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Enhanced Sludge Washing Evaluation Plan

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1.0 ENHANCED SLUDGE WASHING EVALUATION PLAN

Enhanced sludge washing was chosen as the baseline process for separating Hanford tank waste sludge into a high-level waste (HLW) fraction and low-level waste (LLW) fraction to facilitate waste disposal. Section 1.0 briefly discusses the purpose of the evaluation plan and provides the background that led to the choice of enhanced sludge washing as the baseline process. Section 2.0 provides a brief summary of the evaluation plan details. Section 3.0 discusses, in some detail, the technical work planned to support the evaluation of enhanced sludge washing. Section 4.0 briefly discusses the potential importance of policy issues to the evaluation. Section 5.0 discusses the methodology to be used in the evaluation process. Section 6.0 summarizes the milestones that have been defined to complete the enhanced sludge washing evaluation and provides a summary schedule to evaluate the performance of enhanced sludge washing. References are identified in Section 7.0, and additional schedule and milestone information is provided in the appendices.

1.1 PURPOSE

This report has been prepared to present an evaluation plan that will permit a rational, comprehensive evaluation determining if enhanced sludge washing performs satisfactorily and will lead to the best possible decision on whether advanced separation processes are required. The evaluation process will facilitate evaluation of all aspects of enhanced sludge washing within the context of available technical and cost information, policy issues, and stakeholder values and their associated level of uncertainty. The evaluation process is also capable of providing guidance on the allocation of available resources to reduce uncertainty in key technical, cost, and policy issue factors.

This plan will complete *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al., 1994) Milestone M-50-03A, "Define Additional Milestones for Waste Pretreatment Leading to the Decision Whether Advanced Sludge Separation Processes are Required."

1.2 BACKGROUND

The Tank Waste Remediation System (TWRS) Program mission is to store, treat, and immobilize highly radioactive Hanford Site waste (current and future tank waste and the strontium/cesium capsules) in an environmentally sound, safe, and cost-effective manner.

The scope of the TWRS Waste Pretreatment Program is to treat tank waste and separate that waste into HLW and LLW fractions and provide additional treatment as required to feed LLW and HLW immobilization facilities. The intent is to dispose of the

LLW fraction containing the bulk of the chemical constituents near surface and the HLW fraction containing the major fraction of radionuclides in a deep geologic repository.

This overall separations strategy was contained in the Hanford Final Environmental Impact Statement (EIS) (DOE 1987) with the associated Record of Decision (DOE 1988). The strategy contained in these documents served as the basis for the waste tank milestones in the 1989 Tri-Party Agreement that defined a 30-year cleanup program for the Hanford Site.

A number of significant policy changes affecting tank waste occurred subsequent to the publication of these documents. The changes that have significant impact on pretreatment and disposal of Hanford tank waste include:

- The U.S. Department of Energy (DOE) has changed the planning basis to include retrieval of the waste from all single-shell tanks (SST) as well as the double-shell tanks (DST). This increases the planned quantity of waste to be pretreated approximately four-fold.

- Upgrading B Plant for use as a pretreatment facility to bring it into compliance with current environmental and safety requirements was not found to be cost effective. This required building a pretreatment plant for supplying the feed to the LLW immobilization facility.

- Concerns with near-surface disposal of LLW in grout vaults as planned, resulted in the preferred approach being production of a vitrified form with further radionuclide removal. This requires building a LLW vitrification plant for immobilizing the waste for disposal.

The strategy incorporating these changes served as the basis for the waste tank milestones in the Fourth Amendment to the Tri-Party Agreement. Pretreatment processes to achieve the objectives of the Tri-Party Agreement are being identified, technology and processes are being developed, processes are being designed and tested, and facilities will be constructed and operated.

Currently the Pretreatment Program is performing process development activities on LLW and HLW pretreatment processes. Processes that are included in the baseline workscope include separation of liquids from solids to remove supernate and dissolved salts, removal of cesium (also strontium and technetium if necessary) from these alkaline liquid wastes, evaporation of water to concentrate the wastes, and feed to a facility for vitrification as LLW. The solids in the tank will be washed to dissolve salts to the extent practical and those salt-bearing liquids will be added to the supernatant stream going to cesium removal. The sludge remaining in the tanks will be washed further to remove additional solids and to minimize the volume of the feed going to the facility for vitrification as HLW.

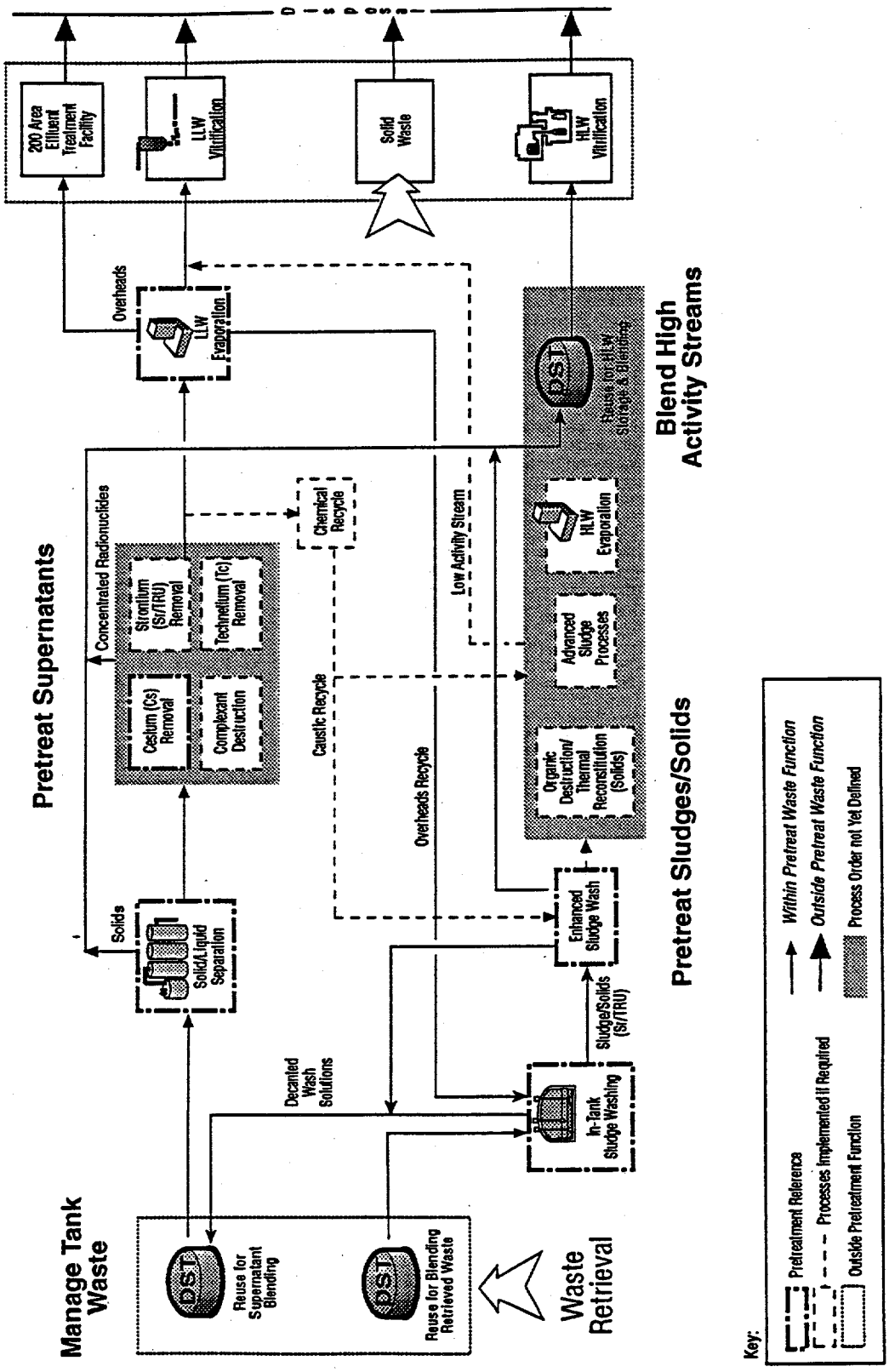
During the negotiations in 1993 leading to the Fourth Amendment to the Tri-Party Agreement, three basic pretreatment methods for waste tank sludge pretreatment were considered: 1) simple sludge washing, 2) enhanced sludge washing, and 3) advanced separations. Simple sludge washing consists of washing the sludge with water with corrosion inhibitors added in existing DSTs. Enhanced sludge washing consists of simple washing followed by leaching of chemical constituents with caustic and other chemicals either in existing DSTs, if possible, or in new specially designed processing equipment. Advanced separations consists of complete dissolution in acid, if possible, followed by extensive chemical and radionuclides separation. Advanced separation would result in the least volume of HLW and simple sludge washing, the most. Based on information available at the time of the negotiations, it was concluded that simple sludge washing would result in a volume of HLW that was "unreasonably" large in terms of cost and federal repository capacity. Advanced separations, which would result in the least HLW, would require extensive technology development, and complex facilities, and the implementation date was uncertain.

The redefined program (see Figure 1-1) resulting from the negotiations was a program that would rely on existing technologies as much as possible (Wodrich 1994). Pretreatment of tank waste using simple processes that could be done within tanks or relatively simple new facilities and require only limited development was preferred over processes requiring complex facilities and extensive technology development. The idea of getting on with the cleanup was far more important to the public stakeholder than minimizing the volume of waste to be sent to the federal repository particularly in light of the uncertainty of when the repository would be available to receive waste (Pacific Northwest Laboratory [PNL] 1994). The level of radioactivity in the LLW planned for near-surface storage at the Hanford Site was felt to be adequately controlled with retrievable storage of an improved waste form.

Therefore, enhanced sludge washing was selected as the pretreatment baseline method with the expectation that it would result in a "reasonable" volume of HLW and the LLW stream would have radionuclides removed to the same extent required for the DSTs only (Bernero 1989). LLW disposal requirements include:

- Nuclear Regulatory Commission's (NRC) "incidental waste" classification (Bernero 1993).
- Does not exceed the comparable limits for commercial LLW (10 CFR 61 Class C Waste).
- Will result in an acceptable disposal system performance assessment.
- Will comply with DOE's As Low As Reasonably Achievable (ALARA) policy.

Figure 1-1. Waste Pretreatment Block Diagram.



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To that end, testing and selective technology development to enhance the simple processes were continued as the major thrust of the technical baseline. In parallel, a limited amount of technology development on other activities such as acid dissolution of sludge, advanced radionuclide removal, and organic destruction were continued as contingencies. Some of these may be necessary, or they might result in significant cost reductions or schedule improvements.

To support the schedule of the disposal program it was agreed that determination of the adequacy of the simple enhanced sludge washing processes to meet program requirements should occur by mid-1998. Consequently, the Tri-Party Agreement Milestone M-50-03, "Complete Evaluation of Enhanced Sludge Washing to Determine Whether Advanced Sludge Separation Processes are Required," was established and scheduled for completion on March 31, 1998. The following additional milestones were established to monitor progress toward evaluation of enhanced sludge washing:

Number	Milestone	Due Date
M-50-03A	Define Additional Milestones for Waste Pretreatment Leading to the Decision Whether Advanced Sludge Separation Processes are Required (M-50-03).	9/30/94
M-50-03-T01	Issue Report on Current Status of Tank Waste Enhanced Sludge Washing.	10/31/94
M-50-03-T2A M-50-03-T2B M-50-03-T2C (formerly M-50-03-T02)	Submit a Report Summarizing the Testing of Enhanced Sludge Washing and Related Tank Waste Sludge Pretreatment Methods for Samples of Tank Waste Sludge.	9/30/95 9/30/96 9/30/97

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2.0 SUMMARY

As a result of significant changes to plans for disposal of Hanford tank waste subsequent to the original signing of the Tri-Party Agreement in 1989, the tank waste disposal program was redefined during negotiations in 1993 to accommodate the changes and expedite cleanup. The redefined program was structured to rely on simple processes as much as possible. Enhanced sludge washing was selected as the baseline method for pretreating sludge tank waste. Testing and selective technology development work on enhanced sludge washing was initiated. Other development work on more complex advanced sludge separation processes was continued primarily as a contingency in case enhanced sludge washing will not satisfy disposal mission requirements. A milestone was defined to complete the evaluation of enhanced sludge washing by March 31, 1998. Two (recently modified to four) milestones were defined to monitor the testing and development work. An additional milestone called for development of a plan to evaluate enhanced sludge washing and to define additional milestones that would lead to a decision on its adequacy. This plan will complete that milestone.

This plan discusses the technical work that is underway, planned, and proposed, which is intended to improve the decision on enhanced sludge washing adequacy by reducing uncertainty in key technical areas. Eight areas of technical work are discussed: waste characterization, enhanced sludge washing process development, advanced separations process development, in-tank sludge washing testing, HLW feed composition and waste form selection, blending studies/retrieval sequence, flowsheet development, and trade studies. Logic is provided to illustrate how the technical work supports the enhanced sludge washing evaluation. Schedule details for the technical work are included as an appendix. Those policy issues that are recognized as having potential for major impacts on the adequacy of enhanced sludge washing are also addressed.

Decision analysis was chosen as the method for evaluating enhanced sludge washing. It was chosen because it is an iterative, structured process that can deal effectively with complex systems. Decision analysis provides a methodology for rational choice in systems facing uncertainty in policy issues, costs, technical information, and stakeholder values. The evaluation process schedule leading to completion of the evaluation is presented. A total of 29 new milestones have been defined. A chronological listing of enhanced sludge washing evaluation related milestones, including existing and newly defined milestones, is presented.

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3.0 TECHNICAL WORK SUPPORTING ENHANCED SLUDGE WASHING EVALUATION

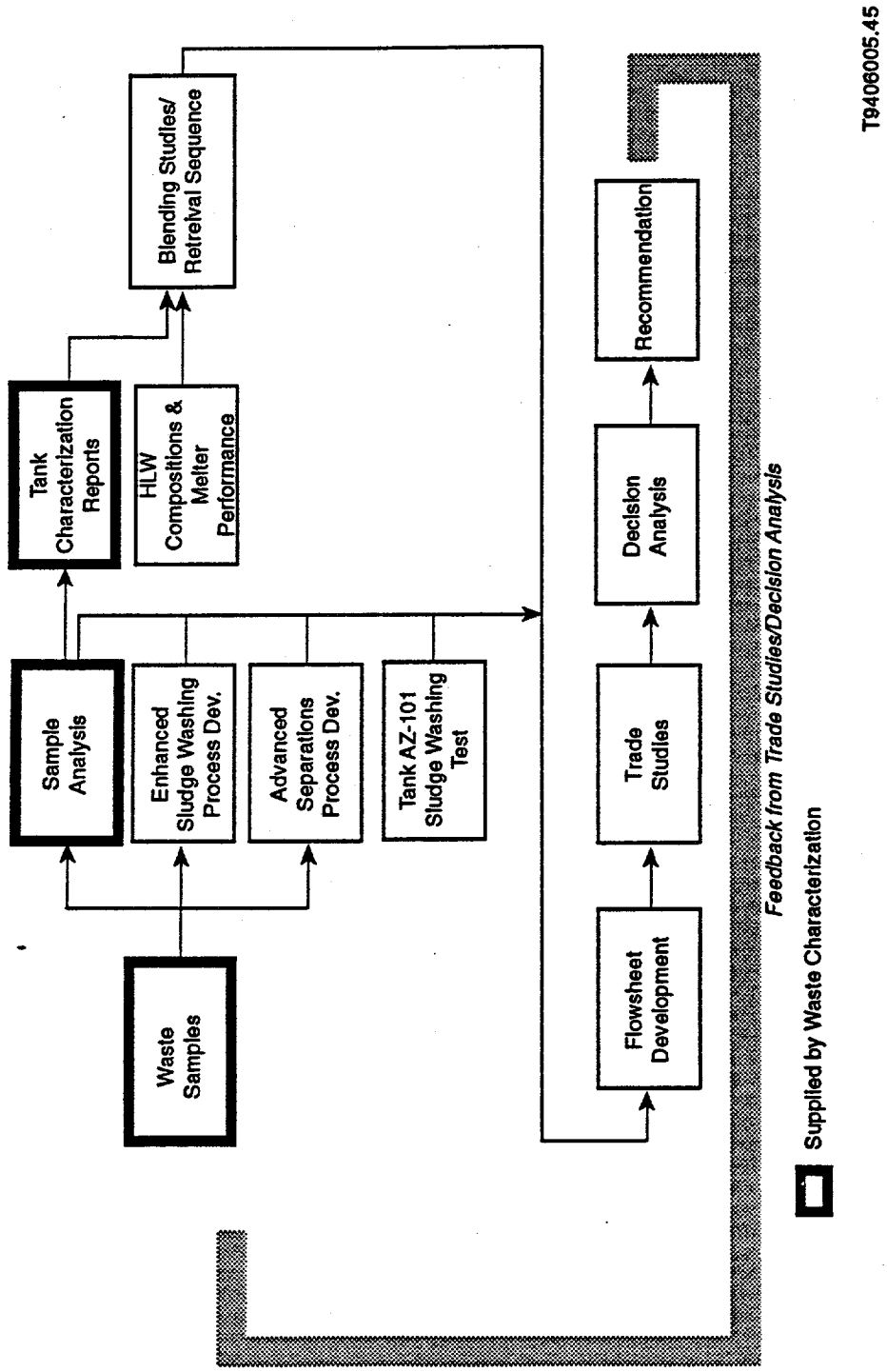
This section describes the logic and technical work for providing technical input to the enhanced sludge washing decision analysis (Figure 3-1). The technical workscope consists of eight major tasks; waste characterization, enhanced sludge washing process development, advanced separations process development, Tank AZ-101 sludge washing test, HLW feed composition and waste form selection, blending studies/retrieval sequence, flowsheet development, and trade studies. The logic shown in Figure 3-1 is iterative in that the results of trade studies and decision analysis that feeds the preliminary recommendations made in fiscal year (FY) 1995 and FY 1996 also feed back into the logic process. This can result in future changes to the type and amount of waste samples needed and the plan for enhanced sludge washing process development.

