (First Floor).

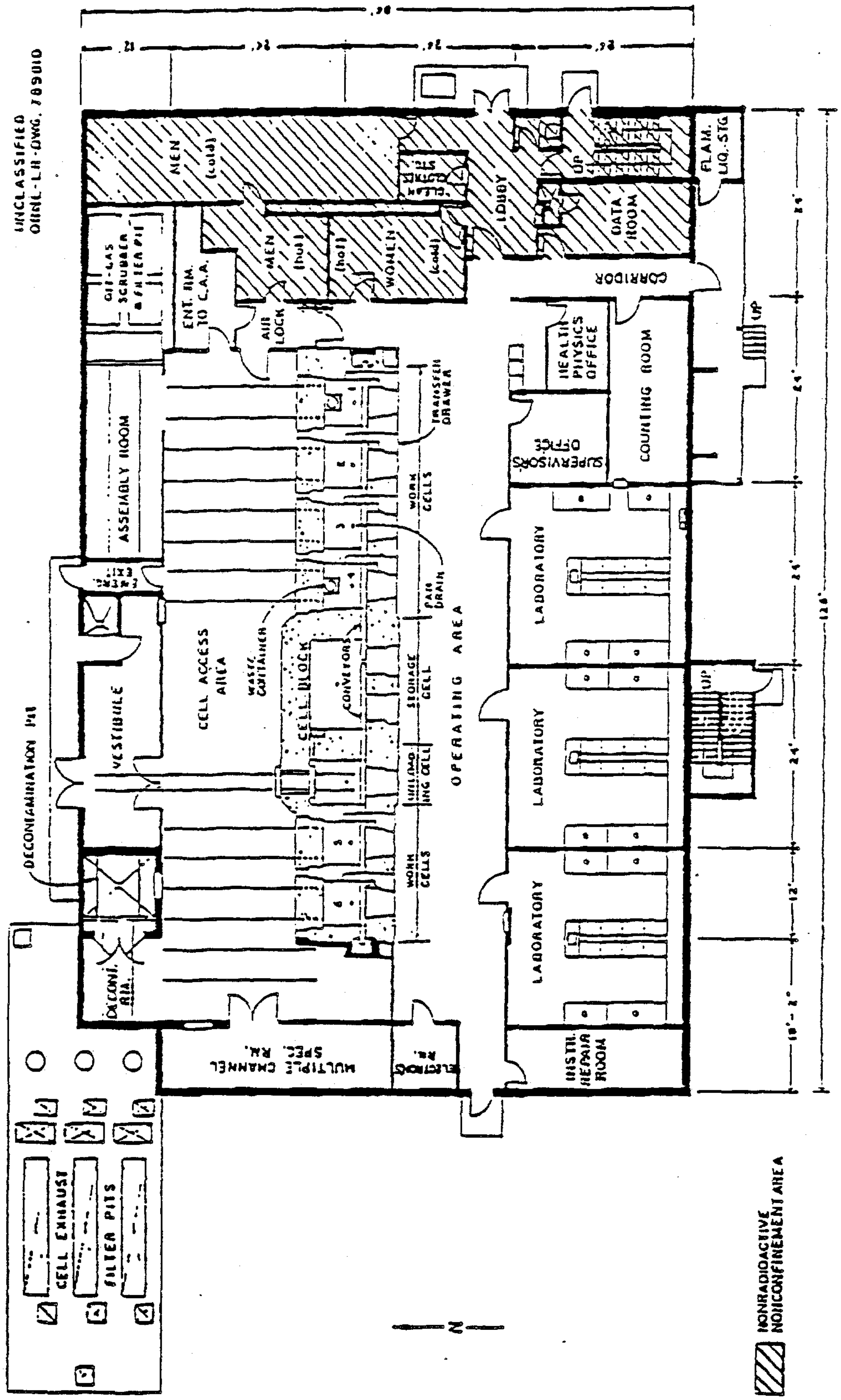


Figure D-27. Building 2026 - Typical Work Cell Cross-Section.

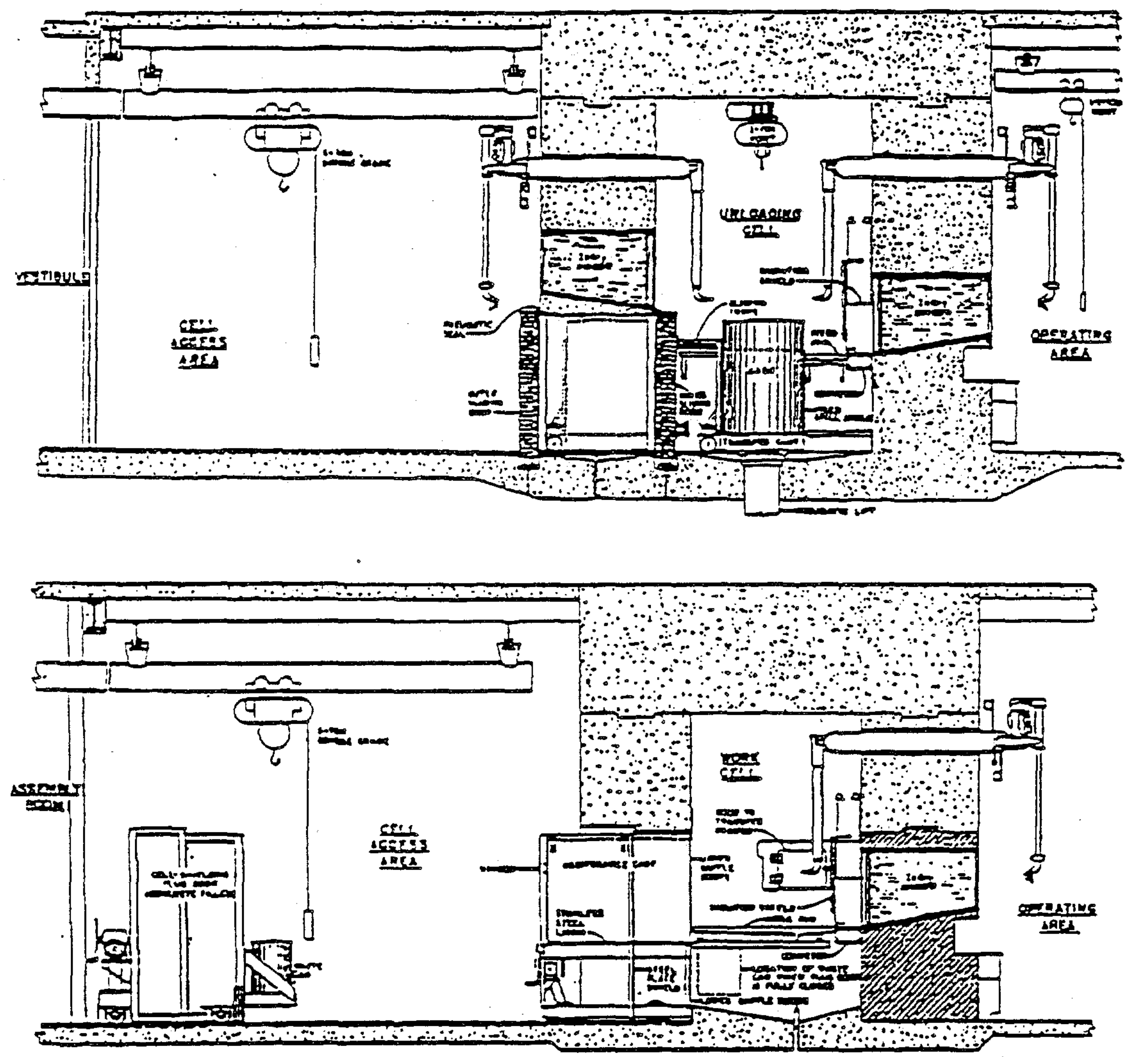


Figure D-28. Building 3517 Arrangement.

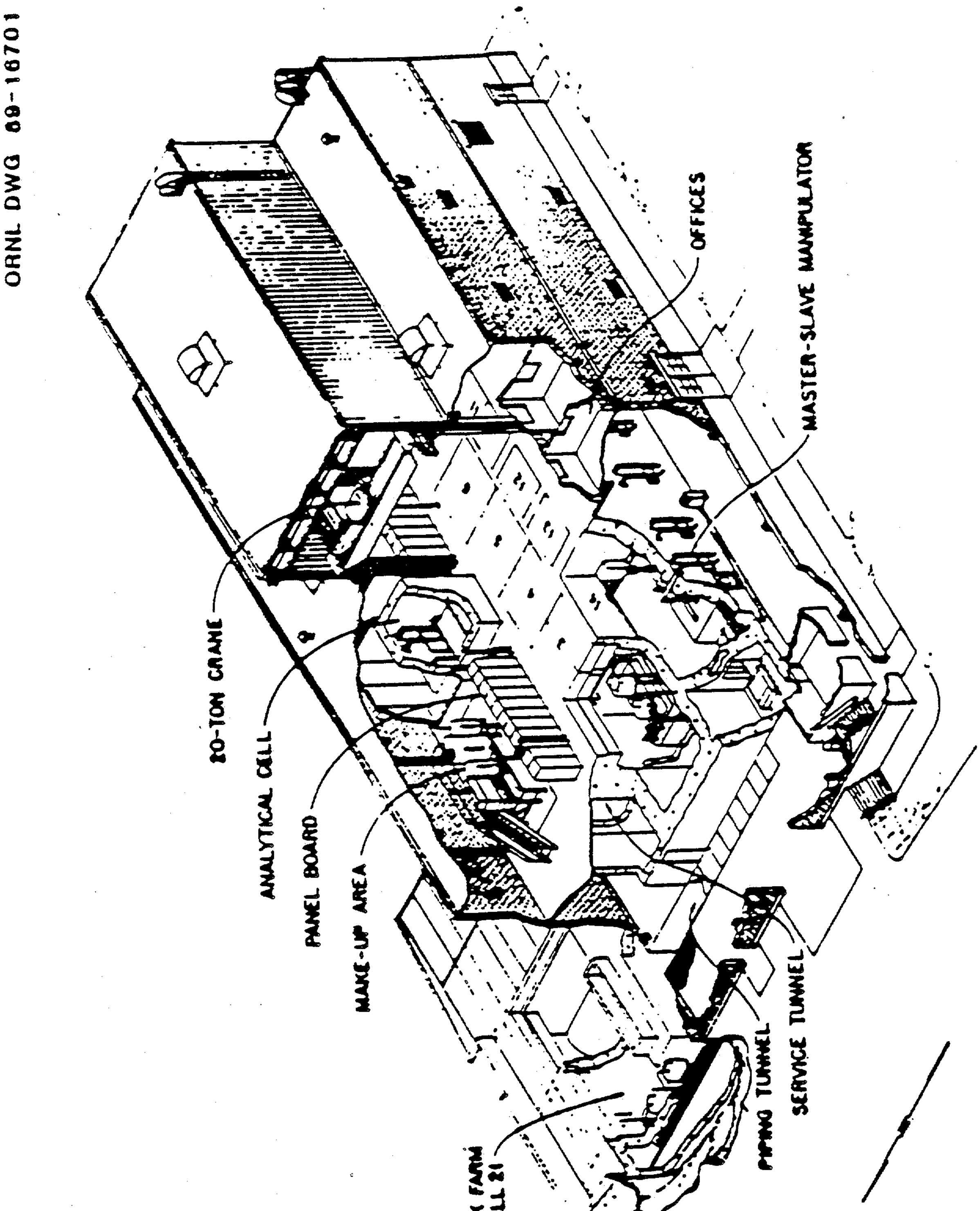


Figure D-29. Building 3517 Floor Plan.

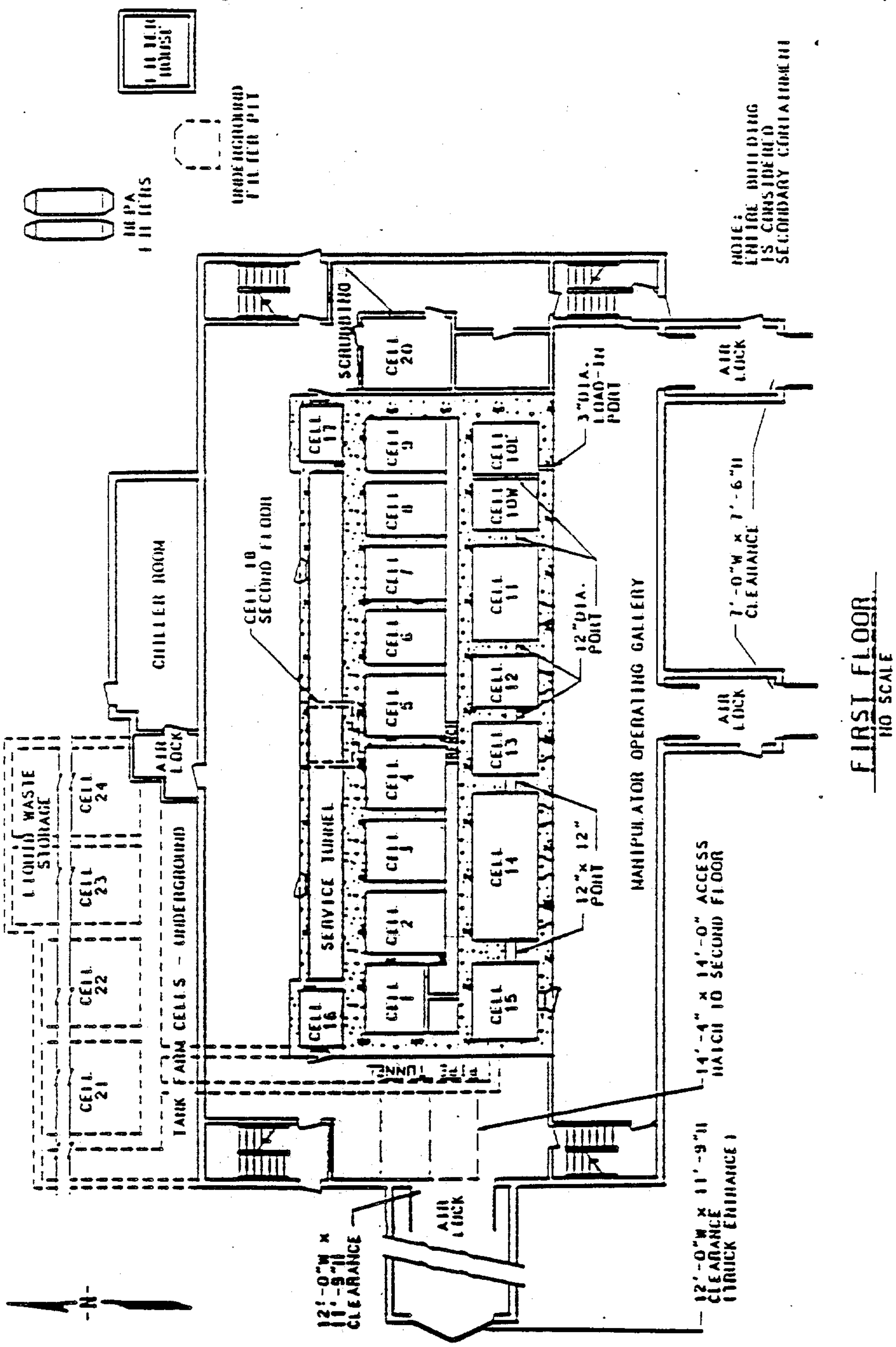


Figure D-30. Building 3047 Arrangement.