Summary information on milestones for the technical work supporting the enhanced sludge washing evaluation is provided in Table 6-1 of Section 6.0, Milestones. A Summary schedule is also provided on Figure 6-1 of Section 6.0. Detailed schedules are provided in Appendix A for each of the technical work tasks described in this section. Milestone Description Sheets (MDSs) for the key milestones are provided as Appendix B. The schedules and MDSs contained in this plan are a subset to the TWRS FY 1995 - 1997 Multi-Year Work Plan (Westinghouse Hanford Company [WHC] 1994b).

3.1 LOGIC FOR TECHNICAL WORK

The logic for performing technical work to feed the decision analysis for evaluating enhanced sludge washing is shown in Figure 3-1. The front-end work (Sections 3.2 to 3.7) described in the following paragraphs of Section 3.0 is funneled into flowsheet development (Section 3.8) to provide flow rates and feed stream compositions to the LLW and HLW vitrification facilities. In turn, flowsheet information is fed into trade studies (Section 5.9) to evaluate process alternatives and process baselines for the TWRS. Outputs from the trade studies include total life-cycle cost, relative technical risk, baseline schedule impacts and volume of HLW produced for the baseline and alternatives to the baseline. These data provide an important input to the decision analysis (Section 5.0) and the recommendation that documents the enhanced sludge washing evaluation.

Figure 3-1. Logic for Enhanced Sludge Washing Technical Work.



3.2 WASTE CHARACTERIZATION

The Waste Characterization Program has two primary functions in support of enhanced sludge washing: 1) assay the tank sludge wastes to provide inventories of the chemical and radiochemical (radionuclide) constituents, 2) provide samples of the tank sludge wastes for process development investigations (and also retain sample portions of the tank wastes for archive purposes). Chemical and radionuclide inventories are critical to estimating the scope of potential pretreatment processes, both in volume and complexity of effort. Actual tank waste samples ensure that laboratory studies are realistic, addressing the actual physical properties and chemical constituents found in Hanford tank waste sludges. These laboratory studies provide the information to determine process feasibility, to develop a process technology baseline, and to provide scaling data for design. The process technology baseline with its associated developed scaling data, in turn, permits engineering assessments and trade studies that will provide the technical basis for the evaluation of enhanced sludge washing. A number of infrastructure support items affect the ability of the Waste Characterization Program to provide adequate samples.

Over the next 3 years the Waste Characterization Program will provide samples for the Waste Pretreatment Program in accordance with formal procedures and will also archive sample portions for possible future use. A formal Data Quality Objectives (DQO) process that represents a disciplined, logical approach to effectively plan, define, obtain, and use samples is guiding sample selection and analysis. The samples requested represent the input and coordinated review of many people, including TWRS Process Engineering, Waste Pretreatment Program, and numerous principal investigators from national laboratories. The cost and difficulty in obtaining samples from tanks are recognized and factored into the sample requests. Principal investigators will submit test plans for all samples requested in accordance with guidelines provided by the Waste Characterization Program.

The samples requested for enhanced sludge washing studies will provide the basis of process technology through a series of laboratory investigations. Studies will be done on approximately 16 different tank/sludge samples in FY 1995, 30 in FY 1996, and 30 in FY 1997. Efforts will be equally divided between PNL and Los Alamos National Laboratory (LANL). Including the five sludge samples already investigated, a process technology baseline covering approximately 70 different sludges will be available for assessments and trade studies by July 1997. Data from these sludge samples will represent nearly 70 percent of the total sludge volume and include the significant waste streams currently identified.

The Waste Characterization Program has developed a draft sampling schedule that considers rotary, push, auger, and grab modes of sampling sludge; that incorporates new sampling hardware as it is planned to become operational; and that incorporates personnel qualification training. The draft sampling schedule provides enough samples in FY 1995, 1996, and 1997 to meet the above requirements. The milestones identified in Table 6-1, and the MDSs included in Appendix B document the Waste Characterization Program's

commitment to provide rotary core, push mode, and auger sludge samples in quantities sufficient to support enhanced sludge washing process development and evaluation.

- **Samples for Process Development/Enhanced Sludge Washing**

Actual tank waste samples are required for pretreatment studies that provide the necessary technical baseline of experimental data to allow realistic assessments of the proposed pretreatment processes. In more detail, pretreatment technology development: 1) provides the technical basis to support the technical approach in preparing acceptable waste feeds for HLW and LLW disposal, 2) fills the technical gaps in current technology to allow enhanced sludge washing evaluation with a minimum of uncertainty, and 3) provides sub-scale design data.

The pretreatment development program plans enhanced sludge washing studies for a number of different sludges. The following criteria represent the basis for sludge sample selection: 1) HLW glass loading especially aluminum, phosphate, and chromium content of the sludge, 2) total oxides in HLW and definition of actual pretreatment process behavior, 3) waste type using Sort On Radioactive Waste Volume (SORWT) model, which is the broadest survey of known variables in sludge waste compositions, 4) investigation of alternative pretreatment processes if enhanced sludge washing does not satisfy TWRS program goals and performance standards, and 5) development of tank selection and blending information to avoid forming hard-to-treat precipitates, if constituents of different tanks were to be mixed improperly.

- **Inventories of Tank Constituents**

Other information on the history of the tank waste, independent of the limited analysis data on tank waste constituents, must also be used. Such information includes process information, such as flowsheets on the various operations that occurred; recorded waste stream volumes to establish waste generation rates; and amounts of chemicals used during the various operations (to include process modifications/changes over each operation). These historic analyses require verification to enhance their defensibility and credibility. Such efforts are underway by a joint ICF-Kaiser Hanford/LANL team. Assessment of all available information can lead to more realistic tank waste inventories when augmented by judicious comparison with new waste sample analyses results.

- **Infrastructure Support**

Oak Ridge National Laboratory (ORNL) and LANL have stated they can handle sludge samples. LANL has already received small amounts of waste and plans to enhance its capability by putting a glove-box addition on a hot cell, which will facilitate handling of samples. There are serious concerns at PNL because of the Building 325 shutdown and difficulties in establishing alternatives such as other PNL facilities or the Plutonium-Uranium Extraction (PUREX) Laboratory. Nevertheless, the November to December 1994 time period appears reasonable for resumption of many operations.

Sandia National Laboratory (SNL) Transportation Department personnel have been continuing their support and evaluation efforts to assess support for pretreatment sampling by addressing the entire process from requesting samples, to taking samples, to handling and shipping samples, to receiving samples for process studies, to regulatory documentation (NEPA, DOT, NRC, etc.). Their initial assessment showed some short-term problems that they are working. A final letter report is due the end of September 1994 detailing the SNL findings and conclusions.

- **Outstanding Issues and Potential Problems.**

Direct determination of tank waste composition by sampling and analysis has severe limitations. Chemical and physical interactions of different waste streams as tanks were filled often caused the solid wastes in tanks to have large inhomogeneities both in the horizontal and the vertical directions, particularly for tanks that were partially sluiced. Riser access for sampling is limited, and often the sampling riser was previously used as a fill line riser, which may lead to bias in the waste components sampled. Consequently one or two core samples from a tank may not provide a true representation of a tank's actual average contents. Limited access, sample recovery issues, and the difficulty in obtaining these radioactive core samples make any statistical sampling procedure extremely difficult if not essentially impossible, both from a physical and economic standpoint.

The two major issues confronting enhanced sludge washing studies are: 1) whether the Waste Characterization Program can provide the tank sludge samples required for pretreatment in a timely manner (this includes both taking sample from a tank and doing the initial extrusion from the sampler and mixing segment extrusions from a core as necessary), and 2) whether the samples can be investigated to develop the necessary process technology baseline in a timely manner. A third and lesser issue exists concerning infrastructure support for shipping samples, handling samples, and analyzing samples onsite at each laboratory. This third issue should only represent a near-term perturbation.

The Waste Characterization Program has encountered serious difficulty in the tank farms this past year in obtaining samples. Additionally, much of the sampling support equipment has not been deployed to the tank farms yet. Considerable crew training requirements also remain. Consequently the sampling schedule currently being finalized depends upon a number of actions still being planned or implemented.

Alternatives and enhancements to both the means of sampling and sample selection are under consideration. Increased and improved auger mode sampling, which is relatively inexpensive and simple, is one consideration and using larger samplers is another. The grab mode provides sludge samples well within the desired time frame. However, grab sludge samples are only acceptable for pretreatment needs if each segment of the sludge core can actually be sampled, which has been a problem previously. Improved definition of tank waste constituents and streams through enhanced use of existing data and analyses offers potential to sample less but acquire more and better information.

The ability of the research laboratories to study enough sludge samples by July 1997 is a concern. Currently, the Building 325 facility at PNL is in a stand down because of safety problems in handling radioactive materials. This represents approximately 20 to 30 percent of the planned laboratory capacity for initial sample processing and 50 percent of the laboratory capacity for enhanced sludge washing studies. This situation has existed since April 22, 1994, (i.e., almost 5 months). Although there is a tentative start up date targeted for early November 1994, there is no definite date when PNL can resume normal enhanced sludge washing studies in the Building 325 facility.

PNL has investigated alternative sites for enhanced sludge washing and has found that the PUREX laboratory at Hanford could accommodate these studies. They have also found that the Building 324 facility could accommodate more limited studies. RL has directed that PNL should place all emphasis on the safe restart of the Building 325 facility at this time. If PNL cannot restart the Building 325 facility in November 1994 and other Hanford laboratories are not used, the enhanced sludge washing process technology base line planned to be available by July 1997 may be delayed. LANL is planning to start sludge washing studies in October 1994. As a backup, the Pretreatment Technology Development Program is soliciting a contingency proposal from ORNL to perform sludge washing studies.

Shipping samples offsite to LANL and ORNL, initial preparation of core samples from the tank, and onsite analyses may all be problems in FY 1995. Initial assessment by SNL Transportation Department personnel indicate that nominally 50 grams of all sludges can be shipped using a Type A container. WHC Transportation and Packaging has indicated that the SAFESEND Type A container that contains limited shielding should be available in November 1994, which would enable shipping 10 to 12 different sludge samples of 50 to 70 grams each year. Additionally, WHC has obtained approximately 20 small, nominally 30 gram Type A shipping containers from LANL. WHC has also acquired 2 PAS-1 Type B containers that could be used for 1 liter samples of sludge when NRC/DOT approval is granted for PAS-1 use, currently projected for January through March 1995. Consequently transportation of samples is currently only a concern and not anticipated to be a problem.

The limiting factor in the current draft sampling schedule proposed by the Waste Characterization Program is laboratory capacity both for initial preparation of core samples directly from the tank and for initial analyses of samples. Initial analytical requirements defined by the current DQOs for pretreatment represent an upper, most conservative limit. The amount of initial analyses required is being reviewed in response to a August 1994 Pretreatment Technical Advisory Panel (TAP) recommendation. The TAP recommended considerable relaxation in the initial analysis required, even to the extent of total elimination. Reduction in the amount of initial analysis of sludge samples for pretreatment may help alleviate the current schedule bottleneck, but total resolution depends on other actions since pretreatment represents only about 14 percent of the total Waste Characterization Program laboratory efforts. This is a near-term FY 1995 problem to resolve.

3.3 ENHANCED SLUDGE WASHING PROCESS DEVELOPMENT

The purpose of this work is to support flowsheet development by gathering data on the effectiveness of solid/liquid separation, sludge washing, and alkaline leaching through laboratory testing using actual tank waste. Annual status reports (TPA M-50-03-T01, T2A, T2B, and T2C) will be issued to document progress on enhanced sludge washing process development. These are identified in Table 6-1 and are described in the corresponding MDSs included in Appendix B.

- **Sludge washing using corrosion inhibited water and sludge leaching using sodium hydroxide**

This activity will consist of conducting laboratory tests on small samples (approximately 5 grams) of actual waste to determine the extent of removal of water and caustic soluble components when washed with inhibited water and sodium hydroxide. Component material balances will be determined as part of this effort. A wide variety of actual wastes will be tested over a range of concentrations and time conditions to estimate the effectiveness on solubilizing phosphates, aluminum and chromium, and other waste constituents near the limiting concentration for acceptable glass formulation. The number of waste types tested each year will depend on an evolving characterization sampling plan.

- **Selective sludge leaching**

Experiments using test-tube amounts of waste that are leached/reacted with dilute acid mixes, alkaline oxidants such as potassium permanganate and carbonate/hydroxide mixes will be conducted to determine if sludge leaching can be further enhanced. Tests in which the reaction time and temperature are varied will also be conducted. Component material balances should be determined as part of this effort.

- **Settling tests**

Liter amounts of actual waste will be used to study settling characteristics of washed sludge, alkaline leached sludge, and sludge rewashed with water. Settling times, the degree of sludge compaction and particle size/distribution in the supernatant will be measured in these tests. Effectiveness of settling agents will also be assessed if settling rates or degree of compaction are not acceptable. Characterization of the particles in the supernate is necessary to evaluate/test techniques to remove the suspended particle matter.

- **Extend sludge processing science**

Basic understanding of the chemical and physical properties that govern the leaching and metathesis of Hanford tank waste sludges is critical to project the effects of these unit operations over the entire range of sludges with limited testing of actual sludges. Experimental testing and modeling will investigate solubility mechanisms including chemical kinetics, ion interactions in solutions and on surfaces and transport processes. Information

on tests of actual sludge will provide input to this activity. The results of this activity will be used to update either the integrated flowsheet or variations of flowsheets used in trade studies.

- **Nonthermal reconstitution tests**

These tests are aimed at reproducing a sludge that is more amenable to caustic leaching than the original aged sludge. Small amounts of acid-dissolved sludge will be neutralized and caustic leached over a range of concentration and time conditions to estimate the effectiveness on solubilizing phosphates, aluminum and chromium and other waste constituents near the limiting concentration for acceptable glass formulation. Component material balances will be determined as part of this effort so that glass volumes may be projected for an integrated flowsheet and subsequent trade study.

3.4 ADVANCED SEPARATIONS PROCESS DEVELOPMENT

The purpose of this work is to develop alternatives to enhanced sludge washing if further reduction in HLW volume is required. A potential alternative being investigated is: acid dissolution followed by radionuclide separation using solvent extraction and/or ion exchange. Actual tank wastes will be used in the laboratory tests and results will be used for preliminary flowsheet development. In FY 1996 and FY 1997 acid dissolution and subsequent radionuclides removal will be pursued only if more simple pretreatment processes are unsuccessful. No milestones have been identified for this activity because only limited funding is available from EM-30 for advanced separations process development.

- **Acid dissolution tests**

Batch testing will be conducted on test-tube quantities under a wide range of time and temperature conditions using nitric acid, nitric/oxalic acid mixtures, and nitric/hydrofluoric acid mixtures. Component material balances will be determined so that better projections of the assumed HLW undissolved sludge and resulting glass volume can be made. This activity will be continued at a reduced level in FY 1995. Uncompleted FY 1994 work will be completed in FY 1995 with EM-30 funding.

- **Radionuclide separation of batch solvent extraction**

Laboratory testing of batch solvent extraction using test-tube quantities will result in preliminary separation coefficients determination for strontium and transuranics. The results of these tests will be used to confirm the generic Transuranic Extraction (TRUEX) Model or to update the model. Uncompleted FY 1994 work will be completed in FY 1995 with EM-30 funding.

- **Bench scale solvent extraction**

Continuous testing of an integrated solvent extraction using 2 cm contactors will be accomplished with simulated waste. Improved separation coefficients for strontium and transuranics will be determined as part of this activity. This activity is not funded by EM-30 in FY 1995.

- **Alternatives to solvent extraction**

Laboratory scale testing of strontium, cesium, and transuranics extraction methods other than solvent extraction will be investigated on test-tube quantities of acid dissolved sludge. This activity is not funded by EM-30 in FY 1995.

- **Cesium solvent extraction**

A solvent extraction process for cesium removal from acid dissolved sludge will be developed. This process will be combined with a strontium removal solvent extraction process that has previously been developed. This activity is not funded by EM-30 in FY 1995.

- **Update generic TRUEX model**

The TRUEX Computer Model developed by Argonne National Laboratory will be updated with new test data to aid in flowsheet development. The expanded version will include a model of Strontium Extraction (SREX) and Cesium Extraction (CSEX). This activity is not funded by EM-30 in FY 1995.

- **Silicotitanate tests for cesium removal**

Removal of cesium from acid dissolved sludge using crystalline silicotitanates will be investigated using test-tube quantities of actual wastes. Preliminary separations coefficients will be determined. This activity is not funded by EM-30 in FY 1995.

3.5 TANK AZ-101 SLUDGE WASHING TEST

This activity involves the performance of a process test to verify the effectiveness of in-tank sludge washing. Laboratory tests are performed on small samples of simulated and actual tank waste sludge to obtain design data on the effectiveness of sludge washing. However, the small scale of the laboratory testing leaves a large uncertainty regarding the implementation of sludge washing in Hanford tanks. An in-tank process test is the most expeditious way to test the effectiveness of in-tank sludge washing.

The process test will be performed by initially sludge washing tank AZ-101. The supernate from tank AZ-101 will be removed and tank AZ-101 will be filled with dilute waste, condensate, or conditioned process water and mixed during a mixer pump process test in support of the Waste Retrieval Program. The AZ-101 mixer pump will be installed as part of Project W-151, AZ-101 Process Test. The sludge washing process test in tank AZ-101 will be conducted in parallel with the Project W-151 mixer pump process test. During the mixer pump/sludge washing process test, measurements will be taken from previously installed instrumentation and sludge samples will be taken and analyzed for future reporting. After several months of mixer pump testing in tank AZ-101 the solids will be allowed to settle for several months during which time measurements will be taken from previously installed instrumentation and sludge samples will be taken and analyzed. Some specific data desired from the test that supports the evaluation of in-tank enhanced sludge washing is supernate clarity and settling times. The data from the test will be used to update the reference flowsheet and to prepare pretreat sludges/solids functions and requirements documents. Results of the sludge washing process test will be reported at the end of FY 1997.