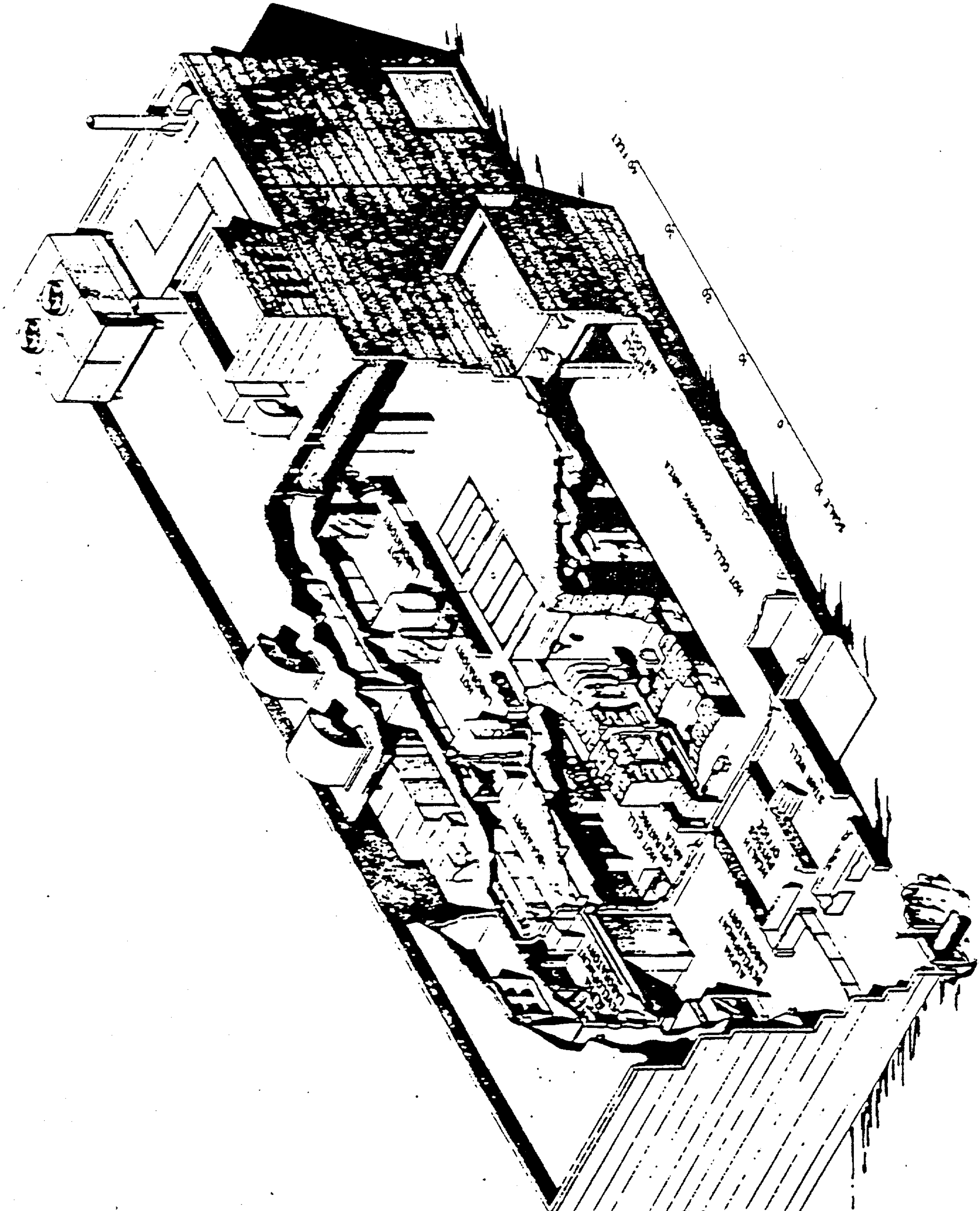
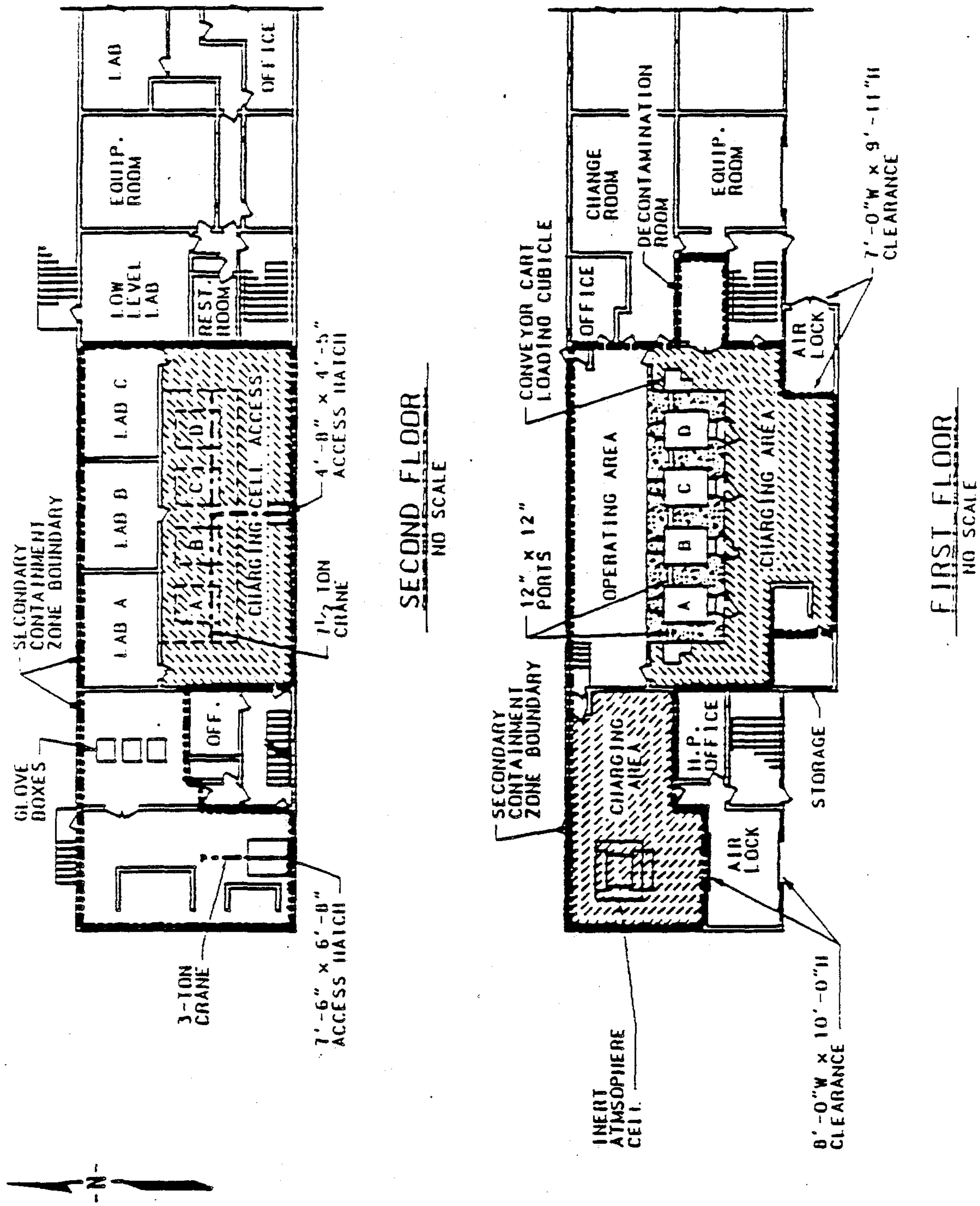


Figure D-31. Building 3047 Floor Plan.



APPENDIX D3

SAMPLE SITE GO-NO-GO ANALYSIS, 222-S LABORATORY

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Table D-3. Preliminary Site Screening Level 2. (3 sheets)

Technology: Settle Decant Group Number: #1

	Waste Volume Constraint	Cell Size	Hot Cell Equip Access	Curie Loading
222-S Building	Y			
Cell IE1		Y	Y	Y
Cell IE2		Y	Y	Y
Cell IF		Y	Y	Y
Cell IA		N	Y	Y
Cell IIA (Pods)		N	Y	Y
WESF	Y			
Cell B		Y	Y	Y
Cell C		Y	Y	Y
Cell D		Y	Y	Y
Cell E		Y	Y	Y
324 Building	Y			
Cell C		Y	Y	Y
Cell D		Y	Y	Y
Cell South		Y	Y	Y
Cell East		Y	Y	Y
325 Building	Y			
Cell A		Y	Y	Y
Cell B		Y	Y	Y
Cell C		Y	Y	Y
Cell SAL		Y	Y	Y

Table D-3. Preliminary Site Screening Level 2. (3 sheets)

Technology: Settle/Decant Group Number: 1

	Waste Volume Constraint	Cell Size	Hot Cell Equip Access	Curie Loading
327 Building	Y			
Cell B				
Cell C		N	Y	Y
Cell D				
Cell E				
Cell G		Y	Y	Y
FMEF	Y			
Cell 132				
Cell 133 S		Y	Y	Y
Cell 134				
Cell 136 [135] D		Y	Y	Y
Cell 137 S		Y	Y	Y
Cell 138 D				
Cell 139 S		Y	Y	Y
Cell 142				
Cell 143 S		Y	Y	Y
Cell 144				
Cell 145		Y	Y	Y
Cell 146		Y	Y	Y
Cell 147		Y	Y	Y
Cell 325		Y	Y	Y
Cell 507		Y	Y	Y

Table D-3. Preliminary Site Screening Level 2. (3 sheets)

Technology: Settle/Decant Group Number: 1

	Waste Volume Constraint	Cell Size	Hot Cell Equip Access	Curie Loading
INEL-LITCO				
CPP 601	Y			
Cell 1		N	Y	Y
Cell 2		N	Y	Y
Cell 3		N	Y	Y
CPP 666	Y			
Cell 1		Y	Y	Y
CPP 684	Y			
Cell 1		Y	Y	Y
Cell 2		Y	Y	Y
Cell 3		Y	Y	Y
ANL-W				
HFEF	Y			
Sta 1		Y	Y	Y
Sta 2		Y	Y	Y
FCF	Y			
Sta 1		Y	Y	Y
Sta 2		Y	Y	Y
Sta 3		Y	Y	Y
Analytical	Y			
Cell 1		Y	Y	Y

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APPENDIX E

SITE SURVEY ANALYSIS DATA

LIST OF FIGURES

LIST OF TABLES

Figure E-1. Site Evaluation Worksheet. (2 sheets)

Site Evaluation Matrix for: Technology__________ Group:__________

Site:__________ Bldg. No.:__________

ID	Specific Objective	Measures	Weight	Scale	Criteria	Comments
	Facilities					
1	Hot Cells	Size	0.0446	100	133% of nominal hot cell size (may be up to 3 adjacent cells that meet or exceed the nominal area (requirement sheet))	
				0	Less than 90% of nominal hot cell size (requirement sheet)	
2		Equipment Access	0.0446	100	150% of nominal equipment access size, cross sectional area of access port (requirement sheet)	
				0	50% of the nominal equipment access size	
3		Services Access	0.0637	100	Hot cell has electrical, air & water installed	
				75	Penetrations available for services installation	
				25	Some penetrations available for utilities but need to do some core drilling	
				0	Hot cell cannot be modified to provide required utilities.	
4		Cell available to meet test schedule	0.127	100	Available 3 months before task start date and 3 months after task need (AE needs data) date	
				75	Available at task start date through task need date	
				25	Available 3 months after task start date through task need date	
				0	Not available during all or portion of the 3 months after the task start date through task need date	
5		Hot Cell Curie Loading Capability	0.0382	100	100% of the identified upper limit	
				0	75% of the identified upper limit	
6	Hot Hood/Glove Box	Size (3'x8'x3')	0.00637	100	Double (3' X 8') or 2 single hoods available	
				50	1 single (3' X 4') hood available	
				0	No hood or glovebox available	
7	Waste Disposal	Waste Disposal	0.0191	100	Retain both primary and secondary waste streams on site	
				50	Retain secondary waste stream on site	
				0	Ship both primary and secondary waste streams back	
8	Analytical	Analytical Equipment Available (Radiochemical)	0.0637	100	Equipment on-site and in same building with no cask transfer required	
				75	Equipment on-site but requires cask transfer	
				0	Equipment available off-site requiring cask transfer	
	Expertise Available					
9		Professional	0.0319	100	Engineer trained on specifics	
				50	Additional staff or training required	
				0	Staff not available	
10		Technician	0.0382	100	Technician trained on specifics	
				50	Additional staff or training required	
				0	Staff not available	
11	ES&H	Safety Documentation	0.102	100	Safety Documentation Current and Bounds Test Operation - No Change Required	
				75	Safety Documentation needs minor revision to cover test operation (<6 months to revise)	
				50	Safety Documentation current but needs updating to cover test operation (6-12 months to revise)	
				25	Safety Documentation needs some change to be current and cover test operation (12 -18 months to revise)	
				0	Safety Documentation needs significant revision to be current (.18 months to revise)	

Figure E-1. Site Evaluation Worksheet. (2 sheets)

Site Evaluation Matrix for: Technology:____________ Group:__________

Site:______________ Bldg. No.:______________

	Permittability					
12		Waste Transportation Logistics	0.0955	100	Within 200 Area of Hanford	
				50	Inter-Area transfer within Hanford	
				0	Off-site	
13		NEPA				
		Existing NEPA Documentation	0.108	100	Existing NEPA documentation covers the proposed action.	
		CX		75	A categorical Exclusion required. Approximately three to four months to prepare.	
		EA		50	An environmental Assessment required. Approximately 12 months to prepare	
		SA		25	A supplemental Analysis to an EIS would be similar to an EA, but would probably take longer to complete.	
		EIS		0	An Environmental Impact Statement required. Approximately 36 months to prepare.	
14		RCRA Permits	0.108	100	RCRA approved in place within 3 months	
				67	RCRA approved in place in 4-9 months	
				33	RCRA approved in place in 10-15 months	
				0	Over 16 months to approve RCRA	
15		Air Permits	0.108	100	Air permits approved within 3 months	
				67	Air permits approved in 4-9 months	
				33	Air permits approved in 10-15 months	
				0	Over 16 months to approve Air Permits	

Table E-1. Sludge Washing, Group 1.

Alternative	1.00 Hot Cell Size	2.00 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Avail-ability	5 Hot Cell Curie Loading	6 Hot Hood Avail-ability	7 Waste Disposal	8 Analytical Equip-ment	9 Profes-sional Expertise	10 Techni-cian Expertise	11 ES&H	12 Transpor-tation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1A)-1	1.33	1.50	75	75	1	100	100	100	50	100	100	100	90	100	100
222-S(1E1)-1	1.33	1.50	75	0	1	100	100	100	50	100	100	100	90	100	100
222-S(1E2)	1.33	1.50	75	0	1	100	100	100	50	100	100	100	75	100	100
222-S(11A)-1	1.33	1.50	75	75	1	100	100	100	50	100	100	100	90	100	100
222-S(1F)-1	1.33	1.50	75	75	1	100	100	100	50	100	100	100	90	100	100
WESF B&C-1	1.33	1.50	75	0	1	0	100	75	50	50	50	100	75	100	67
WESF DE-1	1.33	1.50	75	0	1	0	100	75	50	50	50	100	75	100	67
325 SAL-1	1.33	1.50	100	75	1	100	100	100	100	100	100	50	100	100	100
325A C	1.33	1.50	100	75	1	100	100	100	100	100	100	50	100	100	100
325A B	1.33	1.50	100	100	1	100	100	100	100	100	100	50	100	100	100
325A A	1.33	1.50	100	75	1	100	100	100	100	100	100	50	100	100	100
324 C	1.33	1.50	75	75	1	100	100	75	100	100	100	50	75	67	100
324 D	1.33	1.50	75	75	1	100	100	75	100	100	100	50	75	67	100
324 SMF E	1.33	1.50	100	75	1	100	100	75	100	100	100	50	75	67	100
324 SMF S	1.33	1.50	100	75	1	100	100	75	100	100	100	50	75	67	100
LANLWING9	1.33	1.50	75	75	1	100	50	100	50	50	100	0	100	100	100
ANLE 200 AC	1.33	1.50	75	75	1	100	0	75	50	50	75	0	75	100	67
ANLE 200 KC	1.33	1.50	75	75	1	100	0	75	50	50	75	0	75	100	67
ANLE 200 MC	1.33	1.50	75	0	1	100	0	75	50	50	75	0	75	100	67
ORNL3517 12&13	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 11	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 14	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 15	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 16&17	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3047 A&D	1.33	1.50	75	75	1	0	100	75	100	100	100	0	100	100	100
ORNL3047 B&C	1.33	1.50	75	75	1	0	100	75	100	100	100	0	100	100	100
ORNL4501B&D	1.33	1.50	75	25	1	100	100	100	100	100	100	0	75	100	100
ID CPP-601	1.04	1.50	100	75	1	100	50	100	50	50	75	0	75	67	67
ID CPP-666	1.33	1.50	100	75	1	100	50	100	50	50	75	0	75	67	67
ID CPP-684	1.33	1.50	100	0	1	100	50	100	50	50	75	0	75	67	67
ID HFEF	1.33	1.50	100	75	1	100	50	100	50	50	75	0	100	100	67
ID FCF	1.33	1.50	100	75	1	100	50	100	50	50	75	0	50	67	33
ID ANA LAB	1.33	1.50	100	75	1	100	50	100	50	50	100	0	75	100	100
FMEF Cell 132 + 6 cells	1.33	1.50	75	0	1	0	100	75	50	50	50	50	75	67	67
FMEF Cell 145	1.33	1.50	75	0	1	0	100	75	50	50	50	50	75	67	67
FMEF Cell 146	1.33	1.50	75	0	1	0	100	75	50	50	50	50	75	67	67
FMEF Cell 147	1.33	1.50	75	0	1	0	100	75	50	50	50	50	75	67	67
FMEF Cell 325	1.33	1.50	75	0	1	0	100	75	50	50	50	50	75	67	67
FMEF Cell 507	1.33	1.50	75	0	1	0	100	75	50	50	50	50	75	67	67
FMEF Cell 135 + 4 cells	1.33	1.50	75	0	1	0	100	75	50	50	50	50	100	67	67
327 B/C/D/E	1.33	1.50	75	75	1	100	100	75	100	100	75	50	75	100	100
327 G	1.33	1.50	75	75	1	100	100	75	100	100	75	50	75	67	100

Table E-2. Sludge Washing, Group 3.

Alternative	1.00	2.00	3	4	5	6	7	8	9	10	11	12	13	14	15
	Hot Cell Size	Hot Cell Equip. Access	Hot Cell Services Access	Hot Cell Avail-ability	Hot Cell Curie Loading	Hot Hood Avail-ability	Waste Disposal	Analytical Equip-ment	Profes-sional Expertise	Techni-cian Expertise	ES&H	Transpor-tation Logistics	NEPA	RCRA	AIR
					1										
222-S(1E2)-3	1.33	1.50	75	0	1	100	100	75	50	100	100	100	75	100	100
222-S(1A)-3	1.33	1.50	75	75	1	100	100	75	50	100	100	100	75	100	100
222-S(1E1)-3	1.33	1.50	75	0	1	100	100	75	50	100	100	100	75	100	100
222-S(11A)-3	1.33	1.50	75	75	1	100	100	75	50	100	100	100	75	100	100
222-S(1F)-3	1.33	1.50	75	25	1	100	100	75	50	100	100	100	75	100	100
WESF B&C-3	1.33	1.50	75	0	1	0	100	75	50	50	50	100	75	100	67
WESF DE-3	1.33	1.50	75	0	1	0	100	75	50	50	50	100	75	100	67
325 SAL-3	1.33	1.50	100	75	1	100	100	75	100	100	100	50	100	100	100
325A C	1.33	1.50	100	75	1	100	100	75	100	100	100	50	100	100	100
325A B	1.33	1.50	100	0	1	100	100	75	100	100	100	50	100	100	100
325A A	1.33	1.50	100	75	1	100	100	75	100	100	100	50	100	100	100
324 C	1.33	1.50	100	25	1	100	100	75	100	100	100	50	75	67	100
324 D	1.33	1.50	100	75	1	100	100	75	100	100	100	50	75	67	100
324 SMF E	1.33	1.50	100	75	1	100	100	75	100	100	100	50	75	67	100
324 SMF S	1.33	1.50	100	75	1	100	100	75	100	100	100	50	75	67	100
LANLWING9	1.33	1.50	100	25	1	100	50	100	50	50	100	0	100	100	100
ANLE 200 AC	1.33	1.50	100	25	1	100	0	0	50	50	75	0	75	100	67
ANLE 200 KC	1.33	1.50	100	25	1	100	0	0	50	50	75	0	75	100	67
ANLE 200 MC	1.33	1.50	100	0	1	100	0	0	50	50	75	0	75	100	67
ORNL3517 12&13	1.33	1.50	75	0	1	0	100	0	100	100	75	0	100	100	100
ORNL3517 11	1.33	1.50	75	0	1	0	100	0	100	100	75	0	100	100	100
ORNL3517 14	1.33	1.50	75	0	1	0	100	0	100	100	75	0	100	100	100
ORNL3517 15	1.33	1.50	75	0	1	0	100	0	100	100	75	0	100	100	100
ORNL3517 16&17	1.33	1.50	75	0	1	0	100	0	100	100	75	0	100	100	100
ORNL3047 A&D	1.33	1.50	75	75	1	0	100	0	100	100	100	0	100	100	100
ORNL3047 B&C	1.33	1.50	75	75	1	0	100	0	100	100	100	0	100	100	100
ORNL4501B&D	1.33	1.50	75	25	1	100	100	0	100	100	100	0	75	100	100
ID CPP-601	1.33	1.50	100	75	1	100	50	0	50	50	75	0	75	67	67
ID CPP-666	1.33	1.50	100	75	1	100	50	0	50	50	75	0	75	67	67
ID CPP-684	1.33	1.50	100	0	1	100	50	0	50	50	75	0	75	67	67
LD HFEF	1.33	1.50	100	75	1	100	50	0	50	50	75	0	100	100	67
ID FCF	1.33	1.50	100	75	1	100	50	0	50	50	75	0	50	67	33
ID ANA LAB	1.33	1.50	100	75	1	100	50	0	50	50	100	0	75	100	100
FMEF Cell 132 + 6 cells	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	100	67
FMEF Cell 145	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	100	67
FMEF Cell 146	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	100	67
FMEF Cell 147	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	100	67
FMEF Cell 326	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	100	67
FMEF Cell 507	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	100	67
FMEF Cell 136 + 4 cells	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	100	67
327 B/C/D/E	1.33	1.50	100	75	1	100	100	75	50	100	75	50	75	100	100
327 G	1.33	1.50	100	75	1	100	100	75	50	100	75	50	75	100	100

Table E-3. Sludge Washing, Group 4.

Alternative	1.00 Hot Cell Size	2.00 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Availability	5 Hot Cell Curie Loading	6 Hot Hood Availability	7 Waste Disposal	8 Analytical Equipment	9 Professional Expertise	10 Technician Expertise	11 ES&H	12 Transportation Logistics	13 NEPA	14 RCRA	15 AIR
					1										
222-S(1E2)-4	1.33	1.50	75	0	1	100	100	75	50	100	100	100	90	100	100
222-S(1A)-4	1.33	1.50	75	75	1	100	100	75	50	100	100	100	90	100	100
222-S(1E1)-4	1.33	1.50	75	0	1	100	100	75	50	100	100	100	90	100	100
222-S(11A)-4	1.33	1.50	75	75	1	100	100	75	50	100	100	100	90	100	100
222-S(1F)-4	1.33	1.50	75	75	1	100	100	75	50	100	100	100	90	100	100
WESF B&C-4	1.33	1.50	75	0	1	0	100	75	50	50	50	100	75	100	67
WESF DE-4	1.33	1.50	75	0	1	0	100	75	50	50	50	100	75	100	67
325 SAL	1.33	1.50	100	75	1	100	100	100	100	100	90	50	100	100	100
325A C	1.33	1.50	100	75	1	100	100	100	100	100	90	50	100	100	100
325A B	1.33	1.50	100	0	1	100	100	100	100	100	90	50	100	100	100
325A A	1.33	1.50	75	75	1	100	100	100	100	100	90	50	100	100	100
324 C	1.33	1.50	100	75	1	100	100	75	100	100	95	50	75	67	100
324 D	1.33	1.50	100	75	1	100	100	75	100	100	95	50	75	67	100
324 SMF E	1.33	1.50	100	75	1	100	100	75	100	100	95	50	75	67	100
324 SMF S	1.33	1.50	100	75	1	100	100	75	100	100	95	50	75	67	100
LANLWING9	1.33	1.50	100	75	1	100	50	100	50	50	100	0	100	100	100
ANLE 200 AC	1.33	1.50	100	25	1	100	0	75	50	50	75	0	75	100	67
ANLE 200 KC	1.33	1.50	100	25	1	100	0	75	50	50	75	0	75	100	67
ANLE 200 MC	1.33	1.50	100	0	1	100	0	75	50	50	75	0	75	100	67
ORNL3517 12&13	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 11	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 14	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 15	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 16&17	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3047 A&D	1.33	1.50	75	75	1	0	100	75	100	100	100	0	100	100	100
ORNL3047 B&C	1.33	1.50	75	75	1	0	100	75	100	100	100	0	100	100	100
ORNL4501B&D	1.33	1.50	75	25	1	100	100	75	100	100	75	0	75	100	100
ID CPP-601	0.83	1.50	100	75	1	100	50	75	50	50	75	0	75	67	67
ID CPP-666	1.33	1.50	100	75	1	100	50	75	50	50	75	0	75	67	67
ID CPP-684	1.33	1.50	100	0	1	100	50	75	50	50	75	0	75	67	67
LD HFEF	1.33	1.50	100	75	1	100	50	75	50	50	75	0	100	100	67
ID FCF	1.33	1.50	100	75	1	100	50	75	50	50	75	0	60	67	33
ID ANA LAB	1.33	1.50	100	75	1	100	50	75	50	50	100	0	75	100	100
FMEF Cell 132 + 6 cells	1.33	1.50	75	0	1	0	100	75	50	50	25	50	100	67	67
FMEF Cell 145	1.33	1.50	75	0	1	0	100	75	50	50	25	50	100	67	67
FMEF Cell 146	1.33	1.50	75	0	1	0	100	75	50	50	25	50	100	67	67
FMEF Cell 147	1.33	1.50	75	0	1	0	100	75	50	50	25	50	100	67	67
FMEF Cell 325	1.33	1.50	75	0	1	0	100	75	50	50	25	50	100	67	67
FMEF Cell 507	1.33	1.50	75	0	1	0	100	75	50	50	25	50	100	67	67
FMEF Cell 135 + 4 cells	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	100	67
327 B/C/D/E	1.33	1.50	100	75	1	100	100	75	50	100	90	50	75	67	100
327 G	1.33	1.50	100	75	1	100	100	75	50	100	90	50	75	67	100

Table E-4. Settle/Decant, Group 1.