After completion of the tank AZ-101 mixer pump/sludge washing process test, the washed solids from tank AZ-101 will be combined with the unwashed sludge in tank AZ-102 and the combined mixture will be washed and allowed to settle. The results of this second process test will not be available in time to provide input to the March 1998 M-50-03 Tri-Party Agreement milestone but will support planned sludge washing demonstrations is the late 1990s. Completion of this second process test will provide a demonstration of sludge washing, prepare all of the aging waste sludge for vitrification, and contain all of the washed aging waste sludge in one tank. The wash solutions will be concentrated and stored in one tank ready for cesium removal in the Initial Pretreatment Module (Project W-236B) scheduled for start-up in December 2004 (TPA M-50-02).

3.6 HIGH-LEVEL WASTE FEED COMPOSITION AND WASTE FORM SELECTION

The volume of the HLW glass waste form is ultimately determined by one primary factor, the volume of pretreated waste and one secondary factor, the waste loading. In order to attain the optimum volume of a HLW glass waste form that meets the waste acceptance specifications as defined by the Civilian Radioactive Waste Management System (CRWMS), the Pretreatment Program is working closely with the HLW Program to jointly define the feed stream requirements for pretreated HLW that will be immobilized in the HLW vitrification plant. Definition of the requirements are scheduled as shown in Table 6-1 and Figure 6-1 documented in the MDSs included in Appendix B.

The HLW Program is also working with the CRWMS by providing input to the advanced conceptual design effort at the geological repository. Input on the possible range of standard canisters has been requested (Sheridan 1994) and provided (Powell 1994). Future input will include information on alternate waste forms and canister size. The HLW

Program is working with the Office of Civilian Radioactive Waste Management (OCRWM) to establish optimized canister configuration for the Hanford HLW glass. Trade studies are being performed and reviewed with the OCRWM to evaluate the variables affecting canister handling in the HLW vitrification plant, storage of the canisters at Hanford, shipment of the canisters to the repository and handling of the canisters at the repository. Shipment of the canisters to the repository and their handling at the repository are paid by the disposal fee charged by the OCRWM. This fee has been estimated as several billion dollars and varies greatly with the canister configuration. Thus, these trade studies are important in determining the cost of the disposal program. A report on the results of the trade studies is due in April 1996.

Based on the Pretreatment Program's initial predictions of the range and variability of the HLW feed streams, chemical simulants of pretreated HLW will be used in a series of laboratory-scale, small-scale, and pilot-scale tests. The HLW testing program will evaluate and select a melter system, formulate optimum glass compositions that are compatible with the selected melter, and identify those chemical constituents that are of particular concern to the long-term performance of the waste glass. Data generated by the testing program will provide input to the Pretreatment Program for further updating of its feed processibility and blending studies and other process development activities. Subsequent updates of HLW feed stream ranges and variability by the Pretreatment Program and test results from the HLW Program using chemical simulants will further refine the iterative optimization of HLW feed streams and specification of compatible glass formers.

Small quantities of radioactive pretreated wastes will be required from the Pretreatment Program to confirm early test results obtained through the use of simulants. These confirmatory tests will be performed on a small-scale and will be used to validate the predictive glass formulation models. This combination of simulant testing, glass formulation modeling, and confirmatory radioactive tests will ultimately define the glass composition envelope that provides acceptable long-term performance in accordance with the waste acceptance specifications defined by the CRWMS. Definition of the glass composition envelope is an iterative process that attempts to optimize the waste oxide loading for the range of pretreated HLW feed streams.

A major parameter in achieving an acceptable glass composition envelope is the selection of a reliable and predictable glass melter system. Glasses with higher melting temperatures than those associated with borosilicate glasses can accommodate a broader range and higher volume of waste constituents, while maintaining acceptable levels of durability. The generally higher waste loadings per unit volume and the increased solubility of specific chemical constituents associated with higher melting temperature glasses have significant implications with regards to the amount of HLW produced. If waste oxide loadings approaching 45 percent are achievable for the higher melting temperature glasses it will result in approximately half the volume of glass that would be produced for the nominal 25 percent waste oxide loadings achieved with borosilicate glasses.

3.7 BLENDING STUDIES/RETRIEVAL SEQUENCE

Previous studies have shown that blending waste into homogeneous batches prior to immobilization may result in a significant reduction in HLW volume (Geeting and Kurath 1993). The reduction occurs because the blended waste can have several chemical constituents near the limiting concentration for acceptable glass formulation rather than a single constituent. However, the ability to blend waste and its effectiveness is integrally tied to the tank waste retrieval sequence, waste transfer capability, and lag storage capacity. Blending studies to evaluate different retrieval and processing sequences will be continued as integrated retrieval and pretreatment efforts.

The blending studies will use a decision-analysis approach involving a team comprised of key personnel from several of the major TWRS program elements. An overall goal of the work is to develop a retrieval sequence and blending strategy that supports successful execution of the TWRS mission and to provide estimates of immobilized LLW and immobilized HLW feed composition versus time. The major drivers affecting the retrieval sequence and blending strategy will be identified and system models will be prepared as needed to understand and evaluate which factors affect retrieval sequences and blending strategies. Computer tools will be developed as needed to aid in understanding these factors. The work will identify which TWRS performance measures, measures of effectiveness, or other criteria should be used in evaluating retrieval and blending sequences and strategies. Blending options to be considered include:

- Blending by tank farm.
- Blending by waste type.
- Blending to provide a minimal number of feeds to LLW and HLW vitrification facilities.

The blending studies described here are identified in Table 6-1, and the corresponding MDSs are included in Appendix B. These studies directly support the Tri-Party Agreement Milestone M-45-02 annual reports on SST retrieval sequence. Completion of the M-45-02 milestones is the responsibility of the Retrieval Program. This work will provide the technical basis and rationale for the sequences documented in the retrieval sequence documents that satisfy the M-45-02 milestones. Retrieval sequences identified will also be incorporated into preliminary flowsheets and updates of the TWRS reference flowsheet.

3.8 FLOWSHEET DEVELOPMENT

This work covers the development and maintenance of process flowsheets for the pretreatment of Hanford tank wastes. The flowsheets document the reference process for pretreating Hanford tank waste and provide flow rates and compositions for feed streams to the LLW and HLW vitrification facilities. A reference flowsheet has been prepared, TWRS

Process Flowsheet (Orme 1994), based on the use of caustic (sodium hydroxide) and water to wash aluminum, phosphate, and soluble species out of the Hanford tank waste sludges. This approach is part of the processes termed "enhanced sludge washing" in the Fourth Amendment to the Tri-Party Agreement. The wash waters are routed to LLW pretreatment for removal of cesium and, possibly, strontium and technetium before feeding the liquid stream to the LLW vitrification facility. The radionuclides removed in LLW pretreatment are stored in the tank farm until they are vitrified in the HLW vitrification facility.

The reference flowsheet will be updated annually to incorporate information from ongoing pretreatment development work, blending and retrieval strategy developments, and recommendations from preliminary process flowsheets. These updates are identified on the detailed schedules in Appendix A. The FY 1996 update is included on Figure 6-1 and described in the MDSs included in Appendix B. The reference flowsheet and its updates will support The Tri-Party Agreement Milestone M-50-03 by providing part of the basis for decision making. Information obtained each year from sludge washing and caustic leaching laboratory tests will be incorporated into the reference flowsheet by updating the wash factors used to model the partitioning achieved during washing. Information obtained from laboratory settling tests and in-tank process tests will also be incorporated into the flowsheet in the form of settling times and separation efficiencies.

Some preliminary flowsheets that will support updates to the reference flowsheet include the cesium removal flowsheets for CS-100 and resorcinol-formaldehyde resins (Tri-Party Agreement Milestone M-50-01-T01), a cesium removal flowsheet using crystalline silicotitanate resin, preliminary strontium and technetium removal flowsheets, a time-phased retrieval flowsheet, and a "strawman" advanced processing flowsheet (and updates). As other technologies or needed separations are identified, other flowsheets will be prepared to aid in selection of the Hanford tank waste pretreatment processes. All the preliminary flowsheets will be incorporated into the reference flowsheet after a trade study is performed to establish the need and benefit of adding a proposed process to the overall pretreatment strategy, or a formal process evaluation and selection is performed to choose between alternatives. While these other flowsheets do not directly address the sludge processing portion of the reference flowsheet, the secondary waste generation from these can impact the HLW vitrified product volumes and the canister count.

3.9 TRADE STUDIES

This work includes the evaluation of process alternatives through trade studies that establish the technical and process baselines for Hanford tank waste pretreatment. The trade studies will be used to identify alternate configurations for the LLW and HLW pretreatment processes. Advantages and disadvantages of the various options will be identified and a preferred option recommended. The work is performed by identifying facility functions and requirements, identifying and reviewing alternate options, and preparing preliminary cost estimates for each option. Engineering studies will be performed to assess the performance of the options and identify the best option. In addition, assessments of specific systems,

subsystems, and component implementations will be conducted to optimize plant performance and adapt to changing operating conditions or requirements.

A key trade study planned for FY 1995, with updates in FY 1996 and 1997, is determination of the waste processing strategy for tank waste. The FY 1995 trade study will provide technical input to the TWRS EIS on alternatives for processing tank waste that are (1) no pretreatment, (2) extensive pretreatment, and (3) Tri-Party Agreement preferred. The no pretreatment and extensive pretreatment alternatives were addressed in the 1993 Tank Waste Technical Options Report, WHC-EP-0616, Rev. 0 (Boomer, et al. 1993). Because the Tank Waste Technical Options Report did not address the Tri-Party Agreement preferred alternative, a major focus of the 1995 waste processing alternatives trade study will be an evaluation of the technical risk and life-cycle cost of the Tri-Party Agreement preferred alternative.

The Tri-Party Agreement preferred alternative is the technical baseline in the Fourth Amendment of the Tri-Party Agreement of January 1994. This alternative consists of in-tank sludge washing and enhanced sludge washing (caustic leaching) and processes to separate the waste into HLW and LLW fractions. To provide a consistent basis for comparing waste processing alternatives, facility layouts, and costs in the 1993 Tank Waste Technical Options Report (Boomer et al, 1993) will be updated based on the recently completed Tank Waste Facility Configuration Study (Boomer 1994) and flowsheet data will be updated based on the recently completed TWRS Process Flowsheet (Orme 1994). Both the facility configuration study and the process flowsheet include technical aspects (i.e., sludge washing and enhanced sludge washing) of the Tri-Party Agreement preferred alternative. The 1996 trade study update will include the schedule and cost impacts of implementing advanced separation processes assuming that enhanced sludge washing does not result in a reasonable volume of HLW.

4.0 POLICY ISSUES

Policy issues are factors that may have a major effect on the evaluation of enhanced sludge washing but are generally outside the control of the TWRS program. They may be budgetary, regulatory, configuration, timing, etc, in nature and can act as major constraints. Examples of policy issues that are recognized as having the potential for impacting the evaluation of enhanced sludge washing include:

- Funding levels
- Timing (e.g., how long must HLW be stored at Hanford - when will the CRWMS federal repository accept Hanford HLW?)
- NEPA (will the SST waste be retrieved?)
- Regulatory (will LLW be disposed of onsite, under what conditions?)

The above list is not intended to be all-inclusive, only illustrative. Other important policy issues are expected to be identified during the evaluation process

The criteria for what constitutes a "reasonable" volume of HLW in evaluating the adequacy of enhanced sludge washing is sometimes viewed as a policy issue. In fact, it represents a result of (rather than an input to) the evaluation process that must reflect consideration of all the relevant factors - policy issues, technical information, costs and stakeholder values. For example, what constitutes a "reasonable" volume of HLW might be significantly different for stakeholder values related to the shipment of HLW to the repository than for stakeholder values related to the interim storage of HLW at Hanford for an extended period. The FY 1995 decision basis development activity (see section 5.0) will focus on creating the capability to define the criteria for a reasonable HLW volume.

Participation in policy determinations that may have a major impact on the evaluation of enhanced sludge washing is recognized as being as important as gathering technical information. It is expected that the advanced conceptual design effort at the geological repository will result in improved definitions of the acceptable limits on HLW canister size and heat loading and associated waste disposal. It is intended that results from the enhanced sludge washing evaluation process will be used to provide input to and be helpful in formulating federal repository policy, TWRS - EIS decisions, and other policy actions, as appropriate. No milestones have been defined for policy issues.

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5.0 EVALUATION PROCESS

The evaluation process represents an integral part of the TWRS systems engineering process (WHC 1994a). Figure 5-1 shows the relationship of the evaluation process to other systems engineering process steps. The decision on the adequacy of enhanced sludge washing is only one of many important decisions that will guide the refinement of TWRS functions and requirements definition (DOE-RL 1994). The decision hierarchy for TWRS has been developed and documented (Johnson 1994) and this plan will guide the completion of Decision 4.2.2.1, "Determine Waste Separations Process."

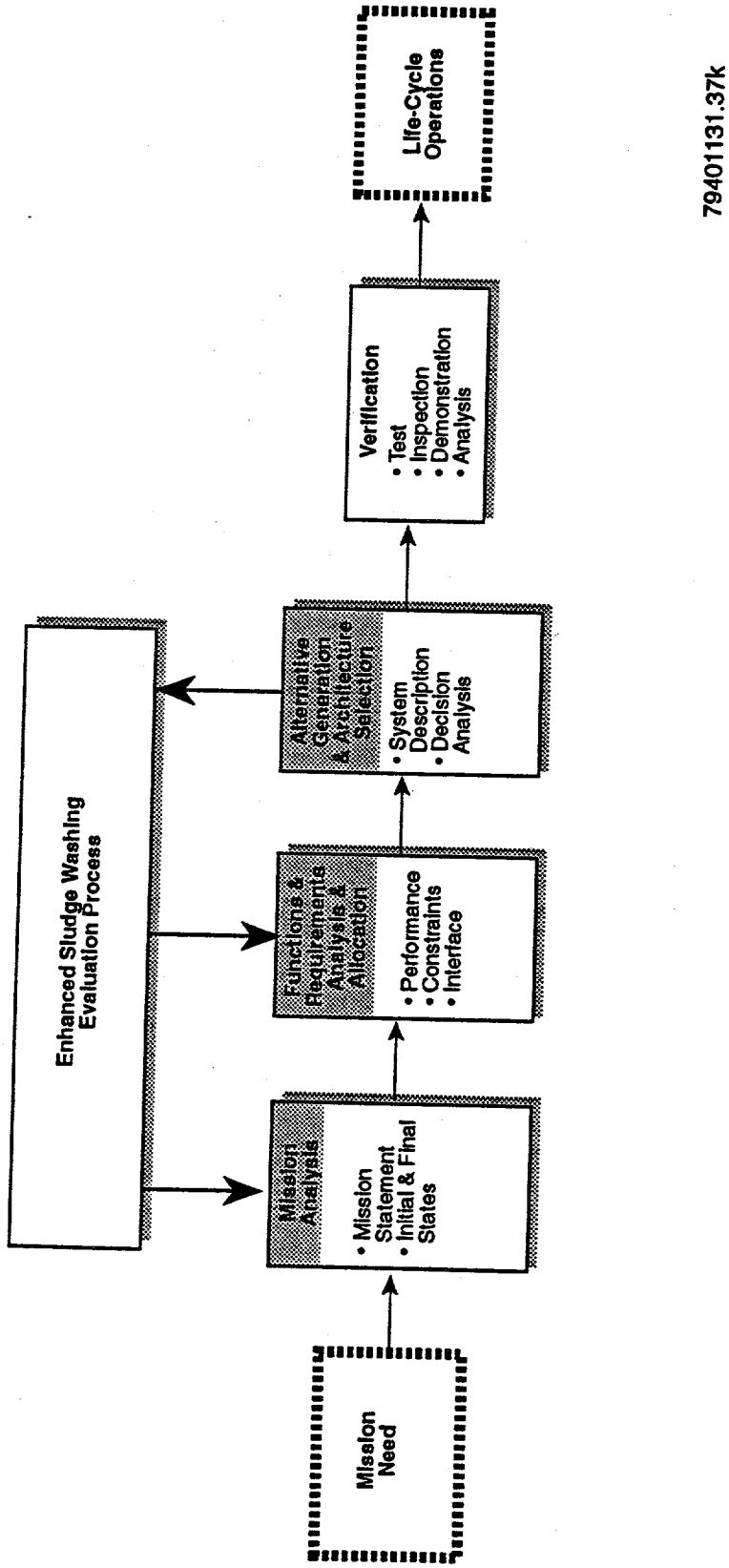
5.1 EVALUATION METHOD

Central to the choice of an evaluation method for complex systems is the realization that most decisions are made with some uncertainty. The notion that all uncertainty can be resolved is unrealistic. Therefore a method must be chosen that can accommodate uncertainty, is rigorous and defensible, and that will result in the best decision at any given time under the uncertainty that exists. Further the evaluation method must enable the decision maker(s) to discern between important and irrelevant factors affecting the decision in a quantifiable way. If time is available before a decision must be made the evaluation methodology can be used to aid in the prioritization of resource allocation to reduce uncertainty in the most critical areas.

Decision analysis (Sage 1992) provides the required attributes for the evaluation of enhanced sludge washing and is the evaluation method of choice. Decision analysis combines systems engineering and statistical decision theory to create a methodology for rational choice in complex, dynamic, and uncertain situations.

The decision analysis procedure is made up of three steps: formulation, analysis, and appraisal. Formulation provides a formal model of the actual decision situation. This model is often a computer spreadsheet model. Analysis begins with a deterministic analysis and concludes with a probabilistic analysis. The deterministic analysis identifies the key uncertainties and drivers that affect the value measures. The probabilistic analysis assesses the key uncertainties as probability distributions and computes the probability of value measures for each alternative. Appraisal critically reviews the sensitivity of the results to

Figure 5-1. Program Systems Engineering Process.



new alternatives, new information, different tradeoffs among values, and improved formulation or representation of the decision situation. If the appraisal proves satisfactory, then the recommendation of the decision analysis should lead to a clear decision.

During formulation, formal techniques for representing the decision situation and alternatives will be used, such as strategy tables, influence diagrams, decision trees, and decision hierarchies. During analysis, formal analytical techniques for system modeling, deterministic sensitivity, probabilistic assessment, and probabilistic analysis will be used as needed. During appraisal, formal techniques for the value of information, value of control, and level of decision quality will be used to focus any additional decision analysis needed for making a clear choice from among the alternatives.

5.2 DECISION PROCESS

The decision process for selecting the preferred TWRS sludge processing approach will conduct three iterations of development for the decision basis. Each iteration will rely on stakeholder contribution for relevant information and analysis, for clear value measures, and for a wide range of alternatives that should be considered before a decision is made. At the conclusion of each stage of iteration of decision basis development, stakeholder review and comment will identify the remaining issues that must be resolved before a clear choice will be selected.

The decision basis is the decision frame (which establishes the purpose, scope, and objectives of the decision), the set of alternatives, the value measures, and relevant information. Each stage of iteration will improve the decision basis from the available set of alternatives, value measures, information, and evaluation methodology. During the first stage of decision basis development, existing enhanced sludge washing information will be modeled. The decision analysis will be used to focus on the areas requiring additional work. For example, the review may identify that additional alternatives are needed to complete the evaluation of enhanced sludge washing. Information gaps that the next iteration in the following fiscal year must fill will be identified.

Three iterations will be conducted to complete the development of the final decision basis that will support the selection of the best alternative. At the end of each iteration, the decision basis will identify the best choice from the available information. New milestones are defined to coincide with the completion of each of the first three iterations on September 30, in 1995, 1996, and 1997, respectively. The information that would change this choice will then be identified to direct further activities toward specific results having the most impact on the decision.

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6.0 MILESTONES

A total of 44 enhanced sludge washing evaluation related milestones are summarized in Table 6-1. Fifteen milestones are existing Tri-Party Agreement Milestones and 29 are newly defined milestones. Totals for activities discussed in this plan are as follows: Waste Characterization - 4 existing, 5 new; Enhanced Sludge Washing - 4 existing, 3 new; tank AZ-101 Sludge Washing Test existing - 1 existing, 4 new; HLW Feed Composition and Waste Form Selection - 6 new; Blending Studies/Retrieval Sequence - 2 existing, 3 new; Flowsheet Development - 2 new; Trade Studies - 3 new; Evaluation Process - 2 existing, 3 new. In addition, 2 existing milestones which illustrate the relationship between the enhanced sludge washing evaluation and the HLW pretreatment facility design are included in Table 6-1.

Milestones are listed in chronological order in Table 6-1. Milestone description sheets for all milestones are contained in Appendix B, also in chronological order.

The summary enhanced sludge washing evaluation schedule is shown on Figure 6-1. Detail schedules are shown in Appendix A.

Table 6-1. Enhanced Sludge Washing Evaluation Related Milestones. (2 pages)

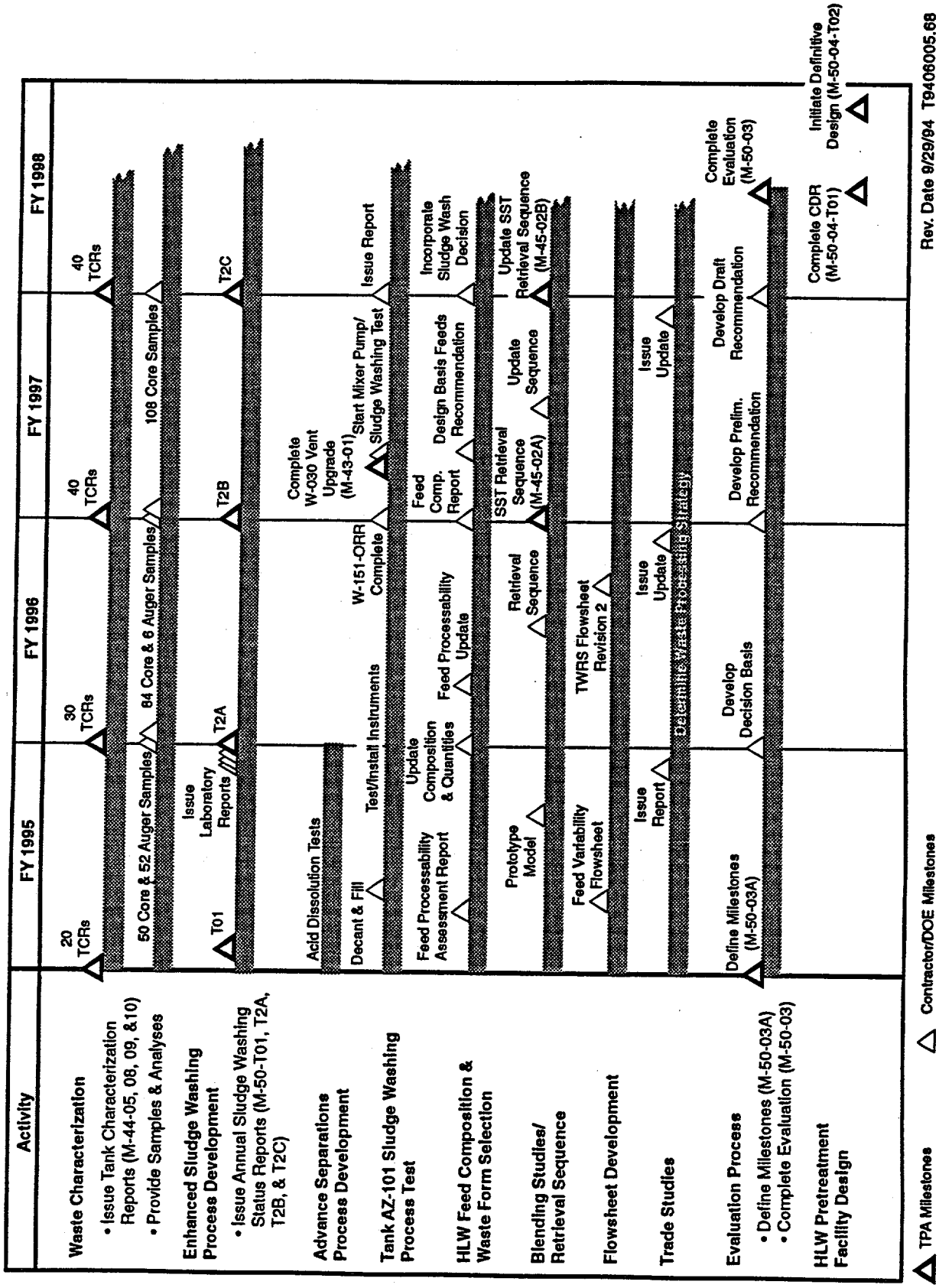
Control Number	Type (Number)	Title	Due Date
TDC-94-390	TPA	Define Additional Milestones for Waste Pretreatment Leading to the Decision whether Advanced Sludge Separation Processes are Required	09/30/94
TW4-94-519	TPA (M-44-05)	Issue 20 Tank Characterization Reports in Accordance with the Approved TCP's	09/30/94
T3A-95-101	TPA (M-50-03-T01)	Issue Report on Current Status of Tank Waste Enhanced Sludge Washing	10/31/94
T3A-95-148*	CONTRACTOR	Issue a Time-Phased Flowsheet Focusing on Feed Variability	12/30/94
T3C-95-104*	CONTRACTOR	Issue Feed Processability Assessment Report	01/06/95
T3A-95-146*	CONTRACTOR	Complete Decant and Fill of Tank AZ-101	01/31/95
T3A-95-140*	CONTRACTOR	Issue Prototype Decision Model for Waste Pretreatment Alternatives	06/01/95
T3A-95-136*	DOE-RL	Determine Waste Processing Strategy and Waste Separations Process	09/01/95
T2D-95-135*	DOE-RL	Collect Rotary and Push Mode Core Samples from HLW Tanks	09/28/95
T2D-95-136*	DOE-RL	Collect Auger Samples from HLW Tanks	09/28/95
T3A-95-102	TPA (M-50-03-T2A)	Submit Report Summarizing the Testing of Enhanced Sludge Washing and Related Tank Waste Sludge Pretreatment Methods for Samples of Tank Waste Sludge	09/29/95
T3A-95-131*	CONTRACTOR	Issue Report on Laboratory Settling Tests of Tank C-107 Sludge	09/29/95
T3A-95-132*	CONTRACTOR	FY 1995 Sludge Washing/Alkaline Leach Tests Conducted at LANL	09/29/95
T3A-95-133*	CONTRACTOR	FY 1995 Sludge Washing/Alkaline Leach Tests Conducted at LANL	09/29/95
T2D-95-102	TPA (M-44-08)	Issue 30 Tank Characterization Reports in Accordance with the Approved Tank Characterization Plans. Complete Input of Characterization Information for 30 HLW Tanks to Electronic Database(s)	09/30/95
T3A-95-112*	DOE-RL	Develop Decision Basis for Evaluation of Enhanced Sludge Washing to Determine Whether Advanced Sludge Separation Processes are Required	09/30/95
T3C-96-114*	CONTRACTOR	Updated Estimates of Tank Waste Types, Compositions & Quantities	10/02/95
T3C-96-107*	CONTRACTOR	Update Feed Processability Evaluation	01/04/96
T3A-96-132*	DOE-RL	Retrieval Sequence (a) Selected	04/03/96
T3A-96-131*	CONTRACTOR	TWRS Process Flowsheet, Rev. 2	08/30/96
T3A-96-140*	CONTRACTOR	Update of Determine Waste Processing Strategy and Waste Separations Process (4.2.2/4.2.2.1)	08/30/96
T2D-96-113*	DOE-RL	Collect Rotary and Push Mode Core Samples form HLW Tanks	09/26/96
T2D-96-114*	DOE-RL	Collect Auger Samples from HLW Tanks	09/26/96
T2D-96-102	TPA (M-44-09)	Issue 40 Tank Characterization Reports in Accordance with the Approved Tank Characterization Plans. Complete Input of Characterization Information for 40 HLW Tanks to Electronic Database(s)	09/30/96
T2E-96-101	TPA (M-45-02A)	Submit Initial Single Shell Tank Retrieval Sequence Document for Ecology Approval	09/30/96
T2E-96-102*	DOE-RL	W-151 ORR/Start-Up Complete	09/30/96

Table 6-1. Enhanced Sludge Washing Evaluation Related Milestones. (2 pages)

Control Number	Type (Number)	Title	Due Date
T3A-96-100	TPA (M-50-03-T2B)	Submit Report Summarizing the Treating of Enhanced Sludge Washing and Related Tank Waste Sludge Pretreatment Methods for Samples of Tank Waste Sludge	09/30/96
T3A-96-110*	DOE-RL	Preliminary Recommendation on Evaluation of Enhanced Sludge Washing to Determine Whether Advanced Sludge Separation Processes are Required	09/30/96
T3C-97-109*	CONTRACTOR	Documentation of Potential Feed Composition Ranges Estimate	10/01/96
T2C-97-100	TPA (M-43-01)	Project W-030 Tank Farm Ventilation Upgrade	12/31/96
T3A-97-114*	CONTRACTOR	Initiate AZ-101 Sludge Washing Process Test	01/02/976
T3C-97-107*	CONTRACTOR	Recommend Design Basis Feeds for Conceptual Design	01/03/97
T3A-97-110*	CONTRACTOR	Retrieval Sequence (b) Selected	04/03/97
T3A-97-111*	CONTRACTOR	Update of Determine Waste Processing Strategy and Waste Separations Process (4.2.2/4.2.2.1)	08/29/97
T2D-97-109*	DOE-RL	Collect Rotary and Push Mode Core Samples form HLW Tanks	09/25/97
T3C-97-100*	CONTRACTOR	Incorporate Pretreatment CDR & Sludge Wash Decision	09/29/97
T2D-97-102	TPA (M-44-10)	Issue 40 Tank Characterization Reports in Accordance with the Approved Tank Characterization Plans. Complete Input of Characterization Information for 40 HLW Tanks to Electronic Database(s)	09/30/97
T2E-97-104	TPA (M-45-02B)	Submit Annual Update of SST Retrieval Sequence	09/30/97
T3A-97-101	TPA (M-50-03-T2C)	Submit Report Summarizing the Testing of Enhanced Sludge Washing and Related Tank Waste Sludge Pretreatment Methods for Samples of Tank Waste Sludge	09/30/97
T3A-97-105*	DOE-RL	Issue Draft Recommendation on Evaluation of Enhanced Sludge Washing to Determine if Advanced Sludge Separation Processes are Required	09/30/97
T3A-97-107*	DOE-RL	Complete In-Tank Sludge Washing Process Test and Issue Report (Tank AZ-101)	09/30/97
T3A-98-100	TPA (M-50-03)	Complete Evaluation of Enhanced Sludge Washing to Determine if Advanced Sludge Separation Processes are Required	03/31/98
T3A-98-101	TPA (M-50-04-T01)	Submit Conceptual Design of HLW Pretreatment Facility	03/31/98
T3A-99-100	TPA (M-50-04-T02)	Initiate Definitive Design of HLW Pretreatment Facility	11/30/98

*Newly Defined Milestones

Figure 6-1. Summary of Enhanced Sludge Washing Evaluation Schedule.



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APPENDIX A

SCHEDULE OF TECHNICAL WORK SUPPORTING ENHANCED SLUDGE WASHING EVALUATION

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EARLY START	EARLY FINISH	MILN	
			CHARACTERIZATION
	30SEP94	TW4-94-519	M-44-05 Issue 20 TCRs ◇ N4E54A00A
30CT94	29SEP95		Complete 8 Sample Preps for Disposal (FY 1995) N4D47A01
30CT94	29SEP95		Complete 4 Analyses for Disposal (FY 1995) N4D47B01
30CT94	29SEP95		Transmit 3 216 Day Val reports for Disposal N4D47C01
1NOV94	29SEP95		Complete 6 Sample Preps for 325 Lab Disposal N4D47D01
1NOV94	29SEP95		Complete 3 Analyses for 325 Lab Disposal N4D47D04
1NOV94	29SEP95		Transmit 2 216 Day Rpts for 325 Disposal N4D47D07
	29SEP95	T2D-95-135	Collect Rotry/Push Mode Core Smpls from Tanks ◇ N4C32A112A
	29SEP95	T2D-95-136	Collect Auger Samples from Tanks ◇ N4C33A112A
	29SEP95	T2D-95-102	M-44-08 Issue 30 TCRs ◇ N4E54A01A
20CT95	30SEP96		Complete 12 Sample Preps for Disposal (FY 1996) N4D47A02
20CT95	30SEP96		Complete 11 Analyses for Disposal (FY 1996) N4D47B02
20CT95	30SEP96		Transmit 9 216 Day Val Rpts for Disposal N4D47C02
20CT95	30SEP96		Complete 8 Sample Preps for 325 Lab Disposal N4D47D02
20CT95	30SEP96		Complete 11 Analyses for 325 Lab Disposal N4D47D05

1993 1994 1995 1996 1997 1998 1999
ONDJFMAMJJASONDJFMAMJJASONDJFMAMJJASONDJFMAMJJASONDJFMAMJJASONDJFMAMJJAS

Plot Date 29SEP94
Data Date 10CT93
Project Start 30SEP93
Project Finish 21DEC28

(c) Primavera Systems, Inc.

Activity Bar/Early Dates
Critical Activity
Progress Bar
◇/P Milestone/Flag Activity

N50A

Sheet 1 of 12

WESTINGHOUSE HANFORD COMPANY
WASTE PRETREATMENT
M-50-03 Report

Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	
			CHARACTERIZATION
20OCT95	30SEP96		Transmit 6 216 Day Val Rpts 325 Disposal (N4D47D08)
	30SEP96	T2D-96-113	Collect Rotry/Push Mode Core Smpls from Tanks (N4C32A122A)
	30SEP96	T2D-96-114	Collect Auger Core Samples from Tanks (N4C33A122A)
	30SEP96	T2D-96-102	M-44-09 Issue 40 TCRs (N4E54A02A5)
10OCT96	30SEP97		Complete 8 Sample Preps for Disposal (FY 1997) (N4D47A03)
10OCT96	30SEP97		Complete 12 Analyses for Disposal (FY 1997) (N4D47B03)
10OCT96	30SEP97		Transmit 17 216 Day Val Rpts for Disposal (N4D47C03)
10OCT96	30SEP97		Complete 5 Sample Preps for 325 Lab Disposal (N4D47D03)
10OCT96	30SEP97		Complete 12 Analyses for Disposal (N4D47D06)
10OCT96	30SEP97		Transmit 11 216 Day Val Rpts 325 Disposal (N4D47D09)
	30SEP97	T2D-97-109	Collect Rotry/Push Mode Core Smpls from Tanks (N4C32A132A)
	30SEP97	T2D-97-102	M-44-10 Issue 40 TCRs (N4E54A03A)
			ENHANCED SLUDGE WASHING PROCESS DEVELOPMENT
1APR94	19OCT94		Prepare 1994 M-50-03-T01 Status Report (PSW04390)
30OCT94	30DEC94		Sldg Pretreat Chemistry Evaluation (Carryover) (AND200)

1993 1994 1995 1996 1997 1998 1999

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Plot Date 29SEP94
Data Date 10CT93
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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

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WESTINGHOUSE HANFORD COMPANY
WASTE PRETREATMENT
M-50-03 Report

Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	
			ENHANCED SLUDGE WASHING PROCESS DEVELOPMENT
30CT94	31OCT94		RL Transmit 1994 M-50-03-T01 Status Report PSW04400
30CT94	29SEP95		Cond Sludge Settling Tests 94-95 Cores PTD5060
30CT94	29SEP95		Establish Radioactive Colloid Test Capability PTD5080
30CT94	29SEP95		Sludge Wash/Alk Leach Test-Act 94-95 Cores-LANL PTL5010
30CT94	29SEP95		Technology Development Program Mgmt - FY 1995 PTW5075Z
30CT94	29SEP95		Infrastructure Support - FY 1995 PTW5090Z
	31OCT94	T3A-95-101	M-50-03-T01 Iss Rpt Stat of Tk Wst Enh Sldg Wash PSW04390A
1NOV94	30OCT95		Sludge Wash/Alk Leach Tests Act 94-95 Cores-PNL PTD5000
1NOV94	30OCT95		Eval Process Science of Actual Sludge - 94-95 PTD5040
1NOV94	30OCT95		Cond Selective Leach Tests of Act 94-95 Cores PTD5050
3APR95	30JUN95		Prepare 1995 M-50-03-T2A Status Report PSW04710
5JUL95	31AUG95		Finalize 1995 M-50-03-T2A Status Report PSW04720
1SEP95	29SEP95		RL Transmit 1995 M-50-03-T2A Status Report PSW04730
	29SEP95	T3A-95-102	M-50-03-T2A - Subt Rpt Sum the Testing of ESW PSW04730A
	29SEP95	T3A-95-131	Iss Rpt on Lab Settling Tests of 107-C Sludge PTD5060A