Alternative	1.00 Hot Cell Size	2.00 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Availability	5 Hot Cell Curie Loading	6 Hot Hood Availability	7 Waste Disposal	8 Analytical Equipment	9 Professional Expertise	10 Technician Expertise	11 ES&H	12 Transportation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1A)-1															
222-S(1E1)-1	1.00	1.50	100	0	1	100	100	100	50	100	100	100	75	100	100
222-S(1E2)	1.11	1.50	100	0	1	100	100	75	50	100	100	100	75	100	100
222-S(11A)-1															
222-S(1F)-1	1.33	1.50	100	0	1	100	100	75	50	100	100	100	75	100	100
WESF B&C-1	1.33	1.50	75	0	1	0	100	75	50	50	25	100	75	100	67
WESF DE-1	1.33	1.50	75	0	1	0	100	75	50	50	25	100	75	100	67
325 SAL-1	0.92	1.35	100	75	1	100	100	100	100	100	100	50	100	100	100
325A C	1.05	1.50	100	75	1	100	100	100	100	100	100	50	100	100	100
325A B	1.05	1.50	100	0	1	100	100	100	100	100	100	50	100	100	100
325A A	1.33	1.50	100	0	1	100	100	100	100	100	100	50	100	100	100
324 C	1.33	1.50	100	25	1	100	100	75	100	100	100	50	75	67	100
324 D	1.33	1.50	100	25	1	100	100	75	100	100	100	50	75	67	100
324 SMF E	1.33	1.50	100	25	1	100	100	75	100	100	100	50	75	67	100
324 SMF S	1.33	1.50	100	25	1	100	100	75	100	100	100	50	75	67	100
LANLWING9	1.00	1.50	100	75	1	100	50	100	50	50	100	0	100	100	100
ANLE 200 AC	1.33	1.50	100	25	1	100	0	0	50	50	50	0	75	67	67
ANLE 200 KC	1.33	1.50	100	25	1	100	0	0	50	50	50	0	75	67	67
ANLE 200 MC	1.33	1.50	100	0	1	100	0	0	50	50	50	0	75	67	67
ORNL3517 12&13	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 11	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 14	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 15	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 16&17	1.33	1.50	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3047 A&D	1.33	1.50	75	0	1	0	100	75	100	100	100	0	100	100	100
ORNL3047 B&C	1.33	1.50	75	0	1	0	100	75	100	100	100	0	100	100	100
ORNL4501B&D	1.33	1.50	75	25	1	50	100	75	100	100	75	0	100	100	100
ID CPP-601															
ID CPP-666	1.33	1.50	100	75	1	100	50	100	50	50	75	0	75	67	67
ID CPP-684	1.33	1.50	100	0	1	100	50	100	50	50	75	0	75	67	67
ID HFEF	1.33	1.50	100	75	1	100	50	100	50	50	75	0	100	100	67
ID FCF	1.33	1.50	100	75	1	100	50	100	50	50	75	0	50	67	33
ID ANA LAB	1.33	1.50	100	25	1	100	50	100	50	50	75	0	75	100	100
FMEF Cell 132 + 6 cells	1.10	1.20	75	0	1	0	100	75	50	50	50	50	75	100	67
FMEF Cell 145	1.33	1.20	75	0	1	0	100	75	50	50	50	50	75	100	67
FMEF Cell 146	1.33	1.20	75	0	1	0	100	75	50	50	50	50	75	100	67
FMEF Cell 147	1.33	1.20	75	0	1	0	100	75	50	50	50	50	75	100	67
FMEF Cell 235	1.33	1.20	75	0	1	0	100	75	50	50	50	50	75	100	67
FMEF Cell 325	1.33	1.20	75	0	1	0	100	75	50	50	50	50	75	100	67
FMEF Cell 507	1.33	1.20	75	0	1	0	100	75	50	50	50	50	75	100	67
FMEF Cell 135 + 4 cells	1.33	1.20	75	0	1	0	100	75	50	50	50	50	75	100	67
327 B/C/D/E															
327 G	1.33	1.50	100	25	1	100	100	75	50	100	75	50	75	67	100

Table E-5. Filtration, Group 1.

Alternative	1 Hot Cell Size	2 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Avail-ability	5 Hot Cell Curie Loading	6 Hot Hood Avail-ability	7 Waste Disposal	8 Analytical Equip-ment	9 Profes-sional Expertise	10 Techni-cian Expertise	11 ES&H	12 Transpor-tation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1A)-1															
222-S(1E1)-1															
222-S(1E2)															
222-S(11A)-1															
222-S(1F)-1	1.33	1.5	100	25	1	100	100	75	50	100	100	100	90	100	100
WESF B&C-1	1.33	1.5	75	0	1	0	100	75	50	50	25	100	75	100	33
WESF DE-1	1.33	1.5	75	0	1	0	100	75	50	50	25	100	75	100	33
325 SAL-1															
325A C	0.94	1.5	100	75	1	100	100	100	100	100	100	50	100	100	100
325A B	0.94	1.5	100	25	1	100	100	100	100	100	100	50	100	100	100
325A A	1.33	1.5	100	25	1	100	100	100	100	100	100	50	100	100	100
324 C	1.33	1.5	100	75	1	100	100	75	100	100	100	50	75	67	100
324 D	1.33	1.5	100	75	1	100	100	75	100	100	100	50	75	67	100
324 SMF E	1.33	1.5	100	75	1	100	100	75	100	100	100	50	75	67	100
324 SMF S	1.33	1.5	100	75	1	100	100	75	100	100	100	50	75	67	100
LANLWING9															
ANLE 200 AC															
ANLE 200 KC															
ANLE 200 MC															
ORNL3517 12&13															
ORNL3517 11															
ORNL3517 14															
ORNL3517 15															
ORNL3517 16&17															
ORNL3047 A&D															
ORNL3047 B&C															
ORNL4501B&D															
ID CPP-601															
ID CPP-666															
ID CPP-684															
ID HFEF															
ID FCF															
ID ANA LAB															
FMEF Cell 132 + 6 cells															
FMEF Cell 145															
FMEF Cell 146															
FMEF Cell 147	1.33	1.5	75	0	1	0	100	75	50	50	50	50	75	100	33
FMEF Cell 326	1.33	1.5	75	0	1	0	100	75	50	50	50	50	75	100	33
FMEF Cell 507	1.33	1.5	75	0	1	0	100	75	50	50	50	50	75	100	33
FMEF Cell 135 + 4 cells															
327 B/C/D/E															
327 G	1.33	1.31	100	75	1	100	100	75	50	100	90	50	75	67	100

*Basis is that Waste Volume cannot be delivered until 7/96; therefore, all cells would be available and scored at 100.

Table E-6. Filtration, Group 2.

Alternative	1 Hot Cell Size	2 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Avail-ability	5 Hot Cell Curie Loading	6 Hot Hood Avail-ability	7 Waste Disposal	8 Analytical Equip-ment	9 Profes-sional Expertise	10 Techni-cian Expertise	11 ES&H	12 Transpor-tation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1E2)-2															
222-S(1A)-2															
222-S(1E1)-2															
222-S(11A)-2															
222-S(1F)-2															
WESF B&C-2	1	1.5	75	100	1	0	100	75	50	50	25	100	75	100	33
WESF DE-2	1.33	1.5	75	100	1	0	100	75	50	50	25	100	75	100	33
325 SAL															
325A C															
325A B															
325A A	1.33	1.17	100	100	1	100	100	100	100	100	100	50	100	100	100
324 C	1.33	1.33	75	100	1	100	100	100	100	100	100	50	75	67	100
324 D	1.33	1.33	100	100	1	100	100	100	100	100	100	50	75	67	100
324 SMF E	1.33	0.97	100	100	1	100	100	100	100	100	75	50	75	67	100
324 SMF S	1.33	0.97	100	100	1	100	100	100	100	100	75	50	75	67	100
LANLWING9															
ANLE 200 AC															
ANLE 200 KC															
ANLE 200 MC															
ORNL3517 12&13															
ORNL3517 11															
ORNL3517 14															
ORNL3517 15															
ORNL3517 16&17															
ORNL3047 A&D															
ORNL3047 B&C															
ORNL4501B&D															
ID CPP-601															
ID CPP-666															
ID CPP-684															
LD HFEF															
ID FCF															
ID ANA LAB															
FMEF Cell 132 + 6 cells															
FMEF Cell 145															
FMEF Cell 146															
FMEF Cell 147	1.33	0.82	75	25	1	0	100	75	50	50	50	50	75	100	33
FMEF Cell 507	1.33	1.25	75	0	1	0	100	75	50	50	50	50	75	100	33
FMEF Cell 135 + 4 cells															
327 B/C/D/E															
327 G															

*Basis is that Waste Volume cannot be delivered until 7/96; therefore, all cells would be available and scored at 100

Table E-7. Filtration, Group 3.

Alternative	1 Hot Cell Size	2 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Avail-ability	5 Hot Cell Curie Loading	6 Hot Hood Avail-ability	7 Waste Disposal	8 Analytical Equip-ment	9 Profes-sional Expertise	10 Techni-cian Expertise	11 ES&H	12 Transpor-tation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1E2)-3															
222-S(1A)-3															
222-S(1E1)-3															
222-S(11A)-3															
222-S(1F)-3	1.12	1.5	100	100	1	100	100	100	50	100	100	100	75	100	100
WESF B&C-3 (Combined)	0.8	1.5	75	*100	1	0	100	75	50	50	25	100	75	100	33
WESF DE-3	1.33	1.5	75	*100	1	0	100	75	50	50	25	100	75	100	33
325 SAL-3															
325A C															
325A B															
325A A	1.22	1.5	100	*100	1	100	100	100	100	100	100	50	100	100	100
324 C	1.33	1.5	100	100	1	100	100	75	100	100	100	50	75	67	100
324 D	1.33	1.5	100	100	1	100	100	75	100	100	100	50	75	67	100
324 SMF E	1.33	1.5	100	100	1	100	100	75	100	100	75	50	75	67	100
324 SMF S	1.33	1.5	100	100	1	100	100	75	100	100	75	50	75	67	100
LANLWING9															
ANLE 200 AC															
ANLE 200 KC															
ANLE 200 MC															
ORNL3517 12&13															
ORNL3517 11															
ORNL3517 14															
ORNL3517 15															
ORNL3517 16&17															
ORNL3047 A&D															
ORNL3047 B&C															
ORNL4501B&D															
ID CPP-601															
ID CPP-666															
ID CPP-684															
LD HFEF															
ID FCF															
ID ANA LAB															
FMEF Cell 132 + 6 cells															
FMEF Cell 145															
FMEF Cell 146															
FMEF Cell 147	1.33	1.5	75	25	1	0	100	75	50	50	50	50	75	100	33
FMEF Cell 325	1.33	1.5	75	0	1	0	100	75	50	50	50	50	75	100	33
FMEF Cell 507	1.33	1.5	75	0	1	0	100	75	50	50	50	50	75	100	33
FMEF Cell 135 + 4 cells															
327 B/C/D/E															
327 G															

*Basis is that Waste Volume cannot be delivered until 7/96; therefore, all cells would be available and scored at 100.

Table E-8. Centrifugation, Group 1.

Alternative	1.00 Hot Cell Size	2.00 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Availability	5 Hot Cell Curie Loading	6 Hot Hood Avail.	7 Waste Disposal	8 Analytical Equip.	9 Professional Expertise	10 Technician Expertise	11 ES&H	12 Transportation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1A)-1															
222-S(1E1)-1															
222-S(1E2)															
222-S(11A)-1															
222-S(1F)-1	0.90	1.50	75	100	1	100	100	100	50	100	100	100	75	100	100
WESF B&C-1(Combined)	1.28	1.50	75	100*	1	0	100	75	50	50	50	100	75	67	33
WESF DE-1	1.33	1.50	75	100*	1	0	100	75	50	50	50	100	75	67	33
325 SAL-1															
325A C															
325A B															
325A A	0.97	1.50	100	100	1	100	100	100	100	100	100	50	100	100	100
324 C	1.33	1.50	100	100	1	100	100	75	100	100	100	50	75	67	100
324 D	1.33	1.50	100	100	1	100	100	75	100	100	100	50	75	67	100
324 SMF E	1.33	1.50	100	100	1	100	100	75	100	100	75	50	75	67	100
324 SMF S	1.33	1.50	100	100	1	100	100	75	100	100	75	50	75	67	100
LANLWING9															
ANLE 200 AC															
ANLE 200 KC															
ANLE 200 MC															
ORNL3517 12&13															
ORNL3517 11															
ORNL3517 14															
ORNL3517 15															
ORNL3517 16&17															
ORNL3047 A&D															
ORNL3047 B&C															
ORNL4501B&D															
ID CPP-601															
ID CPP-666															
ID CPP-684															
ID HFEF															
ID FCF															
ID ANA LAB															
FMEF Cell 132 + 6 cells															
FMEF Cell 145															
FMEF Cell 146															
FMEF Cell 147	1.33	1.50	75	25	1	0	100	75	50	50	50	50	75	67	33
FMEF Cell 325	1.33	1.50	75	0	1	0	100	75	50	50	50	50	75	67	33
FMEF Cell 507	1.33	1.50	75	0	1	0	100	75	50	50	50	50	75	67	33
FMEF Cell 135 + 4 cells															
327 B/C/D/E															
327 G															

*Basis is that Waste Volume cannot be delivered until 7/96; therefore, all cells would be available and scored at 100.

Table E-9. Organic Destruction, Group 1.

Alternative	1 Hot Cell Size	2 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Avail-ability	5 Hot Cell Curie Loading	6 Hot Hood Avail-ability	7 Waste Disposal	8 Analytical Equip-ment	9 Profes-sional Expertise	10 Techni-cian Expertise	11 ES&H	12 Transpor-tation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1A)-1	1.33	1.5	100	25	1	100	100	100	50	100	100	100	75	100	100
222-S(1E1)-1	1.33	1.5	100	0	1	100	100	100	50	100	100	100	75	100	100
222-S(1E2)	1.33	1.5	100	0	1	100	100	100	50	100	100	100	75	100	100
222-S(11A)-1	1.33	1.5	100	25	1	100	100	100	50	100	100	100	75	100	100
222-S(1F)-1	1.33	1.5	100	25	1	100	100	100	50	100	100	100	75	100	100
WESF B&C-1	1.33	1.5	75	0	1	0	100	75	50	50	0	100	75	100	33
WESF DE-1	1.33	1.5	75	0	1	0	100	75	50	50	0	100	75	100	33
325 SAL-1	1.33	1.5	100	25	1	100	100	100	100	100	100	50	100	100	100
325A C	1.33	1.5	100	25	1	100	100	100	100	100	100	50	100	100	100
325A B	1.33	1.5	100	0	1	100	100	100	100	100	100	50	100	100	100
325A A	1.33	1.5	100	25	1	100	100	100	100	100	100	50	100	100	100
324 C	1.33	1.5	100	25	1	100	100	100	100	100	100	50	75	67	100
324 D	1.33	1.5	100	25	1	100	100	100	100	100	100	50	75	67	100
324 SMF E	1.33	1.5	100	25	1	100	100	100	100	100	100	50	75	67	100
324 SMF S	1.33	1.5	100	25	1	100	100	100	100	100	100	50	75	67	100
LANLWING9	1.33	1.5	100	75	1	100	50	100	50	50	100	0	100	100	100
ANLE 200 AC	1.33	1.5	100	25	1	100	0	100	50	50	50	0	75	67	67
ANLE 200 KC	1.33	1.5	100	25	1	100	0	100	50	50	50	0	75	67	67
ANLE 200 MC	1.33	1.5	100	0	1	100	0	100	50	50	50	0	75	67	67
ORNL3517 12&13	1.33	1.5	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 11	1.33	1.5	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 14	1.33	1.5	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 15	1.33	1.5	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3517 16&17	1.33	1.5	75	0	1	0	100	75	100	100	75	0	100	100	100
ORNL3047 A&D	1.33	1.5	75	75	1	0	100	75	100	100	100	0	100	100	100
ORNL3047 B&C	1.33	1.5	75	75	1	0	100	75	100	100	100	0	100	100	100
ORNL4501B&D	1.33	1.5	75	75	1	0	100	75	100	100	100	0	100	100	100
ID CPP-601	1.04	1.5	100	75	1	0	50	100	50	50	75	0	75	67	67
ID CPP-666	1.33	1.5	100	75	1	100	50	100	50	50	75	0	75	67	67
ID CPP-684	1.33	1.5	100	75	1	100	50	100	50	50	75	0	75	67	67
ID HFEF	1.33	1.5	100	75	1	100	50	100	50	50	75	0	100	100	67
ID FCF	1.33	1.5	100	75	1	100	50	100	50	50	75	0	50	67	33
ID ANA LAB	1.33	1.5	100	25	1	100	50	100	50	50	75	0	75	100	100
FMEF Cell 132 + 6 cells	1.33	1.5	75	0	1	0	100	75	50	50	25	50	75	67	67
FMEF Cell 145	1.33	1.5	75	0	1	0	100	75	50	50	25	50	75	67	67
FMEF Cell 146	1.33	1.5	75	0	1	0	100	75	50	50	25	50	75	67	67
FMEF Cell 147	1.33	1.5	75	0	1	0	100	75	50	50	25	50	75	67	67
FMEF Cell 325	1.33	1.5	75	0	1	0	100	75	50	50	25	50	75	67	67
FMEF Cell 507	1.33	1.5	75	0	1	0	100	75	50	50	25	50	75	67	67
FMEF Cell 136 + 4 cells	1.33	1.5	75	0	1	0	100	75	50	50	25	50	75	67	67
327 B/C/D/E	1.33	1.5	100	25	1	100	100	75	50	100	75	50	75	67	100
327 G	1.33	1.5	100	25	1	100	100	75	50	100	75	50	75	67	100

Table E-10. Ion Exchange, Case 1, Group 1.

Alternative	1.00 Hot Cell Size	2.00 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Avail-ability	5 Hot Cell Curie Loading	6 Hot Hood Avail-ability	7 Waste Disposal	8 Analytical Equip-ment	9 Profes-sional Expertise	10 Techni-cian Expertise	11 ES&H	12 Transpor-tation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1A)-1	1.00	0.56	100	100	1	100	100	75	50	100	100	100	75	100	100
222-S(1E1)-1	1.33	0.78	100	100*	1	100	100	75	50	100	100	100	75	100	100
222-S(1E2)															
222-S(11A)-1	1.20	0.56	100	100	1	100	100	75	50	100	100	100	75	100	100
222-S(1F)-1	1.33	1.50	100	75	1	100	100	75	50	100	100	100	75	100	100
WESF B&C-1	1.33	1.50	75	100*	1	0	100	75	50	50	25	100	75	67	67
WESF DE-1	1.33	1.50	75	100*	1	0	100	75	50	50	25	100	75	67	67
325 SAL-1															
325A C	1.33	1.50	100	100	1	100	100	100	100	100	100	50	100	100	100
325A B	1.33	1.50	100	100*	1	100	100	100	100	100	100	50	100	100	100
325A A	1.33	1.50	100	100*	1	100	100	100	100	100	100	50	100	100	100
324 C	1.33	1.50	100	100	1	100	100	75	100	100	100	50	75	67	100
324 D	1.33	1.50	100	100	1	100	100	75	100	100	100	50	75	67	100
324 SMF E	1.33	1.50	100	100	1	100	100	75	100	100	75	50	75	67	100
324 SMF S	1.33	1.50	100	100	1	100	100	75	100	100	75	50	75	67	100
LANLWING9															
ANLE 200 AC															
ANLE 200 KC															
ANLE 200 MC															
ORNL3517 12&13															
ORNL3517 11															
ORNL3517 14															
ORNL3517 15															
ORNL3517 16&17															
ORNL3047 A&D															
ORNL3047 B&C															
ORNL4501B&D															
ID CPP-601															
ID CPP-666															
ID CPP-684															
ID HFEF															
ID FCF															
ID ANA LAB															
FMEF Cell 132 + 6 cells															
FMEF Cell 145															
FMEF Cell 146															
FMEF Cell 147	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	67	67
FMEF Cell 325	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	67	67
FMEF Cell 507	1.33	1.50	75	0	1	0	100	75	50	50	25	50	75	67	67
FMEF Cell 135 + 4 cells															
327 B/C/D/E	1.03	1.50	100	100	1	100	100	75	50	100	75	50	75	67	100
327 G	1.33	1.31	100	100	1	100	100	75	50	100	75	50	75	67	100

*Basis is that Waste Volume cannot be delivered until 7/98; therefore, all cells would be available and scored at 100.

Table E-11. Ion Exchange, Case 1, Group 2.

Alternative	1 Hot Cell Size	2 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Avail-ability	5 Hot Cell Curie Loading	6 Hot Hood Avail-ability	7 Waste Disposal	8 Analytical Equip-ment	9 Profes-sional Expertise	10 Techni-cian Expertise	11 ES&H	12 Transpor-tation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1E2)-2															
222-S(1A)-2															
222-S(1E1)-2	0.92	0.78	100	100*	1	100	100	100	50	100	100	100	75	100	100
222-S(11A)-2															
222-S(1F)-2	1.33	1.5	100	100*	1	100	100	100	50	100	100	100	75	100	100
WESF B+C-2	1.33	1.5	75	100	1	0	100	75	50	50	25	100	75	67	67
WESF D+E-2	1.33	1.5	75	100	1	0	100	75	50	50	25	100	75	67	67
325 SAL-2															
325A C	0.97	1.5	100	100	1	100	100	100	100	100	100	50	100	100	100
325A B	0.97	1.5	100	100*	1	100	100	100	100	100	100	50	100	100	100
325A A	1.33	1.5	100	100*	1	100	100	100	100	100	100	50	100	100	100
324 C	1.33	1.5	100	100	1	100	100	100	100	100	100	50	75	67	100
324 D	1.33	1.5	100	100	1	100	100	100	100	100	100	50	75	67	100
324 SMF E	1.33	1.5	100	100	1	100	100	100	100	100	100	50	75	67	100
324 SMF S	1.33	1.5	100	100	1	100	100	100	100	100	100	50	75	67	100
LANLWING9															
ANLE 200 AC															
ANLE 200 KC															
ANLE 200 MC															
ORNL3517 12&13															
ORNL3517 11															
ORNL3517 14															
ORNL3517 15															
ORNL3517 16&17															
ORNL3047 A&D															
ORNL3047 B&C															
ORNL4501B&D															
ID CPP-601															
ID CPP-666															
ID CPP-684															
LD HFEF															
ID FCF															
ID ANA LAB															
FMEF Cell 132 + 6 cells															
FMEF Cell 145															
FMEF Cell 146															
FMEF Cell 147	1.33	1.5	75	0	1	0	100	75	50	50	50	50	75	67	67
FMEF Cell 325	1.33	1.5	75	0	1	0	100	75	50	50	50	50	75	67	67
FMEF Cell 507	1.33	1.5	75	0	1	0	100	75	50	50	50	50	75	67	67
FMEF Cell 135 + 4 cells															
327 B/C/D/E															
327 G	1.33	1.31	100	100	1	100	100	75	50	100	75	50	75	67	100

*Basis is that Waste Volume cannot be delivered until 7/96; therefore, all cells would be available and scored at 100.

Table E-12. Ion Exchange, Case 2, Group 1.

Alternative	1 Hot Cell Size	2 Hot Cell Equip. Access	3 Hot Cell Services Access	4 Hot Cell Avail-ability	5 Hot Cell Curie Loading	6 Hot Hood Avail-ability	7 Waste Disposal	8 Analytical Equip-ment	9 Profes-sional Expertise	10 Techni-cian Expertise	11 ES&H	12 Transpor-tation Logistics	13 NEPA	14 RCRA	15 AIR
222-S(1A)-1															
222-S(1E1)-1															
222-S(1E2)															
222-S(11A)-1															
222-S(1F)-1															
WESF D-E+C	1.33	1.5	75	100	1	0	100	75	50	50	25	100	75	33	67
325 SAL-1															
325 A & B & C	1.33	1.5	100	100	1	100	100	75	100	100	100	50	100	67	100
324 C	1.33	1.5	100	100	1	100	100	75	100	100	100	50	75	67	100
324 D	1.33	1.5	100	100	1	100	100	75	100	100	100	50	75	67	100
324 SMF E	1.33	1.5	100	100	1	100	100	75	100	100	75	50	75	67	100
324 SMF S	1.33	1.5	100	100*	1	100	100	75	100	100	75	50	75	67	100
LANLWING9															
ANLE 200 AC															
ANLE 200 KC															
ANLE 200 MC															
ORNL3517 12&13															
ORNL3517 11															
ORNL3517 14															
ORNL3517 15															
ORNL3517 16&17															
ORNL3047 A&D															
ORNL3047 B&C															
ORNL4501B&D															
ID CPP-601															
ID CPP-666															
ID CPP-684															
ID HFEF															
ID FCF															
ID ANA LAB															
FMEF Cell 132 + 8 cells															
FMEF Cell 145															
FMEF Cell 146															
FMEF Cell 147	1.33	1.5	75	75	1	0	100	75	50	50	25	50	75	33	67
FMEF Cell 325	1.33	1.5	75	75	1	0	100	75	50	50	25	50	75	33	67
FMEF Cell 507	1.33	1.5	75	75	1	0	100	75	50	50	25	50	75	33	67
FMEF Cell 135 + 4 cells															
327 B/C/D/E															
327 G															

APPENDIX F

DECISION ANALYSIS METHODOLOGY AND SAMPLES

CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDIX F

DECISION ANALYSIS METHODOLOGY AND SAMPLES

F1.0 SITING EVALUATION AND RATING PROCESS

This section describes the methodology for rating the alternative facilities based on "hot test" requirements. Facility rankings were developed for each testing issue group. The following discusses the methodology and provides an example of its application.

The testing issue groups analyzed were as follows:

- Ion Exchange
  - Case 1-Group 1
  - Case 1-Group 2
  - Case 2-Group 1
- Sludge Washing
  - Group 1
  - Group 3
  - Group 4
- Organic Destruction
  - Group 1
- Settling/Decanting
  - Group 1
- Filtration
  - Group 1
  - Group 2
  - Group 3
- Centrifugation
  - Group 1

The Multiattribute Utility (MAU) theory was used as the decision analysis methodology to score the "hot testing" facilities and determine the rankings for each testing issue group. For this, several meetings were held with specialists on the various testing procedures and technologies. During these meetings the objectives, criteria (measures), and the weights (the importance) for criteria were established. Each criteria for the "hot testing" facilities were then scored for every testing issue group. The weights were applied to the criteria in the MAU process to produce an overall score for each alternative ("hot test" facility).

F1.1 OVERVIEW OF THE DECISION PROCESS

The steps in the decision process were as follows.

- Develop the overall objective of the project.

- Develop fundamental objectives or goals that will allow achievement of the overall objective.

  Fundamental objectives are broken down into separate components or sub-objectives by a process of further specification. This continues until a level is arrived at for which measures can be defined.

- Develop criteria (measures) for the objectives.

  Measures are natural scales (e.g., hot cell size) or constructed scales (clear definitions of levels of performance with an assigned score).

- Develop weights for each of the objectives and criteria using the swing weighting method.

- Convert to a common measure by developing value functions for the criteria.

- Aggregate the alternative's scores on individual measures into an overall rating for each alternative.

F1.1.1 Alternatives

Alternatives were reviewed based on the set of objectives and measures developed. Some alternatives were screened out before the decision analysis process because they lacked the necessary features (e.g., inability to ship waste to the facility or some physical aspect of the facility was not adequate).

F1.1.2 Objectives

Objectives are statements on what we want to achieve (Keeney 1992). Objectives with criteria and natural or constructed scales are listed for each of the technology subgroups (Table 4-1).

The overall objective was identified as: Comparatively rank the overall capability of the available hot test facilities and infrastructure to support the "hot testing" requirements of a technology issue group.

Fifteen fundamental objectives were identified as important to this overall goal:

Hot cell size
Hot cell equipment access
Hot cell services access
Hot cell availability to meet test schedule
Hot cell curie loading capability
Hot hood/gloveboxes
Waste disposal (tank sample residue and test by-products)
Analytical equipment available (radiochemical)

Professional expertise
Technical expertise
Environmental, Safety, & Health (ES&H)
Sample transport
National Environmental Policy Act of 1969 (NEPA) Permits
Resource Conservation and Recovery Act of 1976 (RCRA) Permits
Air Permits.

Cost was not considered in this decision process because the goal was to establish alternatives based solely on technical capability and availability at this stage. Objectives that clearly showed no significant variation from site to site and those objectives (requirements) that could be easily remedied were dropped from consideration (e.g., the common availability of master/slave manipulators in hot cells or a minor piece of equipment that could easily be purchased).

FI.1.3 Criteria Scales

Criteria are also called performance measures or attributes. They measure the degree to which the objectives are achieved. Normally fundamental objectives are further broken down into more specific sub-objectives until a criterion or performance measure was identified. In this case, only one level of objectives was needed.