1993 1994 1995 1996 1997 1998 1999

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Plot Date 29SEP94
Data Date 10CT93
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Activity Bar/Early Dates
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WESTINGHOUSE HANFORD COMPANY
WASTE PRETREATMENT
M-50-03 Report

Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	Activity
			ENHANCED SLUDGE WASHING PROCESS DEVELOPMENT
	29SEP95	T3A-95-133	FY 1995 Sludge Wash/Alkaline Leach Tests-LANL (PTL5010A)
20CT95	30SEP97		Cond Sludge Settling Tests 95-Out Cores (PTD5065)
20CT95	30SEP97		Conduct Radioactive Colloid Tests (PTD5085)
20CT95	30SEP97		Sludge Wash/Alk Leach Test Act 95-Out Cores-LANL (PTL5015)
	30OCT95	T3A-95-132	FY 1995 Sludge Wash/Alkaline Leach Tests-PNL (PTD5000A)
31OCT95	29OCT97		Sludge Wash/Alk Leach Test Act 95-Out Cores-PNL (PTD5005)
31OCT95	29OCT97		Eval Process Science of Actual Sludge - 95-Out (PTD5045)
31OCT95	29OCT97		Cond Selective Leach Tests of Act 95-Out Cores (PTD5055)
1APR96	28JUN96		Prepare 1996 M-50-03-T2B Status Report (PSW04740)
1JUL96	30AUG96		Finalize 1996 M-50-03-T2B Status Report (PSW04750)
3SEP96	30SEP96		RL Transmit 1996 M-50-03-T2B Status Report (PSW04760)
	30SEP96	T3A-96-100	M-50-03-T2B - Subt Rpt Sum the Testing of ESW (PSW04760A)
3APR97	30JUN97		Prepare 1997 M-50-03-T2C Status Report (PSW04770)
1JUL97	29AUG97		Finalize 1997 M-50-03-T2C Status Report (PSW04780)
2SEP97	30SEP97		RL Transmit 1997 M-50-03-T2C Status Report (PSW04790)

Timeline: 1993 (O N D) 1994 (J F M A M J J A S O N D) 1995 (J F M A M J J A S O N D) 1996 (J F M A M J J A S O N D) 1997 (J F M A M J J A S O N D) 1998 (J F M A M J J A S O N D) 1999 (J F M A M J J A S)

Plot Date 29SEP94
Data Date 10CT93
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Activity Bar/Early Dates
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WESTINGHOUSE HANFORD COMPANY
WASTE PRETREATMENT
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Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	
			ENHANCED SLUDGE WASHING PROCESS DEVELOPMENT
	30SEP97	T3A-97-101	M-50-03-T2C Subt Rpt Sum the Testing of ESW PSW04790A
			ADVANCED SEPARATIONS PROCESS DEVELOPMENT
30CT94	30DEC94		Sludge Dissolution Testing/Report (Carryover) AHD221
30CT94	29SEP95		Conduct Acid Dissolutions Test with 94-95 Cores PTD0500
			TANK AZ-101 SLUDGE WASHING PROCESS TEST
30CT94	30NOV94		Install Tank AZ-101 Decant Pump PSW49000
30CT94	29SEP95		Sludge Washing Instrumentation Testing PSW49010
1DEC94	31JAN95		Decant and Fill Tank AZ-101 PSW49005
	31JAN95	T3A-95-146	Complete Decant and Fill of Tank AZ-101 PSW49005A
1MAR95	30SEP96		W-151 ORR/Startup ROD160
20CT95	31DEC96		Tank AZ-101 Sludge Washing Preparations PSW49015
	30SEP96	T2E-96-102	W-151 ORR/ Startup Complete ROD160-1
10CT96	31DEC96		W-030 Vent UPG; Test & Startup FY97 N3G24F4
	31DEC96	T2C-97-100	M-43-01 Complete Project W-030 TK Farm Vent Upgr N3G24F5M
2JAN97		T3A-97-114	Initiate Tank AZ-101 Sludge Washing Process Test PSW49019A

1993 1994 1995 1996 1997 1998 1999

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Plot Date 29SEP94
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WESTINGHOUSE HANFORD COMPANY
WASTE PRETREATMENT
M-50-03 Report

Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	
			TANK AZ-101 SLUDGE WASHING PROCESS TEST
2JAN97	30APR97		Tank AZ-101 Sludge Washing Process Test (PSW49020)
2JAN97	30APR97		Perform DST Waste Retrieval Proc. Test (R00115)
1MAY97	29AUG97		Tank AZ-101 Settling Test (PSW49025)
1JUL97	30SEP97		Prepare Tank AZ-101 Draft Process Test Report (PSW49030)
	30SEP97	T3A-97-107	Complete In-Tank Sldg Wash Proc Test/Iss Rpt (PSW49030A)
10CT97	26NOV97		Prepare Tank AZ-101 Final Process Test Report (PSW49035)
			HLW COMPOSITION and WASTE FORM SELECTION
30CT94	20CT95		Estimate Potential Feed Composition Ranges FY95 (SDW1000)
30CT94	20CT95		Updt Est of Tank Waste Types Comp. & Qty (SDW1001)
5JAN95	4JAN96		Second Phase Pretreatment/HLW Interface Optimiz (SDW2100)
6JAN95	5JAN95	T3C-95-104	Issue Feed Processability Assessment Rpt (SDW2005)
3FEB95	5JUL95		HLW Product Description for Trade Studies (SDW3040)
6JUL95	5JAN96		Waste Form Product Configuration (SDW3060)
6JUL95	5JAN96		Alternative Glass Types (SDW3070)
	20CT95	T3C-96-114	Issue Est of Tank Waste Types Comp. & Qty (SDW1001A)

1993 1994 1995 1996 1997 1998 1999

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WESTINGHOUSE HANFORD COMPANY
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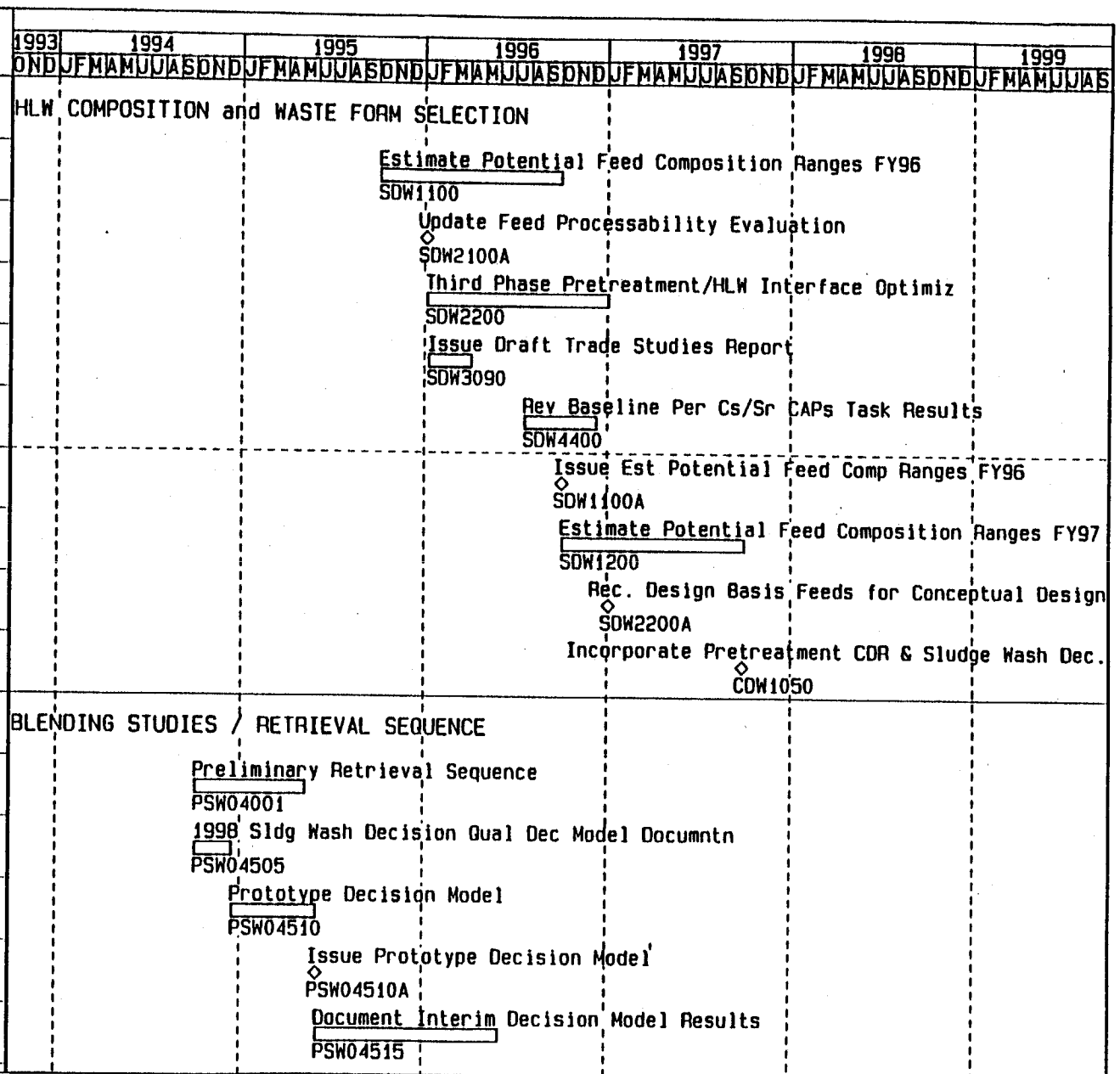
Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	Activity
			HLW COMPOSITION and WASTE FORM SELECTION
30CT95	10CT96		Estimate Potential Feed Composition Ranges FY96 (SDW1100)
	4JAN96	T3C-96-107	Update Feed Processability Evaluation (SDW2100A)
5JAN96	3JAN97		Third Phase Pretreatment/HLW Interface Optimiz (SDW2200)
8JAN96	4APR96		Issue Draft Trade Studies Report (SDW3090)
19JUL96	11DEC96		Rev Baseline Per Cs/Sr CAPs Task Results (SDW4400)
	10CT96	T3C-97-109	Issue Est Potential Feed Comp Ranges FY96 (SDW1100A)
20CT96	10CT97		Estimate Potential Feed Composition Ranges FY97 (SDW1200)
	3JAN97	T3C-97-107	Rec. Design Basis Feeds for Conceptual Design (SDW2200A)
	26SEP97	T3C-97-100	Incorporate Pretreatment CDR & Sludge Wash Dec. (CDW1050)
			BLENDING STUDIES / RETRIEVAL SEQUENCE
30CT94	10MAY95		Preliminary Retrieval Sequence (PSW04001)
30CT94	15DEC94		1998 Sldg Wash Decision Qual Dec Model Documntn (PSW04505)
16DEC94	1JUN95		Prototype Decision Model (PSW04510)
	1JUN95	T3A-95-140	Issue Prototype Decision Model (PSW04510A)
2JUN95	3JUN96		Document Interim Decision Model Results (PSW04515)



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WESTINGHOUSE HANFORD COMPANY
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Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	Activity
			BLENDING STUDIES / RETRIEVAL SEQUENCE
30CT95	6MAY96		Prepare Retrieval Sequence (a) Selected PSW04003
	3APR96	T3A-96-132	Retrieval Sequence (a) Selected PSW04003A
7MAY96	5MAY97		Prepare Retrieval Sequence (b) Selected PSW04004
	30SEP96	T2E-96-101	M-45-02A Submit Initial SST Retrieval Sequence R00100A
	3APR97	T3A-97-110	Retrieval Sequence (b) Selected PSW04004A
3JUN97	30SEP97		Document Decision Mod Supp 3/98 Sludge Wash Dec PSW04525
	30SEP97	T2E-97-104	M-45-02B Submit Annual SST Ret. Sequence Update R00100C
			FLOWSHEET DEVELOPMENT
30CT94	31OCT94		Prep a Corrigenda to TWRS Process Flwsht-Rev 0 PSW04030
30CT94	30DEC94		Prep Time-Phased Ret Flwsht on Feed Variability PSW04035
30CT94	31MAR95		Prep TWRS Process Flowsheet Rev 1 - Draft PSW04040
16DEC94	31MAR95		Prep Strawman Adv Processing Flowsheet-Rev 0 PSW04010
	30DEC94	T3A-95-148	Issue Time-Phased Ret Flwsht on Feed Variability PSW04035A
3APR95	30JUN95		Prep TWRS Process Flowsheet Rev 1 PSW04045
30CT95	29MAR96		Prep TWRS Process Flowsheet Rev 2 - Draft PSW04050

1993 1994 1995 1996 1997 1998 1999

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Plot Date 29SEP94
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WESTINGHOUSE HANFORD COMPANY
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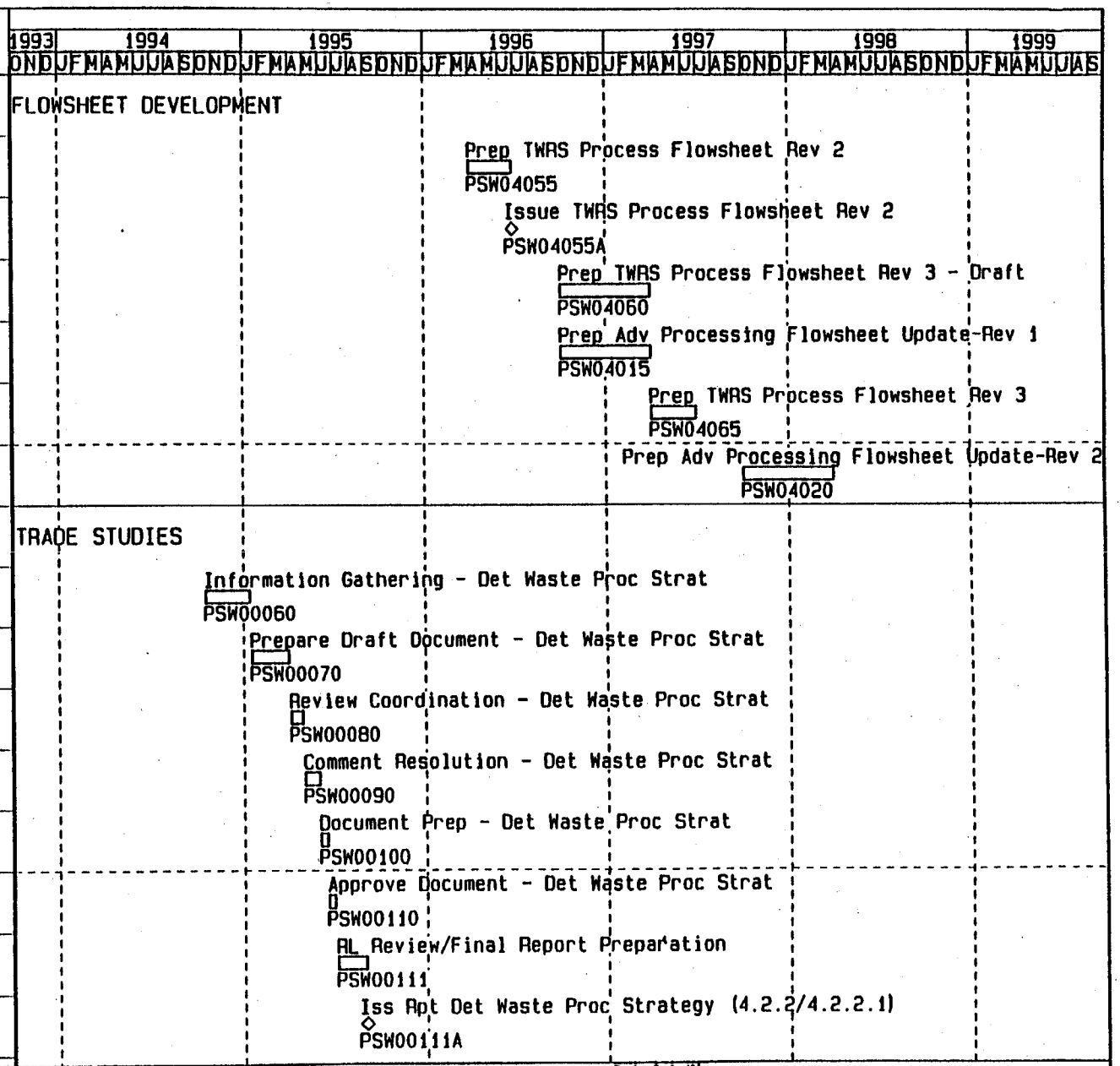
Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	Activity
			FLOWSHEET DEVELOPMENT
1APR96	28JUN96		Prep TWRS Process Flowsheet Rev 2 (PSW04055)
	28JUN96	T3A-96-131	Issue TWRS Process Flowsheet Rev 2 (PSW04055A)
10CT96	31MAR97		Prep TWRS Process Flowsheet Rev 3 - Draft (PSW04060)
20CT96	1APR97		Prep Adv Processing Flowsheet Update-Rev 1 (PSW04015)
1APR97	30JUN97		Prep TWRS Process Flowsheet Rev 3 (PSW04065)
20CT97	1APR98		Prep Adv Processing Flowsheet Update-Rev 2 (PSW04020)
			TRADE STUDIES
170CT94	13JAN95		Information Gathering - Det Waste Proc Strat (PSW00060)
16JAN95	31MAR95		Prepare Draft Document - Det Waste Proc Strat (PSW00070)
3APR95	28APR95		Review Coordination - Det Waste Proc Strat (PSW00080)
1MAY95	31MAY95		Comment Resolution - Det Waste Proc Strat (PSW00090)
1JUN95	15JUN95		Document Prep - Det Waste Proc Strat (PSW00100)
16JUN95	30JUN95		Approve Document - Det Waste Proc Strat (PSW00110)
5JUL95	1SEP95		RL Review/Final Report Preparation (PSW00111)
	1SEP95	T3A-95-136	Iss Rpt Det Waste Proc Strategy (4.2.2/4.2.2.1) (PSW00111A)