Most of the measures were constructed scales that were established by a team composed of analytical chemists, technology development engineers, and project engineers. In this case, most of the measures were constructed scales and had a common scale of 0 to 100 (see Table F-1). The scales were constructed to minimize ambiguity, so a given level of performance could be clearly scored. The constructed scale's value functions consisted of numerical values assigned to levels of performance with a common scale from 0 to 100.

Natural scales were developed for hot cell size, hot cell equipment access and hot cell curie loading capability. The hot cell size measure was a ratio of the cell floor area to the nominal floor area requirement. The hot cell equipment access measure was a ratio of the cell's equipment access size to the nominal hot cell equipment access requirement. The hot cell curie loading capability measure was a ratio of the cell's curie loading capability to the upper limit curie loading needed. The value functions were linear and were provided a scale between 0 and 100.

For the natural scales such as hot cell size, if the value for the cell was above the needed range of the scale, it was given a maximum score of 100 because excess size was not considered a benefit.

F1.1.4 Weights

Weights for the objectives capture the tradeoff at each level between the objectives at that level; the highest weights are matched with the most important objectives or criteria. The importance of the objectives are compared at each level with each other.

Table F-1. Decision Analysis Objectives and Scales. (sheet 1 of 3)

Objective	Weight	Scale construction
Hot cell size	0.0447	Ratio of cell size to the nominal hot cell size, floor area (0.9 to 1.33).
Hot cell equipment access	0.0447	Ratio of equipment access of cell to nominal equipment access size, cross sectional area (0.5 to 1.5).
Hot cell services access	0.0638	100 Hot cell has electrical, air, and water installed. 75 Penetrations are available for services installation. 25 Some penetrations are available for utilities but some core drilling is needed. 0 Hot cell cannot be modified to provide the required utilities.
Hot cell availability to meet test schedule	0.127	100 Available 3 months before task start date and 3 months after task need date. 75 Available at task start date through task need date. 25 Available 3 months after task start date through task need date. 0 Not available during all or portion of the 3 months after the task start date through the task need date.
Hot cell curie loading capability	0.0382	Ratio of hot cell curie loading capability to the desired curie loading limit, area (0.75 to 1.00).
Hot hood/gloveboxes	0.00637	100 One double (3 by 8 ft) or two single hoods available. 50 One single (3 by 4 ft) hood available. 0 No hood or glovebox available.
Waste disposal (tank sample residue and test by-products)	0.0191	100 Retain both primary and secondary waste streams onsite. 50 Retain secondary waste stream on the site onsite. 0 Ship both primary and secondary waste streams back.

Table F-1. Decision Analysis Objectives and Scales. (sheet 2 of 3)

Objective	Weight	Scale construction
Analytical equipment available (radiochemical)	0.0638	100 Equipment onsite and in the same building with no cask transfer required. 75 Equipment onsite but requires cask transfer. 0 Equipment is offsite requiring cask transfer.
Professional expertise	0.0319	100 Engineer trained on the specifics. 50 Additional staff or training required. 0 Staff unavailable.
Technical expertise	0.0382	100 Technician trained on specifics. 50 Additional staff or training required. 0 Staff unavailable.
Environmental, Safety, & Health	0.102	100 Documentation is current and bounds test operation, no change required. 75 Safety documentation needs minor revisions to cover test operation (<6 months to revise). 50 Safety documentation needs revisions to cover test operation (6-12 months to revise). 25 Safety documentation needs some change to be current and cover the test operation (12-18 months to revise). 0 Safety documentation needs significant revision to be current (>18 months to revise).
Sample transport	0.0956	100 Within 200 Area of Hanford Site 50 Inter-area transfer within Hanford Site 0 Offsite

Table F-1. Decision Analysis Objectives and Scales. (sheet 3 of 3)

Objective	Weight	Scale construction
NEPA Permits	0.108	100 Existing NEPA documentation covers the proposed action. 75 A categorical exclusion is required. Approximately 3 to 4 months to prepare. 50 An Environmental Assessment is required. Approximately 12 months to prepare. 25 A supplemental analysis to an Environmental Impact Statement (similar to EA) is required, longer to prepare than EA. 0 An Environmental Impact Statement is required. Approximately 36 months to prepare.
RCRA Permits	0.108	100 RCRA approval in place within 3 months. 67 RCRA approval within 3-9 months. 33 RCRA approval within 9-15 months. 0 over 15 months to approve RCRA.
Air Permits	0.108	100 Air Permits approved within 3 months. 67 Air Permits approved within 3-9 months. 33 Air Permits approved within 9-15 months. 0 over 15 months to approve Air Permits.

EA = Environmental Assessment
NEPA = National Environmental Policy Act of 1969
RCRA = Resource Conservation and Recovery Act of 1976

Weights depend on the ranges in performance over which the alternatives vary; an objective that has a narrow range will receive less weight than one that can significantly impact the alternative by changing the level of performance. In the process of developing the weights, ranges normally are considered in a "bottom up" process; in this case we had only one level of objectives to consider.

The method that was used to determine the weights or the relative importance of the criteria is a standard decision analytic process known as "swing weighting," which ties the weights to range of the scales.

Some objectives would have had larger weights without the initial screening for minimum criteria because evaluators were concerned that certain criteria or objectives met minimum levels. Because the minimums were met, the concern was not as great for those objectives thus their importance or weight was proportionally smaller.

F1.1.5 Overall Rating

The overall evaluations of the "hot test" alternatives were obtained by rolling up all the individual parts for each alternative into a single number by which the alternatives can be quantitatively compared. The function used in this case was a linearly additive value function in which the assessed criteria weights were multiplied by the score (value) for each of the criteria for the particular alternative. A score of 100 would indicate a maximum score on all the criteria.

The evaluations for each technology issue group include the following (the references are to figures and tables in the main text of this report).

- A facility evaluation table for recording preselected scoring data about each of the candidate hot test facilities (Appendix D2).

- The criteria scoring of each facility and testing issue group (see Table 4-1, in the main report text).

- A graphical representation of the overall rating for the facilities (Figures 4-1 through 4-12).

- Performance Profiles for the highest ranked facilities for each issue group were prepared (those for the ion-exchange work will be shown in the following example).

  The performance profile shows how an alternative's level of performance on the major objectives and the weight given to each major objective combine to produce that alternative's overall evaluation. The performance profile graph uses bar width to represent the weight while the height represents the alternative's performance on that objective. The profile shows how an individual objective contributes to the overall score for the alternative. The total area of all the bars is the alternative's overall value. These profiles show the relative strengths and weaknesses of each alternative.

- Sensitivity analysis of selected fundamental objectives.

  A sensitivity analysis was performed to determine the robustness of the alternative rankings to changes in weighting (how the value of an alternative or testing facility varies based on changing the weight or importance of one fundamental objective). Thus insight into the effect of an individual objective on the overall performance rating is shown.

F2.0 SITE EVALUATION

Each alternative for each testing issue group was scored using the criteria established. The overall ranking for each testing issue group is displayed in Table 4-1 in the main text. To illustrate the evaluation and sensitivity analysis process used on each testing issue group, the narrative below will discuss (1) the top ion-exchange hot test candidates and their performance profiles, and (2) the sensitivity of the rankings because of changes in measure weights. The sensitivity of the rankings regarding increases or decreases in importance of a measure were reviewed; one weight of a measure is increased (e.g., to 20%) or decreased while holding the other measures at proportionally the same relative weight.

F2.1 ALTERNATIVE EVALUATION FOR ION-EXCHANGE ISSUE CASE 1 GROUP 1

F2.1.1 Overall Ranking

The result of the overall ranking (Table 4-1) shows 325A C, 325A B, and 325A A as the top candidates (95) with 222-S(1F) (91), and 222-S(1E1) (91) in fourth and fifth positions.

F2.1.2 Performance Profiles

The performance profiles (Figures F-1 through F-5) for 325A C, 325A B, and 325A A indicate maximum scores for all measures except for Sample Transport. Hot Cell 222-S(1F) had maximum scores for all measures except for Availability, NEPA Permits, Analytical Equipment, and Professional Expertise. The 222-S(1E1) had maximum scores for all measures except NEPA Permits, analytical equipment, equipment access, hot cell size, and professional expertise measures.

F2.1.3 Sensitivity Analysis

Referring to Table 4-1 (main text), the top three candidates and 222-S(1F) are robust for changes in ES&H, Air, NEPA, or RCRA Permit weightings (up to 20%). The 222-S(1E1) surpasses 222-S(1F) when availability is weighted at 20%. No change in the ranking results when measure weights are decreased to 4% for sample transport, 2% for analytical equipment, or 2% for services access. Increasing the weight for the sample transport measure to 20% moves 222-S(1F) and 222-S(1E1) to the first position. Decreasing the weight for the RCRA Permits measure does not change the original ranking.

F2.2 TEST GROUP SITING RECOMMENDATION

Upon completion of the above analysis for all testing issue groups, the combined site evaluation team met as discussed in Sections 4.3 and 4.3.1 to perform the final facility assignments as presented in Table 4-2.

Figure F-1. Performance Profile for 325A A.

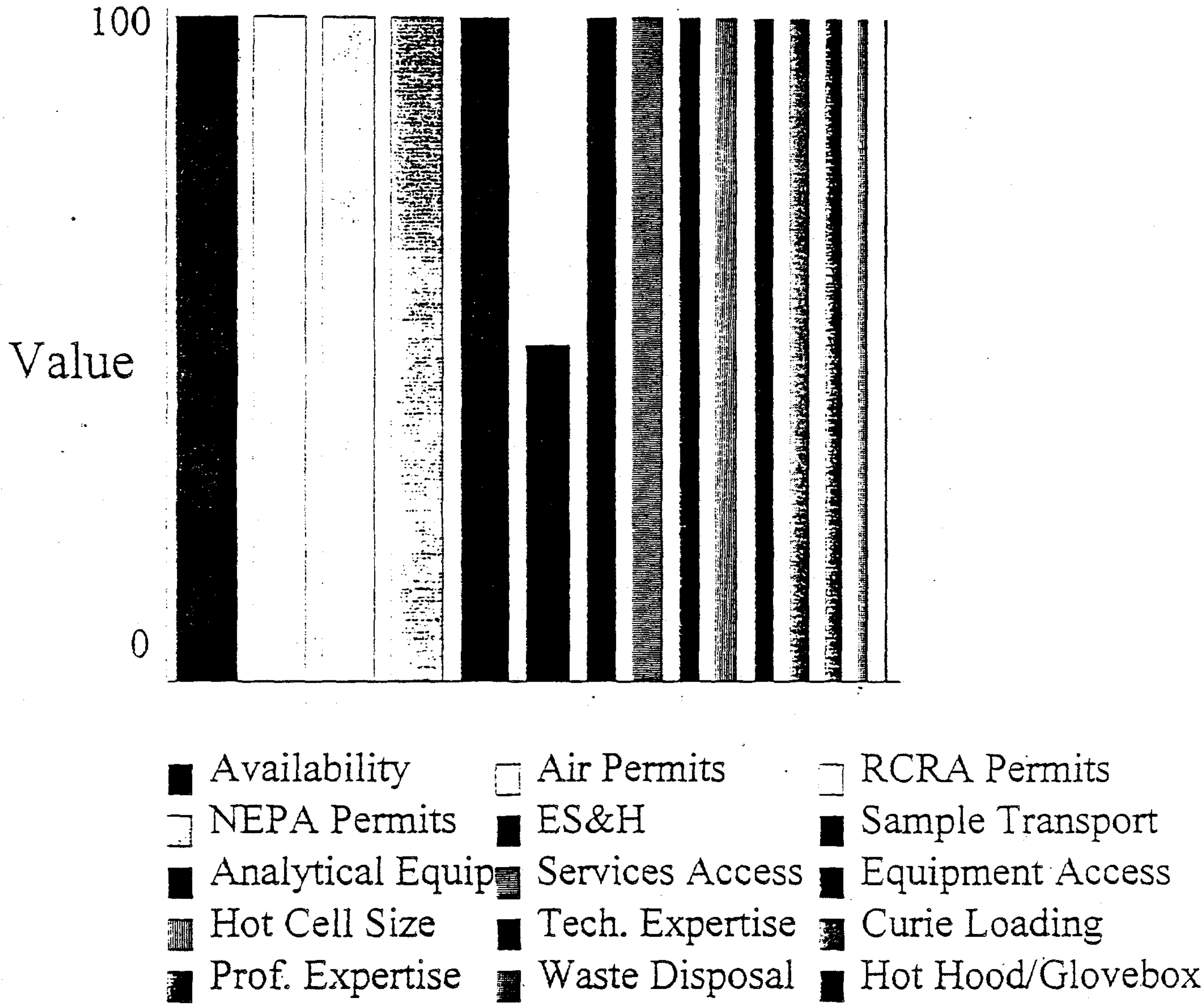


Figure F-2. Performance Profile for 325A B.