Plot Date 29SEP94
Data Date 10CT93
Project Start 30SEP93
Project Finish 21DEC28

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WESTINGHOUSE HANFORD COMPANY
WASTE PRETREATMENT
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Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	Activity
			TRADE STUDIES
5SEP95	29MAR96		Prepare Draft Update Rpt - Det Waste Proc Strat PSW00112
1APR96	28JUN96		Prepare RL Draft Update - Det Waste Proc Strat PSW00113
4JUN96	2JUN97		Document Decision Model Results PSW04520
1JUL96	30AUG96		RL Review/Final Report Preparation PSW00114
	30AUG96	T3A-96-140	Iss Rpt Det Waste Proc Strategy (4.2.2/4.2.2.1) PSW00114A
3SEP96	31MAR97		Prepare Draft Update Rpt - Det Waste Proc Strat PSW00115
1APR97	30JUN97		Prepare RL Draft Update - Det Waste Proc Strat PSW00116
1JUL97	29AUG97		RL Review/Final Report Preparation PSW00117
	29AUG97	T3A-97-111	Iss Rpt Det Waste Proc Strategy (4.2.2/4.2.2.1) PSW00117A
			DECISION ANALYSIS
30SEP94		TDC-94-390	M-50-03A Define Add'l Sludge Washing Milestones PSW04405A
3OCT94	31MAR95		Develop Decision Analysis 1995 Report M-50-03 PSW04410
30DEC94	17AUG95		Stakeholders Input to Decision Basis 1995 Report PSW04412
3APR95	29SEP95		Prepare Decision Analysis 1995 Report M-50-03 PSW04411
18AUG95	15SEP95		RL and Stakeholders Review 1995 Report PSW04413

1993 1994 1995 1996 1997 1998 1999

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Plot Date 29SEP94
Data Date 1OCT93
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WESTINGHOUSE HANFORD COMPANY
WASTE PRETREATMENT
M-50-03 Report

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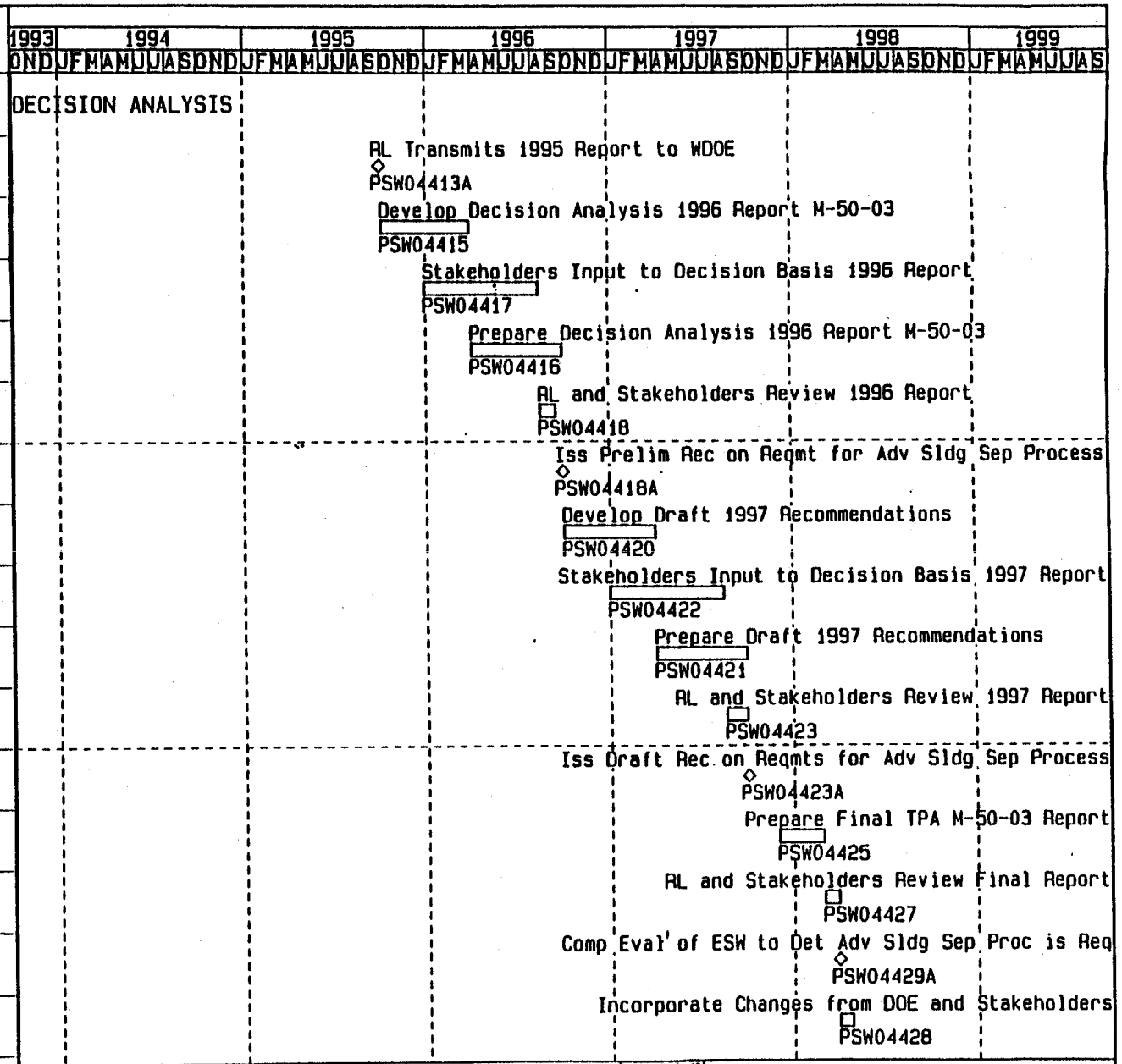
Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	Activity
			DECISION ANALYSIS
	29SEP95	T3A-95-112	RL Transmits 1995 Report to WDOE (PSW04413A)
20CT95	29MAR96		Develop Decision Analysis 1996 Report M-50-03 (PSW04415)
29DEC95	15AUG96		Stakeholders Input to Decision Basis 1996 Report (PSW04417)
1APR96	30SEP96		Prepare Decision Analysis 1996 Report M-50-03 (PSW04416)
16AUG96	16SEP96		RL and Stakeholders Review 1996 Report (PSW04418)
	30SEP96	T3A-96-110	Iss Prelim Rec on Reqmt for Adv Sldg Sep Process (PSW04418A)
10CT96	31MAR97		Develop Draft 1997 Recommendations (PSW04420)
30DEC96	15AUG97		Stakeholders Input to Decision Basis 1997 Report (PSW04422)
1APR97	30SEP97		Prepare Draft 1997 Recommendations (PSW04421)
18AUG97	30SEP97		RL and Stakeholders Review 1997 Report (PSW04423)
	30SEP97	T3A-97-105	Iss Draft Rec on Reqmts for Adv Sldg Sep Process (PSW04423A)
1DEC97	2MAR98		Prepare Final TPA M-50-03 Report (PSW04425)
3MAR98	31MAR98		RL and Stakeholders Review Final Report (PSW04427)
	31MAR98	T3A-98-100	Comp Eval of ESW to Det Adv Sldg Sep Proc is Req (PSW04429A)
1APR98	27APR98		Incorporate Changes from DOE and Stakeholders (PSW04428)



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WESTINGHOUSE HANFORD COMPANY
WASTE PRETREATMENT
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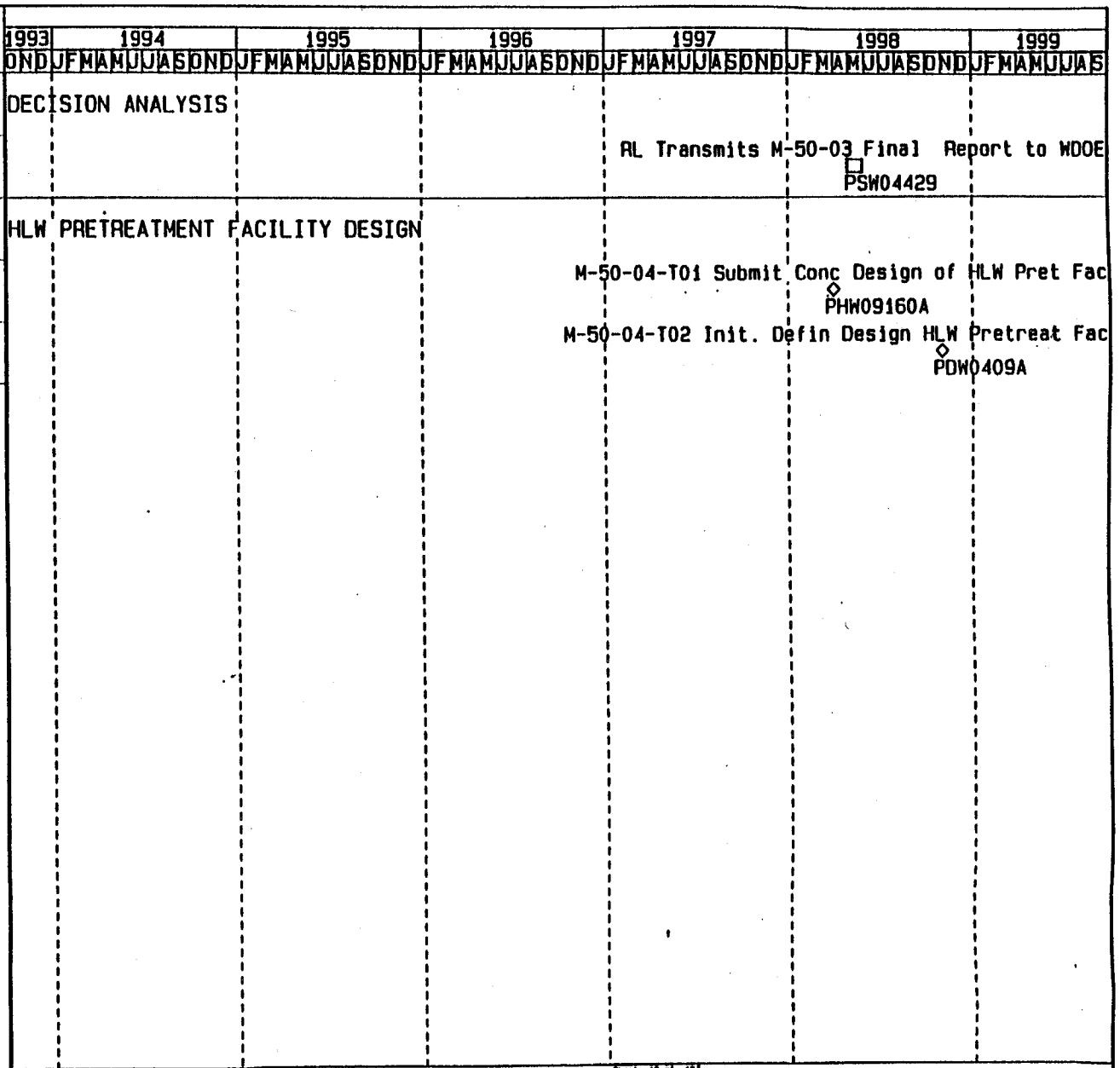
Date	Revision	Checked	Approved

EARLY START	EARLY FINISH	MILN	Activity
			DECISION ANALYSIS
28APR98	28MAY98		RL Transmits M-50-03 Final Report to WDOE (PSW04429)
			HLW PRETREATMENT FACILITY DESIGN
	31MAR98	T3A-98-101	M-50-04-T01 Submit Conc Design of HLW Pret Fac (PHW09160A)
2NOV98		T3A-99-100	M-50-04-T02 Init. Defin Design HLW Pretreat Fac (PDW0409A)



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WESTINGHOUSE HANFORD COMPANY
WASTE PRETREATMENT
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APPENDIX B

MILESTONE DESCRIPTION SHEETS

THE MILESTONE DESCRIPTION SHEETS ARE ORDERED CHRONOLOGICALLY BY MILESTONE CONTROL NUMBER.

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WHC TWRS Milestone Description Sheet

Title: Define Additional Milestones for Waste Pretreatment Leading to the Decision whether Advanced Sludge Separation Processes are required

Schedule ID: PSW04390A/ PXW04-0A

Revision: 0

Assigned to: TWRS Strategic Analysis

WBS Designator: 1.1.1.3.01.04.03.33

ADS No.: 1220-00-AF

Milestone Control No.: TDC-94-390

Completion Date: 9/30/94

Milestone Class:

[X] TPA M-50-03A
[ ] DOE-HQ
[ ] DOE-RL
[ ] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[X] DOE-RL
[ ] Other (Specify):

Description and what constitutes completion of this commitment:

The decision of whether advanced sludge separation processes are required will need the development of information from several TWRS Program Elements, (e.g. Waste Pretreatment, HLW Vitrification, LLW Vitrification, and Waste Retrieval), to determine if enhanced sludge separation processes are required. Some interim information to be included on this schedule may include the development of the decision-making methods. It will also include the schedule to evaluate the performance of enhance sludge washing, acceptance of criteria for making the decision encompassed in TPA Milestone M-50-03 and the decision method to be used.

Acceptance Criteria:

The acceptance criteria for accomplishing this milestone (M-50-03A) will be transmitted to DOE-RL approval three months in advance of the completion date. The Criteria will include the logic and strategy for Milestone M-50-03A. The milestone deliverable will be a contractor report approved for external publication and ready for transmittal to the WDOE by DOE-RL. The report will include a strategy plan and schedule defining additional milestones leading to the decision whether advanced sludge separation processes are required. This decision is encompassed in TPA Milestone M-50-03 scheduled for completion by 3/31/98. The schedule will be based on inputs received from stakeholder including DOE-RL, DOE-HQ, WDOE, and Waste Pretreatment Sub-Panel of Technical Advisory Panel.

Deliverables:

Acceptance criteria for this milestone (M-50-03A) will be transmitted to DOE-RL for approval by 6/30/94. A contractor approved draft report will be transmitted to DOE-RL by 8/15/94 for review by DOE-RL. The report will include a strategy plan and schedule for completing TPA Milestone M-50-03. A final contractor report incorporating DOE comments on the draft report and approved for external publication will be transmitted to DOE-RL by 9/15/94 for transmittal to the WDOE by 9/30/94.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WESTINGHOUSE HANFORD COMPANY
TANK WASTE REMEDIATION SYSTEM DIVISION
WASTE TANK SAFETY AND OPERATIONS PROGRAM
FY94

MILESTONE DESCRIPTION SHEET

TITLE: ISSUE 20 TANK CHARACTERIZATION REPORTS IN ACCORDANCE WITH THE APPROVED TCP'S.

DATE: 11/18/93
REVISION: 0

ASSIGNED TO: CHARACTERIZATION PROGRAM

ADS NO: 1130

PROGRAM WBS DESIGNATOR: 1.1.1.4.4.02

COMPLETION DATE: 09/30/94

MILESTONE CONTROL NO: TW4-94-519

FDS CODE: 1N4D42

MILESTONE CLASS:	DELIVERABLE:	ADDRESSED TO:
[X] TPA	[X] Report	[ ] DOE-HQ
[ ] DOE-HQ	[ ] Letter	[X] DOE-RL
[ ] DOE-RL	[ ] Drawings	[ ] Other (Specify)
[ ] WHC Key	[ ] Other (Specify)	

Description and what constitutes completion of this commitment:

Statement of Work:

Generate and issue 20 tank characterization reports (TCR) in support of TPA milestone M-44-05. These TCRs will integrate historical knowledge concerning DSTs and SSTs with analytical and statistical data analysis from the characterization effort. TCRs will be issued as external publication (EP) documents. Delivery of final documents (cleared with either WHC or PNL concurrence) to DOE-RL for approval and release is considered completion of this milestone. This MDS is related to MDS 436, 437, and 520. Completion of the three MDSs fulfills TPA milestone M-44-05 for 20 TCRs by September 30, 1994.

Deliverables:

1. 20 Tank Characterization Reports — A formal letter of notification, with the TCR attatched, will be sent to DOE-RL with the completion of each TCR. All of the 20 TCRs will be completed by 09/15/94.

J. R. Mobley 1/17/94
Cost Account Manager: Date:
J. R. Mobley

C. DeFigh-Price 1/17/94
Program Element Manager: Date:
C. DeFigh-Price

J. R. Mobley 1/17/94
Activity Manager: Date:
J. R. Mobley

4/18/94
DOE Monitor: Date:

WHC TWRS Milestone Description Sheet

Title: Issue Report on Current Status of Tank Waste Enhanced Sludge Washing

Schedule ID: PSW04390B/PXW04-1A

Revision: 0

Assigned to: Waste Pretreatment

WBS Designator: 1.1.1.3.01.04.03.33

ADS No.: 1220-00-AF

Milestone Control No.: T3A-95-101

Completion Date: 10/31/94

Milestone Class:

[X] TPA M-50-03-T01
[ ] DOE-HQ
[ ] DOE-RL
[ ] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[X] DOE-RL
[ ] Other (Specify):

Description and what constitutes completion of this commitment:

This milestone will report on Hanford progress in enhanced sludge washing. Included in the scope of this milestone will be the issuance of a plan that will define the tests to be performed on Hanford tank sludges. In addition, the enhanced sludge washing laboratory test results on Hanford sludges completed through the third quarter of the fiscal year will be presented with expected impacts on HLW vitrification. These impacts will be illustrated in a summary of HLW glass volume projections for all Hanford waste types. Finally, the status and results of computer modeling of sludge washing of tank wastes will be presented.

Acceptance Criteria:

The report will include data from all actual tests completed through the third quarter of FY 1994 on sludge washing and enhanced sludge washing and the expected impacts on HLW glass volume. (Because of delay of testing at 325 Lab only two the originally scheduled five tank sample tests have been completed, Tanks 241-B-101 and 241-U-110).