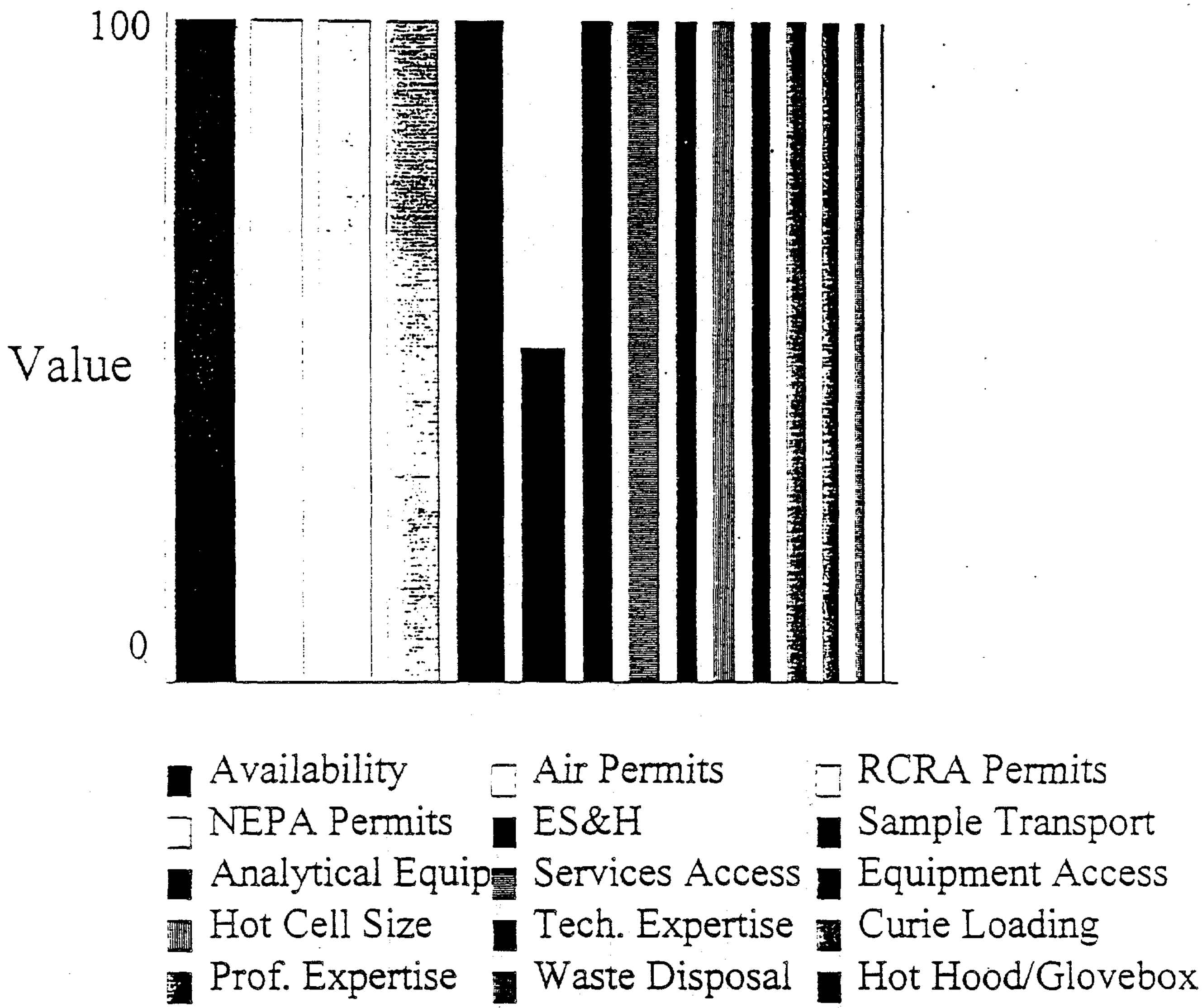


Figure F-3. Performance Profile for 325A C.

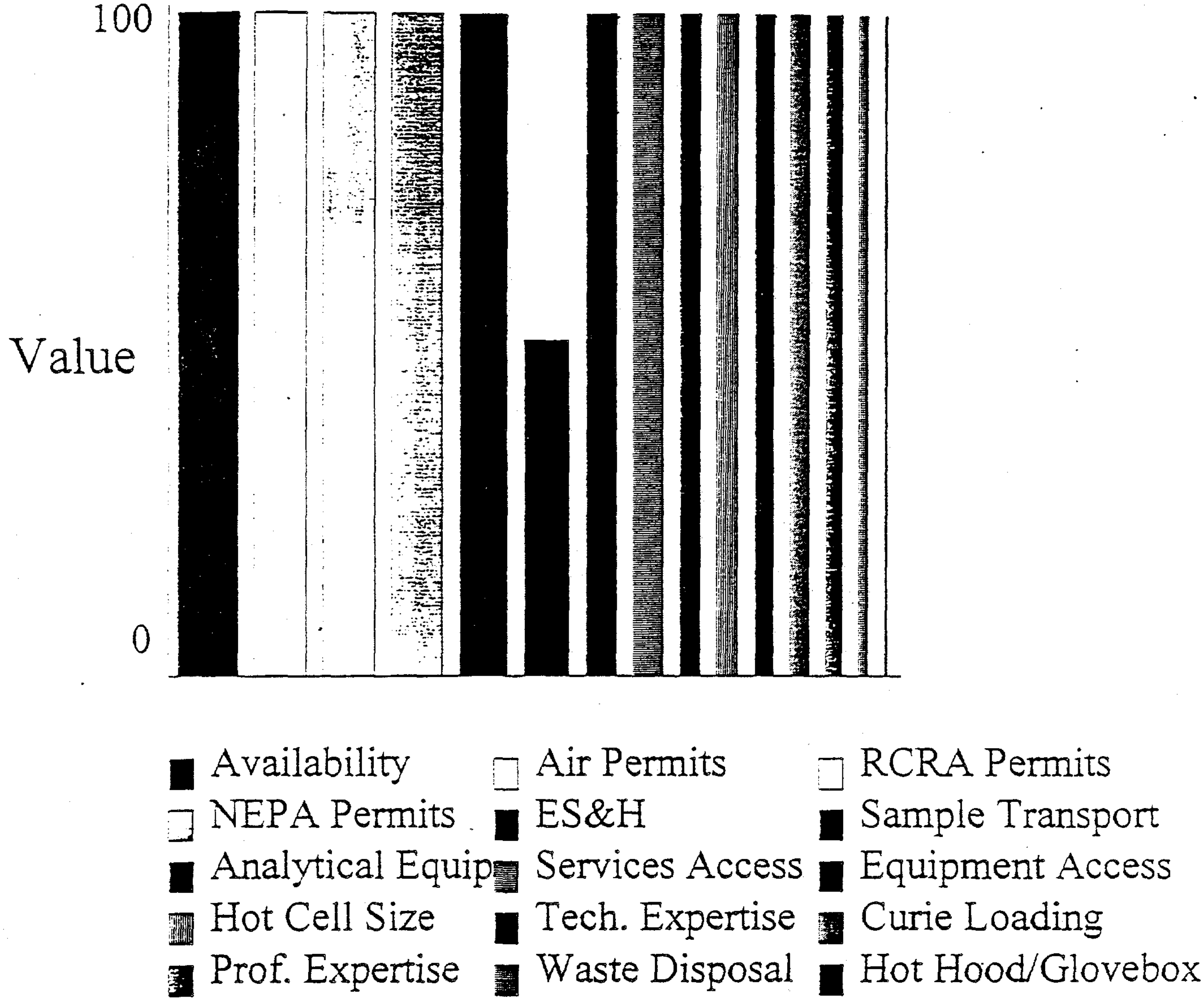


Figure F-4. Performance Profile for 222-S(1F).

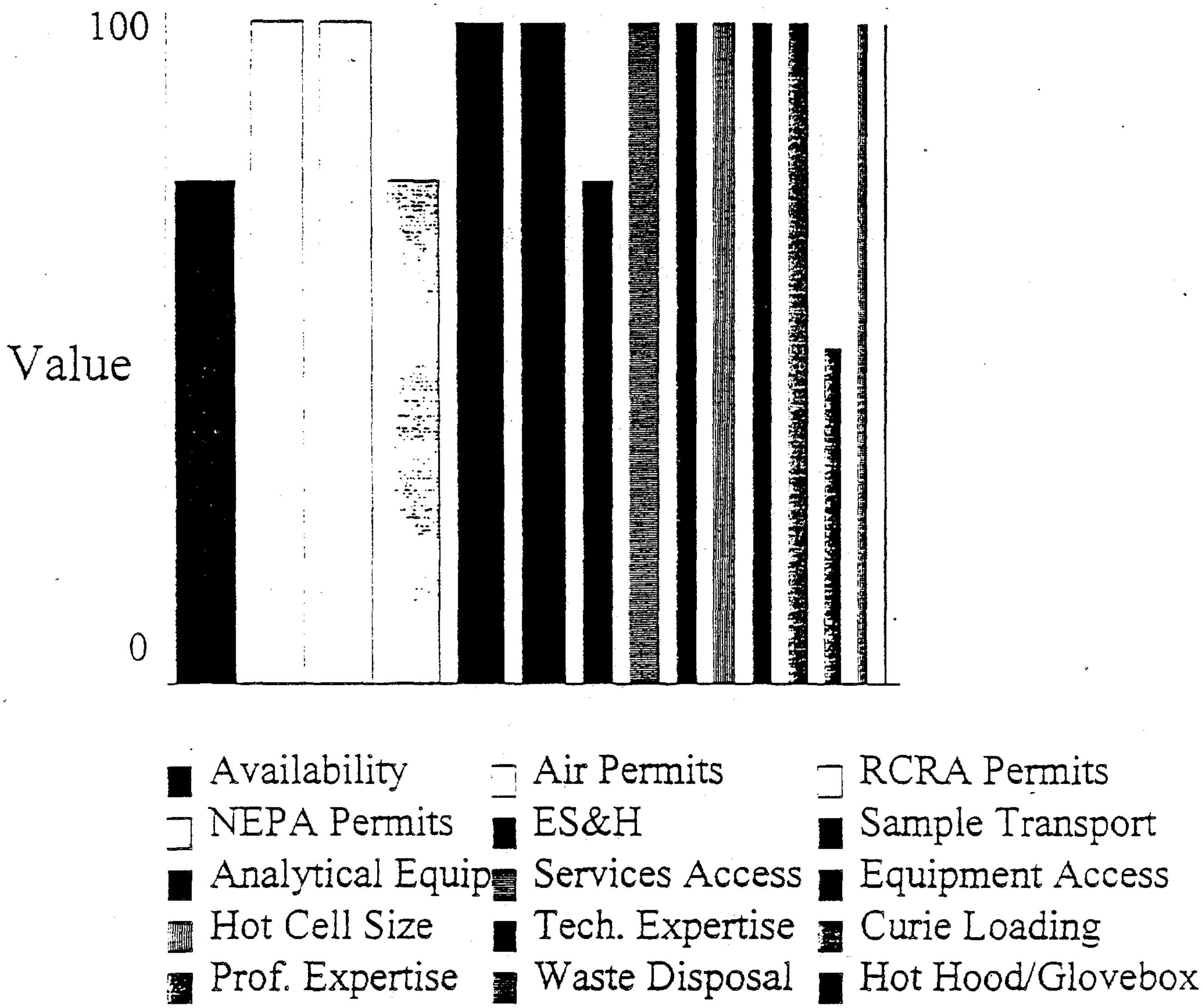
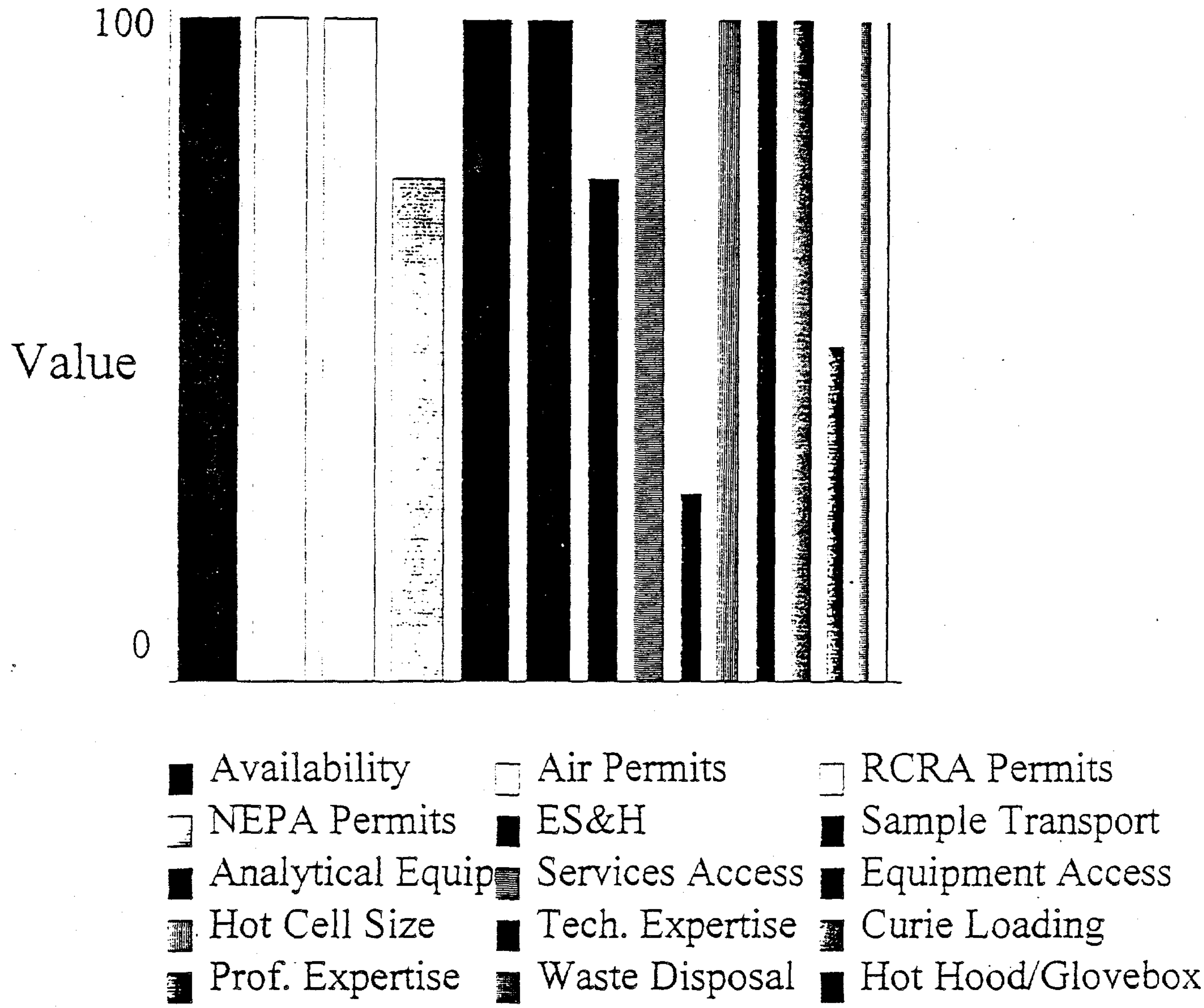


Figure F-5. Performance Profile for 222-S(1E1).



F3.0 REFERENCES

Keeney, Ralph L., 1992, *Value Focused Thinking: A Path to Creative Decision Making*, Harvard University Press, Cambridge, Massachusetts.

National Environmental Policy Act of 1969, 42 USC 4321, et seq.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.

APPENDIX G

RECORD OF KEY MEMORANDUMS

CONTENTS

[544] From: Curtis R Stroup at ~WHC321 12/1/94 12:59PM (3273 bytes: 1 ln, 1 fl)
To: Cary M Seidel, Steven M Joyce, Gary F Howden at ~WHC97, David A Dodd at ~WHC121
Subject: MEETING WITH STATES ON TRANSPORTATION OF HANFORD TANK SAMPLE
------------------------------- Message Contents -------------------------------

Text item 1: Text_1

On November 9, 1994, a meeting was held to discuss the transportation of type A containers and the PAS-1 type B cask, containing Hanford tank waste samples, from Hanford to INEL and LANL. Representatives (see attached list of attendees) from WHC Analytical Services Oregon Department of Energy (Ken Niles), Department of Energy, WHC transportation, and Washington State Patrol (Mr. Bill Bennett) attended the meeting.

Mr. Ken Niles and Mr. Bill Bennett felt that the packaging and transportation methods and rates (~2 PAS-1 shipments per month) were acceptable. Mr. Ken Niles stated that he would discuss Hanford's transportation plans at the next western governors meeting. Mr. Niles felt that shipments of larger quantities than PAS-1 casks could carry would be an issue with the states. Mr. Niles also stated that he would discuss Hanford's transportation plans with the Umatilla Indians at his next opportunity.

NAME	PHONE	ORG.
Curtis Stroup	509-372-0816	Analytical labs.
Paula Clark	509-376-4718	Dept. of Energy (Analytical Services)
Frank Votaw	509-376-7171	T & P Haz. Mat. Operations
Sen Moy	509-376-8372	DOE Traffic Manager
Bill Bennett	206-783-0347	W. S. P.
Ken Niles	503-378-4906	Oregon DOE
Bill Irvine	509-376-5727	WHC Transportation & Packaging
J. Greg Field	509-376-0781	WHC/TP/Packaging Safety Engineering
Richard J. Smith	509-376-9501	WHC/TP/Packaging Safety Engineering
Cary M. Seidel	509-375-0846	Analytical Labs.

[517] From: David A Dodd at ~WHC121 11/7/94 4:46PM (1812 bytes: 32 ln)
To: Paul F Stevens at ~WHC217, Gary F Howden at ~WHC97, Curtis R Stroup at ~WHC321
Subject: PAS-1 Cask Maximum Cs-137 Concentration
------------------------------ Message Contents ------------------------------

Text item 1: Text_1

Paul,

I think the feedstock that would be sent to the selected site in the PAS-1 cask would be on the order of 1 Ci/L. The eluant off the loaded Cs column would reach the 50 Ci/L. That product might have to be diluted for return to Hanford in the cask. There would be no alpha in that material and therefore hydrogen generation should be negligible.

David Dodd

One of the criteria for the tank sample testing facility that was put forth at the meeting this morning was that they be able to accommodate tank samples with Cs-137 concentrations up to 50 Ci/l. I have reviewed the Safety Analysis Report (SAR) for the PAS-1 cask, which would be used to ship the tank samples off the Hanford Site, at least in the initial phase of the campaign. Due to operational limits due to potential hydrogen generation, the maximum Cs-137 concentration that the cask can accommodate is 5 Ci/l. The shielding analysis assumes a mixture of isotopes with the Cs-137 concentration at 3 Ci/l (with 4 l of samples).

As the SAR is written now, Cs-137 50 Ci/l samples must be diluted. Future revisions may allow small tank samples with high Cs-137 concentrations to be shipped.

Paul Stevens
Packaging Safety Engineering

[522] From: Paul F Stevens at ~WHC217 11/10/94 2:13PM (1901 bytes: 1 ln)
To: Gary F Howden at ~WHC97, David A Dodd at ~WHC121, Curtis R Stroup at ~WHC321
Subject: DOE Laboratory Compatibility with Tank Sample Casks
------------------------------- Message Contents -------------------------------

Text item 1: Text_1

When PSE started work on the revision of the PAS-1 cask SAR to include liquid shipments of up to 4 liters, they visited many of the DOE laboratory sites that you are considering for your testing campaigns to assess their ability to handle the cask. For INEL, ANL-E and the Hanford labs (325 & 222S) we have data that indicates that they can handle the PAS-1 cask and sample containers. We do not have enough information on ORNL's facilities to make a positive judgment.

The PAS-1 cask maybe removed from its overpack outside the laboratory facility and transported into the facility with a dolly (the cask without overpack is approximately 1,900 lb). The laboratory facility must have the capability of removing the primary containment vessel from the PAS-1 (750 lb) and be capable of loading the shielded sample containers into the glove box (130 lb each, 7 in OD, 13 in high).

If you have information the ORNL facility that might help me determine if it can handle the PAS cask, please let me know. Also, if you have a ORNL contact I could talk to, it would be greatly appreciated.

I will not be in the office tomorrow - if you have any information/news, please leave it with my secretary, Donna Rodgers (376-8772).

Paul Stevens
Packaging Safety Engineering

Testing Siting Final Report Notes G. F. Howden

11/22/94 (Revised 11/23/94)

Daily Team Meeting:

Attending: Bruce, Pat and Gary

Progress:

Pat reported on his investigation of the shipping cask question from the previous meeting:

Type A casks are shipped by common carrier and do not require dedicated trucks.

Type B casks are special haul on dedicated trucks. Cost is about $1.50/mile.

Discussion:

Discussed ways/issues that would support combining some of the issues to reduce the total number of issues to be analyzed. A key issue was sample transportation. Called Curtis Stroup on speaker phone with following info from Curtis:

Curtis will write up a memo to file covering the discussions with the State of Oregon officials the week of 11/10/94, including attendance list and will provide a copy by 12/1/94.

Curtis says the understanding with the Oregon State representatives was that they would support two truck shipments per month across Oregon carrying two PAS-1 casks **. Curtis says it's very questionable whether they would consider a 50-100 liter cask.

Curtis' understanding is that the PAS-1 cask (which will be permitted to carry up to 4 liters of hi activity waste in January, 1995) can be redesigned to carry up to 8 liters/cask. That would require redesign of the inner container and relicensing. Time to do so is estimated at 6 months to redesign and 3 months to relicense. With some aggressive work, Curtis believes the first of several new cask containers could be available for use in a total of 9-10 months from start of redesign.

A follow up call between Curtis and Gary provided the following guidance:

<u>Offsite shipping capability</u>

Type A casks:

Beginning January, up to 250 mL samples can be shipped to any national lab via common carrier. Have 2 Type A casks. (Twenty 10mL and One 100 mL container Warthog) New Type A Hedgehog capable of 10, 100 & 250 mL by May 95. Expect 15-20 available) Retrieval via existing 250 mL sampler system and 10 mL grab sampler. Can support shipments of a maximum of 3 Type A 10 mL containers per month. (Lela Susaki has charge of archive sample inventory) George Stanton has charge of taking samples for TWRS pretreatment

Beginning February '95: Two PAS-1 casks, capable of 4 liters each, 16 liters per month. Retrieval via existing 250 mL sampler system, current plans are to keep 70 mL out of every 250 mL core sample leaving balance to go back to tanks or out for shipment. Expect to be taking about (2 cores per tank) 300 to 400 core samples (not counting grab samples) in FY 95. Out of 300 to 400, we could get at best about 40 to 50 liters in year.

(A new strategy has been proposed to drastically reduce the number of core samples taken. Takes about 20 shifts to take 2 cores. If the present coring program is reduced, Pretreatment could fund the coring crews to take core samples for us since they would be available or partially disbanded).

Beginning November/December '95: Two PAS-1 Casks *, capable of 8 liters each, 32 liters/month based on current agreements with Oregon. Retrieval based on current projections would net about 60 liters during the year or 30 liters the first half of CY 96 that could be shipped to other sites.

Beginning July/September '96: Two or more PAS-1 Casks *, capable of 8 liters each, at least 16 liters/month with the 25 liter sampler system operational to provide retrieval and 222 lab support + for repackaging.

++

Footnotes:

* All containers procured with Characterization funds. Characterization would have first priority if require. Procurement of additional PAS-1 casks has a lead time of about 5 months at a cost of $150K each, the Hedgehog Type A will be 3.5 months lead time At $10-15K each in quantity.

\+ Curtis is going to call Jim Mullally in Bazinetts group to set up a meeting to discuss the SRP 25 liter coring device and scope what will be required to interface it with the 222 lab facility.

** Assumes all other states might fall in line with Oregon, which is probably not true.

Testing Siting Final Report Notes (Cont'd)

11/23/94

Daily Team Meeting:

Attending: Bruce, Pat, Rudy, Gary

Next Meeting: Monday 11/28/94 at 10AM @ Raytheon Bld

Progress:

Bruce finished the data sheets for the 222 labs and passed to Pat for review.

Gary reviewed and discussed the sample shipping limitations described above.

Discussion:

Discussed ways to reduce the number of alternatives to be considered. Continuing site assessment will be done based on the following "rules" and screening criteria:

Rule #1) Work on an issue will not be split between sites, that is, when an issue requires a combination of cold and hot testing, the work will all be done at the same site. The basis for this rule is avoidance of data correlation problems, reduced coordination and administration.

Rule #2) Issues that can use the same radioactive waste sample(s) for resolution will be combined/grouped and will not be split between sites. The basis for this rule is avoidance of unnecessary shipping of radioactive waste samples.

Rule #3) Issues that require an elaborate/costly hot lab or hot cell set up and can be resolved on the same set up as another issue(s) will be combined/grouped. The basis for this rule is avoidance of unnecessary test apparatus/set up cost. The guidance for this rule is costs over $ 25K per set up.

Continuing site assessment will also be subject to the following two Go-No-Go screening criteria on an issue by issue basis. Failure on one or both will be the basis for not spending time preparing detailed assessment data sheets for the issue at that site.

Question A) Can WHC ship the identified schedule of tank waste to the site in time to for the site to meet the A-E schedule?

Question B) Are there conditions at the candidate site that would preclude it from consideration?

B-1) Cell or hot lab unavailable

B-2) Staff commitment

B-3) Some indication a state would not allow waste shipment to that site

B-4) Time to obtain needed operating permits for the site facility

B-5) DOE directive/guidance

MEETING MINUTES

Subject: Use of WESF Cells For IPM Process Development Testing

TO: Distribution **BUILDING:** See Distribution

FROM: Gary Howden **CHAIRMAN:** R. R. Gadd

Dept-Operation-Component	Area	Shift	Meeting Date	Number Attending
TWRS/Projects/IPM Project	200E	Day	10/3/94	8

Distribution:

B Plant/WESF		IPM Project	
W. W. Bowen	S6-65	D. L. Banning	G3-20
R. E. Heineman Jr	S6-65	S. A. Barker	G3-20
D. K. Smith	S6-65	R. R. Gadd	G3-20
		G. F. Howden	G3-20
		R. V. Vaddey	G3-20

++

The meeting was called to identify issues that must be assessed to provide a recommendation to WHC senior management and DOE/RL on the use of "B" through "E" window cell work stations in WESF for a two year process development testing mission in support of the design of the Initial Pretreatment Module (IPM).

R. R. Gadd opened the meeting with a statement of the IPM Projects objective to find a compatible location for performing pretreatment process development. The test will be a treatability study that has a maximum throughput requirement. An RD & D permit would allow greater throughput, but would take much longer to obtain.

It was also noted that this test work would be completely self contained within the WESF cells and would not require rad waste transfers through or to B Plant. A French shielded transporter being procured by the Tank Farms Maintenance & Operations organization would be used to move tank waste samples to WESF and remove the test effluents.

R. E. Heineman indicated that the program for the return of cesium and strontium capsules from several offsite locations is their primary mission and carries a high priority with DOE/HQ and DOE/RL and a lot of public visibility. He identified the following points for assessment in development of a recommendation on use of WESF for the added testing mission:

Mission Related Issues:

1. Are there basic incompatibilities in the use of the facility for an operational mission of capsule storage & maintenance, and a testing mission of chemical process development in support of the IPM Project design?

2. What are the risks to the capsule return and storage mission of giving up 4/7ths of the available cell work station space.

Operational Issues:

1. What added demands would the pretreatment testing mission make on the capsule recovery mission resources, space and personnel.

2. What effect would a joint mission have on the capsule recovery missions emergency response capability?

3. What effect would a joint mission have on the recovery and repackaging of residual Cs and Sr stored at other hot cell facilities?

4. Cell cleanout and modification would take place in late CY 95 and early CY96. Testing would start in mid-1996. Would the test program interfere with the capsule return program?

Safety and Permitting Issues:

1. What would be the impact on existing safety and environmental permitting of a joint mission?

2. The work to isolate WESF from B Plant is expected to be complete in CY 95. Would this impact the cell clean-up and installation of test equipment?

Schedule Issues:

1. B Plant/WESF Management is planning on starting design of a capsule re-encapsulation capability in FY-96. Would performance of the 1-2 year test (starting in mid CY 96) effect the development of this capability? If so, are there work-arounds?

Conclusion:

Kent Smith will continue as the primary interface with the IPM Project and will work with the Project staff on resolution of the above issues.

A ground rule for the assessments is that we cannot delay the capsule return shipments and on-site handling.

++

As of 10/26/94, RL has placed any further action on use of WESF for IPM Project testing on hold pending resolution of budget and test sizing issues. We will advise when this hold is lifted.

December 21, 1994

TO: G.F.Howden
FROM: D.A. Dodd

Subject: Transloading Waste Tank Samples for Off-site Shipment

There is currently only one cask type, PAS-I, approved for use in shipping liquid and solid, Hanford waste tank materials to off-site locations. This cask is not conducive in its present configuration for loading in the tank farm area. Samples are currently brought to the 222-S Laboratory, composited into predetermined quantities in primary containers, and loaded into the cask. Shipping and manifest documents are prepared and arrangements are made through WHC Transportation for shipment. Each shipment requires a significant effort to coordinate and document.

Questions have been raised concerning the ability and willingness of 222-S Laboratory to perform this transloading activity if off-site facilities are chosen as the location for conducting tests necessary to design the Pretreatment Process Facility. In response, the 222-S Laboratory is willing to provide support to this effort as long as the primary function/mission of the laboratory, analyses of samples, is not jeopardized. If this activity is to continue for the duration of testing, 3 years, a special handling location within the building will be established. This segregation of work activities would then interject minimum perturbations to the production mission.

A stipulation is imposed however, no major modifications to the facility be required to accommodate the activity. This precludes the transloading of 25 liter samplers but lesser volume samplers, e.g.3 L, 500 mL, can be accommodated. Major modifications would be required to move the > 8 ton cask, to mate the cask to the hotcell for shielding during entry of the sampler into the hotcell, to move and empty the weight of the sampler, and to clean the sampler for reuse. Modifications necessary for this activity could not be completed within the time frame of the testing unless extraordinary priority were placed on them. Placing appropriate priority would adversely impact other production activities in the facility.

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