Excellent

The Programmatic issues associated with the test results are fully addressed. Models converge and predict duplicate lab results.

Satisfactory

Programmatic issues are identified, but not fully discussed. Models work and predict results which are compared to lab results and variances explained.

Unsatisfactory

Planned tests are not completed due to management or operator deficiencies. Programmatic issues are not clearly identified.

Basis of Measurement: Fulfillment of the requirements identified in the MYWP MDSs.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverables are:

- Letter of transmittal by 09/30/94 with the following documents attached:
  - "Laboratory Development of Sludge Washing and Alkaline leaching Processes: Test Plan for Fy 1994, PNL-9984 Hanford Tank Sludges: A Status Report," PNL-10078 previously submitted to fulfill Milestone TDC-94-332.
  - Modeling Report (WHC approved document transmittal to DOE for review and approval)
  - "Computer Simulation of Laboratory Leaching and Washing of Tank Waste Sludges" (WHC-SD-XXX), Milesto TDC-94-326
- Final transmittal to RL by 10/24/94.

The letter of transmittal will also contain a summary of HLW glass volume projections for all Hanford Waste type

W.B. Barton	K.A. Gasper
Cost Account Manager — Date	Program Element Manager — Date
I.E. Reep	L. Erickson
Activity Manager — Date	DOE Manager (agreement) — Date
L. Erickson	
DOE Manager (acceptance) — Date	

WHC TWRS Milestone Description Sheet

Title: Issue a Time-Phased Flowsheet Focusing on Feed Variability

Schedule ID: PSW04035A

Revision: 0

Assigned to: TWRS Process Engineering

WBS Designator: 1.1.1.3.01.04.03.02

ADS No.: 1220-00-AF

Milestone Control No.: T3A-95-148

Completion Date: 12/30/94

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[ ] DOE-RL
[X] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[ ] DOE-RL
[X] Other (Specify): WHC

Description and what constitutes completion of this commitment:

This work is a precursor to the FY 1995 update of the TWRS Process Flowsheet. Rev. 0 of the flowsheet issued in 1994 assumed that the feed was a uniform blend of all tank waste. The next step is to begin considering retrieval sequences. An early retrieval sequence report will be available at the end of FY 1994. The early retrieval sequence report will provide an ordering of tanks that will be inputted to the TWRS Process Flowsheet to provide a feed composition range for pretreatment.

Acceptance Criteria:

Deliverables:

The deliverable is an internally approved document showing the variability of retrieved waste composition for the duration of tank retrieval operations.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WESTINGHOUSE HANFORD COMPANY

Tank Waste Remediation System Division

Milestone Description Sheet

Title: Issue Feed Processability Assessment Report

Schedule ID: SDW2005
Revision: 0

Assigned To: High Level Waste
WBS Designator: 1.1.1.3.03.04
Milestone Control No.: T3C-95-104

ADS No.: 1240-0
Completion Date: 01/06/95

Milestone Class:	Deliverable	Addressed to:
[ ] TPA_____	[X] Report	[ ] DOE-HQ
[ ] DOE-HQ_____	[ ] Letter	[ ] DOE-RL
[ ] DOE-RL_____	[ ] Drawings	[X] Other (Specify)
[X] Contractor Key	[ ] Other (Specify)	WHC Management
	_____	

Description:

Review available data from Pretreatment/Characterization and provide an evaluation of glass formulations, process compatibility, and melter operational performance characteristics for each waste. Develop estimates of total glass production ranges based on different blending, pretreatment and glass composition.

Acceptance Criteria:

Issuance of report to WHC management.

Deliverables:

Report on potential range of feed compositions.

Signatures:

Cost Account Manager — Date T. W. Crawford	Program Element Manager — Date R. W. Powell
Activity Manager — Date R. W. Powell	DOE Manager (Agreement) — Date J. C. Peschong

DOE Manager (Acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Complete Decant and Fill of Tank AZ-101

Schedule ID: PSW49010A

Revision: 0

Assigned to: TWRS Process Design

WBS Designator: 1.1.1.3.01.04.02.15

ADS No.: 1220-00-AF

Milestone Control No.: T3A-95-146

Completion Date: 01/31/95

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[ ] DOE-RL
[X] CONTRACTOR

Deliverable:

[ ] REPORT
[ ] LETTER
[ ] DRAWINGS
[X] Other (Specify):

Addressed to:

[ ] DOE-HQ
[ ] DOE-RL
[ ] Other (Specify):

Description and what constitutes completion of this commitment:

The first step in preparing AZ-101 for mixer pump installation and sludge washing is to decant the suparnatant liquid and refill the tank with dilute waste. This requires the installation and operation of a decant pump, instrumentation, and a computer control system. This milestone commitment will be met when the decanting of AZ-101 has been completed.

Acceptance Criteria:

Tank has been decanted to a level ≤ 2 feet above the solid/liquid interface.

Deliverables:

A nearly empty tank ready to be refilled.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Issue Prototype Decision Model for Waste Pretreatment Alternatives

Schedule ID: PSW04510A

Revision: 0

Assigned to: TWRS Process Technology

WBS Designator: 1.1.1.3.01.04.03.40

ADS No.: 1220-00-AF

Milestone Control No.: T3A-95-140

Completion Date: 06/01/95

Milestone Class:		Deliverable:		Addressed to:	
[ ]	TPA	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[ ]	DOE-RL
[ ]	DOE-RL	[ ]	DRAWINGS	[X]	Other (Specify): WHC Internal
[X]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

Background: In FY-94, a decision model for pretreatment was developed. The work scope can be broken into seve phases for purposes of discussion:

- Prototype model supporting sludge wash decision - limited to pretreatment
- Integrate LLW vitrification decision model with pretreatment model
- Integrate HLW vitrification decision model with previous models.
- Use model to support evaluation of alternatives for the sludge wash decision.

Scope: The scope of this milestone description sheet is limited to the first phase (Prototype model). Prepare the sludg wash-decision criteria to be used by the model, build a prototype decision model that incorporates these criteria, a use the model to evaluate at least two alternatives, one of which will be consistent with the emerging TWRS baselir

Acceptance Criteria:

The prototype decision model report shall:

- Be approved by appropriate organizations within WHC,
- Be cleared for public release,
- Document the decision analysis process/methodology/criteria used, and
- Evaluate at least two alternatives as described in the scope section, above.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverable is one or more supporting documents, that taken together as a set meet the requirements in the acceptance criteria section. An example of such a set is:

- A report documenting the prototype decision model, including the decision criteria
- A report documenting the results of using the model to evaluate two or more pretreatment alternatives.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Determine Waste Processing Strategy and Waste Separations Process (4.2.2/4.2.2.1)

Schedule ID: PSW00111A

Revision: 0

Assigned to: TWRS Process Design

WBS Designator: 1.1.1.3.01.04.02

ADS No.: 1220-00-AF

Milestone Control No.: T3A-95-136

Completion Date: 09/01/95

Milestone Class:		Deliverable:		Addressed to:	
[ ]	TPA	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[ ]	DOE-RL
[X]	DOE-RL	[ ]	DRAWINGS	[X]	Other (Specify): WHC-Internal
[ ]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

This activity will provide technical justification (via a trade study) for the "case Beta" separations strategy (i.e. sludg washing and enhanced sludge washing) and establish the basis for additional development work for advance separations. The study will assess four categories of separations alternatives consistent with environmental impa statement (EIS) preparation including no pretreatment, treatment of waste to an intermediate form, enhanced sludg washing and extensive pretreatment separations (e.g., CLEAN). A trade study report will be prepared which includ information gathering, draft document preparation, WHC review, and WHC approval. The commitment will be comple with WHC appoval of the study document according to the appropriate Impact Level (assumed to be N/A or level 4

Acceptance Criteria:

Acceptance will be provided by WHC approval of the study document.

Deliverables:

One study document will be prepared which addresses the alternatives given above.

W.B. Barton		K.A. Gasper	
Cost Account Manager	Date	Program Element Manager	Date
I.E. Reep		L. Erickson	
Activity Manager	Date	DOE Manager (agreement)	Date
L. Erickson			
DOE Manager (acceptance)	Date		

Westinghouse Hanford Company
Tank Waste Remediation System
Milestone Description Sheet

Title: Collect Rotary and Push Mode Core Samples from High Level Waste Tanks

Schedule ID: N4C32A112A

Revision: 0

Assigned to: Waste Tank Sampling Engineering

ADS No.: 1130-0C

Program WBS Designator: 1.1.1.2.04.03.02

Completion Date: 09-28-95

Milestone Control No.: T2D-95-135

Milestone Class:	Deliverables:	Addressed To:
[ ] TPA	[ ] Report	[ ] DOE-HQ
[ ] DOE-HQ	[X] Letter	[ ] DOE-RL
[X] DOE-RL	[ ] Drawings	[ ] Other(Specify):____
[ ] CONTRACTOR	[ ] Other(Specify) ____	

Description and what constitutes completion of this commitment (What work is specifically going to be done to accomplish this milestone):

High level tank waste surface to tank bottom core samples will be collected using the Push and Rotary mode coring systems. The number of core samples identified for Push mode sampling is 22 (based on 2 cores/tank). The number of core samples identified for Rotary mode sampling is 28 (based on 2 cores/tank). Waste samples will be transported and relinquished to an onsite laboratory. Relinquishment of all required* waste samples to the laboratory via a transportation chain of custody document constitutes completion of the sampling commitment. In the event any of the above tanks cannot be sampled, contingency tanks will be selected.

The cost requirement for these sampling events is $5.7M for push and $8.4M for rotary. This is based on rotary truck 2 deploying to the field on 10/03/94 and working days and swings, five days a week, through July 1995. Also assumed is the deployment of trucks 3 and 4 by 06/01/95. Deployment is defined as the truck availability to take samples in tank farms. At present, there are no flammable gas tanks to be rotary sampled in FY 1994/5. Before any flammable gas tank can be added to the schedule for FY 1995, truck 3 or 4 must be available and the safety-related documentation complete. Prior to the rotary truck being deployed into a tank with a hard sludge crust that requires rotary sampling, the ability to have some rotation without nitrogen flow must be present. This will require a change to the safety analysis.

* See acceptance criteria below.

Acceptance Criteria:

Waste sampling in direct accordance with an approved (WHC) Tank Characterization Plan.

Deliverables (Describe the specific products or conditions):

Quarterly performance reports will be transmitted by the Characterization Program Element manager to DOE-RL manager as part of the DNFSB 93-5 Commitment 1.10. The reports will identify sampling performance based on a quarterly and fiscal year-to-date percent complete scheme. Additionally, any non-recoverable schedule variance will be reported and consequential impacts identified.

P. A. Young
Cost Account Manager Date

C. DeFigh-Price
Program Element Manager Date

G. A. Stanton
Activity Manager Date

R. E. Gerton
DOE Manager (agreement) Date

R. E. Gerton
DOE Manager (acceptance) Date

Westinghouse Hanford Company
Tank Waste Remediation System
Milestone Description Sheet

Rev. 0

Title: Collect Auger Samples from High Level Waste Tanks

Schedule ID: N4C33A112A

Revision: 0

Assigned to: Waste Tank Sampling Engineering

ADS No.: 1130-0C

Program WBS Designator: 1.1.1.2.04.03.03

Completion Date: 09-28-95

Milestone Control No.: T2D-95-136

Milestone Class:	Deliverables:	Addressed To:
[ ] TPA	[ ] Report	[ ] DOE-HQ
[ ] DOE-HQ	[X] Letter	[X] DOE-RL
[X] DOE-RL	[ ] Drawings	[ ] Other(Specify):
[ ] CONTRACTOR	[ ] Other(Specify)	

Description and what constitutes completion of this commitment (What work is specifically going to be done to accomplish this milestone):

High level tank waste surface samples will be collected using an auger sampling system. The number of auger samples identified for auger sampling is 52 (assumes 2 samples/tank) based on sampling schedule 3.0. Waste samples will be transported and relinquished to an onsite laboratory. Relinquishment of all required* waste samples to the laboratory via a transportation chain of custody document constitutes completion of the sampling commitment. In the event any of the above tanks cannot be sampled, contingency tanks will be selected. The 20 inch auger is required for field deployment on 10/13/94.

The 52 augers will require $2.4M of available funding.

* See acceptance criteria below.

Acceptance Criteria:

Waste sampling in direct accordance with an approved (WHC) Tank Characterization Plan.

Deliverables (Describe the specific products or conditions):

Quarterly performance reports will be transmitted by the Characterization Program Element manager to DOE-RL manager as part of the DNFSB 93-5 Commitment 1.10. The reports will identify sampling performance based on a quarterly and fiscal year-to-date percent complete scheme. Additionally, any non-recoverable schedule variance will be reported and consequential impacts identified.

P. A. Young
Cost Account Manager — Date

G. A. Stanton
Activity Manager — Date

R. E. Gerton
DOE Manager (acceptance) — Date

C. DeFigh-Price
Program Element Manager — Date

R. E. Gerton
DOE Manager (agreement) — Date

WHC TWRS Milestone Description Sheet

Title: Submit Report Summarizing the Testing of Enhanced Sludge Washing and Related Tank Waste Sludge Pretreatment Methods for Samples of Tank Waste Sludge

Schedule ID: PSW04730A/PXW04-1B

Revision: 0

Assigned to: Process Technology

WBS Designator: 1.1.1.3.01.04.03.33

ADS No.: 1220-00-AF

Milestone Control No.: T3A-95-102

Completion Date: 09/29/95

Milestone Class:		Deliverable:		Addressed to:	
[X]	TPA M-50-03-T2A	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[X]	DOE-RL
[ ]	DOE-RL	[ ]	DRAWINGS	[ ]	Other (Specify):
[ ]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

Perform testing of enhanced sludge washing and related tank waste sludge pretreatment methods using actual ta waste samples. Document and issue results of testing completed to that time. This annual report will also docume preliminary candidate tank waste pretreatment sequence and tank blending strategies. Goals for both early progress waste immobilization and minimization of the production of high level glass will be addressed in these strategies.

These preliminary strategies will be utilized to predict the production of high level waste glass associated with candida enhanced sludge washings and related tank waste sludge pretreatment methods. The prediction of the HLW gla volume production will be updated.

Acceptance Criteria:

The report will include the latest laboratory data available on sludge washing and enhanced sludge washing, and t expected impacts on HLW glass volume will be provided.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverables are:

- Contractor approved report to DOE-RL for review and comment by 08/15/95.
- Final WHC-approved report for external release and transmittal by 9/15/95.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Issue Report on Laboratory Settling Tests of Tank C-107 Sludge

Schedule ID: PTD5060A

Revision: 0

Assigned to: Waste Pretreatment - TDPO

WBS Designator: 1.1.1.3.01.02.03.08

ADS No.: 1220-00-AB

Milestone Control No.: T3A-95-131

Completion Date: 09/29/95

Milestone Class:		Deliverable:		Addressed to:	
[ ]	TPA	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[ ]	DOE-RL
[ ]	DOE-RL	[ ]	DRAWINGS	[X]	Other (Specify): WHC
[X]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

This milestone will report on settling tests conducted on tank C-107 actual sludge by PNL. The report will include da on settling rate, compaction and quality of the supernate for sludge washed with inhibited water, with alkaline solutic and again with inhibited water. Tests will be initiated with approximately one liter of sludge.

Acceptance Criteria:

This draft report will include laboratory data completed on at least one cycle of enhanced sludge washing similar to t latest integrated flowsheet for an actual core of tank C-107.

Deliverables:

The deliverable is a draft report issued for WHC review on settling tests of tank C-107.

J.N. Appel		K.A. Gasper	
Cost Account Manager	Date	Program Element Manager	Date
I.E. Reep			
Activity Manager	Date	Performing Manager (Other)	Date
L. Erickson		L. Erickson	
DOE Manager (acceptance)	Date	DOE Manager (agreement)	Date

WHC TWRS Milestone Description Sheet

Title: FY 1995 Sludge Washing/Alkaline Leach Tests Conducted at PNL

Schedule ID: PTD5000A

Revision: 0

Assigned to: Waste Pretreatment - TDPO

WBS Designator: 1.1.1.3.01.02.03.01

ADS No.: 1220-00-AB

Milestone Control No.: T3A-95-132

Completion Date: 09/29/95

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[ ] DOE-RL
[X] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[ ] DOE-RL
[X] Other (Specify): WHC

Description and what constitutes completion of this commitment:

This milestone will report progress in sludge washing and alkaline leach tests completed during FY 1995. These tests will consist of small scale batch washing and leaching of approximately 5 gram samples of actual sludges. Eight cores of actual waste will be tested. Chemical analysis of washing and leaching solutions and sludges prior to and after each step will be performed so that component material balances can be included in the report. These component balances will facilitiate the estimation of the high level waste (HLW) glass volume.

Acceptance Criteria:

The draft report will include laboratory data of small scale sludge wash/alkaline leach test on eight cores of actual waste. The data will consist of elemental material balances so that HLW glass volumes may be projected based on composition.

Deliverables:

The deliverable is a draft report issued for WHC review on sludge washing/alkaline leaching tests conducted in FY 1995 by Pacific Northwest Laboratory (PNL).

J.N. Appel
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

Performing Manager (Other) — Date

L. Erickson
DOE Manager (acceptance) — Date

L. Erickson
DOE Manager (agreement) — Date

WHC TWRS Milestone Description Sheet

Title: FY 1995 Sludge Washing/Alkaline Leach Tests Conducted at LANL

Schedule ID: PTL5010A

Revision: 0

Assigned to: Waste Pretreatment - TDPO

WBS Designator: 1.1.1.3.01.02.03.02

ADS No.: 1220-00-AB

Milestone Control No.: T3A-95-133

Completion Date: 09/29/95

Milestone Class:		Deliverable:		Addressed to:	
[ ]	TPA	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[ ]	DOE-RL
[ ]	DOE-RL	[ ]	DRAWINGS	[X]	Other (Specify): WHC
[X]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

This milestone will report progress in sludge washing and alkaline leach tests completed during FY 1995. These te will consist of small scale batch washing and leaching of approximately 5 gram samples of actual sludges. Eight co of actual waste will be tested. Chemical analysis of washing and leaching solutions and sludges prior to and after ea step will be performed so that component material balances can be included in the report. These component balan will facilitiate the estimation of the high level waste (HLW) glass volume.

Acceptance Criteria:

The draft report will include laboratory data of small scale sludge wash/alkaline leach test on eight cores of actu waste. The data will consist of elemental material balances so that HLW glass volumes may be projected based composition.

Deliverables:

The deliverable is a draft report issued for WHC review on sludge washing/alkaline leaching tests conducted in FY 19 by Los Alamos National Laboratory (LANL).

J.N. Appel		K.A. Gasper	
Cost Account Manager	Date	Program Element Manager	Date
I.E. Reep			
Activity Manager	Date	Performing Manager (Other)	Date
L. Erickson		L. Erickson	
DOE Manager (acceptance)	Date	DOE Manager	Date

WESTINGHOUSE HANFORD COMPANY
TANK WASTE REMEDIATION SYSTEM DIVISION
MILESTONE DESCRIPTION SHEET

TITLE: ISSUE 30 TANK CHARACTERIZATION REPORTS IN ACCORDANCE WITH THE APPROVED TANK CHARACTERIZATION PLANS. COMPLETE INPUT OF CHARACTERIZATION INFORMATION FOR 30 HLW TANKS TO ELECTRONIC DATABASE(S) (M-44-08)

SCHEDULE ID: N4E54A01A
REVISION: 0

ASSIGNED TO: Characterization Support
WBS DESIGNATOR: 1.1.1.2.04.05.04

ADS NO: 1130-0-OE
COMPLETION DATE: 9/30/95

MILESTONE CONTROL NO: T2D-95-102

MILESTONE CLASS:	DELIVERABLE:	ADDRESSED TO:
[X] TPA M-44-08	[X] REPORT	[ ] DOE-HQ
[ ] DOE-HQ	[ ] LETTER	[X] DOE-RL
[ ] DOE-RL	[ ] DRAWINGS	[ ] OTHER (SPECIFY)
[ ] CONTRACTOR	[ ] OTHER (SPECIFY)	

Description and what constitutes completion of this commitment:

Generate and issue 30 Tank Characterization Reports (TCRs) (in accordance with the approved Tank Characterization Plans) in support of TPA milestone M-44-08. These TCRs will integrate tank waste historical data with tank waste analytical data. Update previously issued TCRs as necessary to incorporate new information. TCRs will be cleared for public release.

Acceptance Criteria:

1) The Tank Characterization Reports must include both the relevant historical data and the information obtained by the characterization effort in accordance with the approved Tank Characterization Plans. The TCRs will be similar in content and format to that prepared for tank 241-AP-101 and issued as supporting documents. One copy of each TCR will be transmitted to RL for formal submittal to Ecology. All other internal and external distribution of the TCRs will be performed by the Characterization Program.

2) Characterization data for all 30 tanks must be accessible by onsite and offsite stakeholders through the Tank Characterization Database.

Deliverables: (Describe the specific products or condition)

1) Provide a draft to DOE-RL during review process so RL can perform concurrent review.

2) Transmit each new or revised TCR to DOE-RL as it is issued. Provide with each TCR a draft transmittal letter which DOE-RL may use to forward the document to EPA and Ecology.

3) Provide a final letter after transmission of all TCRs to DOE-RL, indicating completion of the milestone and the date that each TCR was transmitted.

For C. S. Haller Todd Brown 9/19/94
Cost Account Manager Date

C. DeFigh-Price C DeFigh-Price 9-20-94
Program Element Manager Date

S. J. Eberlein 9-19-94
Activity Manager Date

R. E. Gerton
DOE Monitor Date

R. E. Gerton
DOE Manager (acceptance) Date

D5-75

WHC TWRS Milestone Description Sheet

Title: Develop Decision Basis for Evaluation of Enhanced Sludge Washing to Determine Whether Advanced Sludge Separation Processes are Required

Schedule ID: PSW04413A

Revision: 0

Assigned to: TWRS Strategic Analysis

WBS Designator: 1.1.1.3.01.04.03

ADS No.: 1220-00-AF

Milestone Control No.: T3A-95-112

Completion Date: 09/30/95

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[X] DOE-RL
[ ] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[X] DOE-RL
[ ] Other (Specify):

Description and what constitutes completion of this commitment:

A decision basis will be developed which implements decision methodology and decision criteria developed with stakeholder participation for TPA M-50-03 "Complete evaluation of enhanced sludge washing to determine wheth advanced sludge separation processes are required" by 03/31/98. The performance of sludge washing and related tar waste sludge pretreatment methods will be evaluated as part of the decision basis verification process using data available in FY 1995. The initial evaluation results will be used to :

- Provide a basis for a decision on the need for advanced sludge separations if a decision is required earlier than t planned date of 3/31/98.
- Provide programmatic guidance to prioritize testing, engineering, and development efforts required to reduce t uncertainty of factors affecting the decision.

Acceptance Criteria:

The acceptance criteria, including the plan for accomplishing this milestone, will be documented in the deliverabl submitted to DOE-RL to fulfill TPA Milestone M-50-03A by 09/30/94. A draft of the deliverable will be submitted thr months prior to the completion date for review by DOE and stakeholders. A final report approved for external publication will be transmitted to DOE-RL one month prior to the completion date for transmittal to WDOE by the completion date.

Excellent

Decision basis is developed utilizing input from the technical community, management and other stakeholders. Quali products are provided fully addressing programmatic issues and requiring minimal rework. Report is effective in providing guidance in prioritizing test and supporting other program decision making.

Satisfactory

Decision basis is developed based on input from the technical community management and input from stakeholde Products identify programmatic issues. Report can be used for prioritizing tests. Draft recommendation may requ considerable rework, and is accepted by DOE by the end of FY 1995. With effort, products provide FY 1996 Mu Year Program Planning activity support.

Unsatisfactory

Decision basis is developed, but required rework, and is not accepted by DOE by the end of FY 1995. Products do r adequately support FY 1996 Multi-Year Program Planning activities in a timely manner.

Basis of Measurement: Fulfillment of the requirements identified in the MYWP MDSs.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverables are:

- A contractor approved draft report transmitted to DOE-RL for review by 06/30/95.
- A final report approved for external publication transmitted to DOE-RL by 08/31/95.

W.B. Barton
Cost Account Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (acceptance) — Date

K.A. Gasper
Program Element Manager — Date

L. Erickson
DOE Manager (agreement) — Date

WESTINGHOUSE HANFORD COMPANY

Tank Waste Remediation System Division

Milestone Description Sheet

Title: Updated Estimates of Tank Waste Types, Compositions & Quantities

Schedule ID: SDW1001
Revision: 0

Assigned To: High Level Waste
WBS Designator: 1.1.1.3.03.04
Milestone Control No.: T3C-96-114

ADS No.: 1240-0
Completion Date: 10/02/95

Milestone Class:	Deliverable	Addressed to:
[ ] TPA	[X] Report	[ ] DOE-HQ
[ ] DOE-HQ	[ ] Letter	[ ] DOE-RL
[ ] DOE-RL	[ ] Drawings	[X] Other (Specify)
[X] Contractor Key	[ ] Other (Specify)	WHC Management

Description:

Critically review available data. Consider uncertainties in tank waste inventory, pretreatment performance, and blending alternatives. Provide estimates of the potential range of feed compositions to the HLW vitrification plant.

Acceptance Criteria:

Issuance of the report to WHC senior management.

Deliverables:

Report detailing estimates of potential feed composition ranges.

Signatures:

Cost Account Manager — Date
T. W. Crawford

Program Element Manager — Date
R. W. Powell

Activity Manager — Date
R. W. Powell

DOE Manager (Agreement) — Date
J. C. Peschong

DOE Manager (Acceptance) — Date

WESTINGHOUSE HANFORD COMPANY

Tank Waste Remediation System Division

Milestone Description Sheet

Title: Update Feed Processability Evaluation

Schedule ID: SDW2100
Revision: 0

Assigned To: High Level Waste
WBS Designator: 1.1.1.3.03.04
Milestone Control No.: T3C-96-107

ADS No.: 1240-0
Completion Date: 01/04/96

Milestone Class:	Deliverable	Addressed to:
[ ] TPA_____	[X] Report	[ ] DOE-HQ
[ ] DOE-HQ_____	[ ] Letter	[ ] DOE-RL
[ ] DOE-RL_____	[ ] Drawings	[X] Other (Specify)
[X] Contractor Key	[ ] Other (Specify)	WHC Management
	_____	

Description:

Identify and develop strategies for controlling critical components through blending, pretreatment or glass formulation and dilution to maximize the waste oxide loading and optimize melter and plant performance. Issue updated feed processability assessment report.

Acceptance Criteria:

Transmittal of report to WHC management.

Deliverables:

Feed Processability Report.

Signatures:

Cost Account Manager T. W. Crawford — Date	Program Element Manager R. W. Powell — Date
Activity Manager R. W. Powell — Date	DOE Manager (Agreement) J. C. Peschong — Date

DOE Manager (Acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Retrieval Sequence (a) Selected

Schedule ID: PSW04003A

Revision: 0

Assigned to: TWRS Process Technology

WBS Designator: 1.1.1.3.01.04.02.25

ADS No.: 1220-0-AF

Milestone Control No.: T3A-96-132

Completion Date: 04/03/96

Milestone Class:		Deliverable:		Addressed to:	
[ ]	TPA	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[ ]	DOE-RL
[X]	DOE-RL	[ ]	DRAWINGS	[X]	Other (Specify): WHC-Internal
[ ]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

Background: TPA milestone number M-45-02A "Initial Retrieval Sequence Report" calls for the transmittal of the init SST retrieval sequence to Ecology for their approval by September 30, 1996. Although not required by the TPA milestone, the report will include the retrieval sequence of all 177 SSTs and DSTs. The preparation of that report is t responsibility of the Retrieval Program. The technical basis for that report is the subject of this milestone descripti sheet.

The sequence selected for this milestone is an update of the preliminary retrieval sequence to be established circa M 1995 and documented in the Preliminary Retrieval Sequence Report to be issued circa September 1995. This sequen shall be selected from alternatives based upon the metrics estimated by a computer simulation of the TWRS. In t event that the computer simulation is not ready on time, the retrieval sequence (a) can be based upon manual estimation of a subset of the metrics. The selected sequence shall be documented in a report.

Acceptance Criteria:

The retrieval sequence shall:

- Be approved by appropriate organizations within WHC,
- Be cleared for public release,
- Provide the order and estimated timing of the retrieval of all 177 SSTs and DSTs,
- Be based upon the metrics estimated by a computer simulation of the behavior of the Tank Waste Remediati System (TWRS) to alternative retrieval sequences and blending strategies, or manual estimates thereof,
- Be developed using assumptions consistent with the current TWRS baseline.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverable is one or more supporting documents, that together meet the above acceptance criteria.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Issue TWRS Process Flowsheet, Rev. 2

Schedule ID: PSW04055A

Revision: 0

Assigned to: TWRS Process Technology

WBS Designator: 1.1.1.3.01.04.03.02

ADS No.: 1220-00-AF

Milestone Control No.: T3A-96-131

Completion Date: 06/28/96

Milestone Class:		Deliverable:		Addressed to:	
[ ]	TPA	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[ ]	DOE-RL
[ ]	DOE-RL	[ ]	DRAWINGS	[X]	Other (Specify): WHC-Internal
[X]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

Using the latest process requirements, processing sequences development results, and information from vendors, revis the previous year's issue of the Tank Waste Remediation System (TWRS) Process Flowsheet.

Acceptance Criteria:

Deliverables:

A completed internal supporting document (SD) will be issued for reference use within the TWRS Process Engineerin organization.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Update of Determine Waste Processing Strategy and Waste Separations Process (4.2.2/4.2.2.1)

Schedule ID: PSW00114A

Revision: 0

Assigned to: TWRS Process Design

WBS Designator: 1.1.1.3.01.04.02

ADS No.: 1220-00-AF

Milestone Control No.: T3A-96-140

Completion Date: 08/30/96

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[ ] DOE-RL
[X] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[ ] DOE-RL
[X] Other (Specify): WHC-Internal

Description and what constitutes completion of this commitment:

This activity will provide for the first update to the current technical justification (via a trade study) for the "case Beta" separations strategy and establish the basis for additional development work for advance separations. The study assessed separations alternatives consistent with environmental impact statement (EIS) preparation including no pretreatment, treatment of waste to an intermediate form, enhanced sludge washing, and extensive pretreatment separations (e.g., CLEAN). A trade study report was prepared in FY 1995 which included information gathering, draft document preparation, WHC review, and WHC approval. This update to that document will be complete with WHC approval of the updated study document according to the appropriate Impact Level. The study will also include the cost and schedule impacts of implementing advanced separations processes assuming that enhanced sludge washing will not result in an acceptably low volume of HLW.

Acceptance Criteria:

Acceptance will be provided by WHC approval of the update to the study document.

Deliverables:

Annual update to previous study document which incorporates latest data.

W.B. Barton
Cost Account Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (acceptance) — Date

K.A. Gasper
Program Element Manager — Date

L. Erickson
DOE Manager (agreement) — Date

Westinghouse Hanford Company
Tank Waste Remediation System
Milestone Description Sheet

Rev. 0

Title: Collect Rotary and Push Mode Core Samples from High Level Waste Tanks

Schedule ID: N4C32A122A

Revision: 0

Assigned to: Waste Tank Sampling Engineering

ADS No.: 1130-0C

Program WBS Designator: 1.1.1.2.04.03.02

Completion Date: 09-26-96

Milestone Control No.: T2D-96-113

Milestone Class:	Deliverables:	Addressed To:
[ ] TPA	[ ] Report	[ ] DOE-HQ
[ ] DOE-HQ	[X] Letter	[X] DOE-RL
[X] DOE-RL	[ ] Drawings	[ ] Other(Specify): ____
[ ] CONTRACTOR	[ ] Other(Specify) ____	

Description and what constitutes completion of this commitment (What work is specifically going to be done to accomplish this milestone):

High level tank waste surface to tank bottom core samples will be collected using the Push and Rotary mode coring systems. The number of cores identified for Push mode sampling is 36 (based on 2 cores/tank). The number of cores identified for Rotary mode sampling is 48 (based on 2 cores/tank). Waste samples will be transported and relinquished to an onsite laboratory. Relinquishment of all required* waste samples to the laboratory via a transportation chain of custody document constitutes completion of the sampling commitment. In the event any of the above tanks cannot be sampled, contingency tanks will be selected.

This assumes $11.0M of funding for rotary and $6.8M for push sampling. This requires all 4 trucks deployed and working in the field. The safety issues for rotary in a flammable gas tanks will need to be resolved by 2/14/96 (U-107). As of 9/22/94 the first flammable rotary tanks.
* See acceptance criteria below.

Acceptance Criteria:
Waste sampling in direct accordance with an approved (WHC) Tank Characterization Plan.

Deliverables (Describe the specific products or conditions):
Quarterly performance reports will be transmitted by the Characterization Program Element manager to DOE-RL manager as part of the DNFSB 93-5 Commitment 1.10. The reports will identify sampling performance based on a fiscal year-to-date percent complete scheme. Additionally, any non-recoverable schedule variance will be reported and consequential impacts identified.

P. A. Young Cost Account Manager Date	C. DeFigh-Price Program Element Manager Date
G. A. Stanton Activity Manager Date	R. E. Gerton DOE Manager (agreement) Date
R. E. Gerton DOE Manager (acceptance) Date	

Westinghouse Hanford Company
Tank Waste Remediation System
Milestone Description Sheet

Rev. 0

Title: Collect Auger Samples from High Level Waste Tanks

Schedule ID: N4C33A122A

Revision: 0

Assigned to: Waste Tank Sampling Engineering

ADS No.: 1130-0C

Program WBS Designator: 1.1.1.2.04.03.03

Completion Date: 09-26-96

Milestone Control No.: T2D-96-114

Milestone Class:	Deliverables:	Addressed To:
[ ] TPA	[ ] Report	[ ] DOE-HQ
[ ] DOE-HQ	[X] Letter	[X] DOE-RL
[X] DOE-RL	[ ] Drawings	[ ] Other(Specify):_____
[ ] CONTRACTOR	[ ] Other(Specify) ____	

Description and what constitutes completion of this commitment (What work is specifically going to be done to accomplish this milestone):

High level tank waste surface samples will be collected using an auger sampling system. Six cores will be sampled by auger method. Waste samples will be transported and relinquished to an onsite laboratory. Relinquishment of all required* waste samples to the laboratory via a transportation chain of custody document constitutes completion of the sampling commitment. In the event any of the above tanks cannot be sampled, contingency tanks will be selected.

This requires $.3M of funding.

* See acceptance criteria below.

Acceptance Criteria:

Waste sampling in direct accordance with an approved (WHC) Tank Characterization Plan.

Deliverables (Describe the specific products or conditions):

Quarterly performance reports will be transmitted by the Characterization Program Element manager as part of the DNFSB 93-5 Commitment 1.10. The reports will identify sampling performance based on a quarterly and fiscal year-to-date percent complete scheme. Additionally, any non-recoverable schedule variance will be reported and consequential impacts identified.

P. A. Young
Cost Account Manager — Date

C. DeFigh-Price
Program Element Manager — Date

G. A. Stanton
Activity Manager — Date

R. E. Gerton
DOE Manager (agreement) — Date

R. E. Gerton
DOE Manager (acceptance) — Date

WESTINGHOUSE HANFORD COMPANY
TANK WASTE REMEDIATION SYSTEM DIVISION
MILESTONE DESCRIPTION SHEET

TITLE: ISSUE 40 TANK CHARACTERIZATION REPORTS IN ACCORDANCE WITH THE APPROVED TANK CHARACTERIZATION PLANS. COMPLETE INPUT OF CHARACTERIZATION INFORMATION FOR 40 HLW TANKS TO ELECTRONIC DATABASE(S) (M-44-09)

SCHEDULE ID: N4E54A02A
REVISION: 0

ASSIGNED TO: Characterization Support
WBS DESIGNATOR: 1.1.1.2.04.05.04

ADS NO: 1130-0-0E
COMPLETION DATE: 9/30/96

MILESTONE CONTROL NO: T2D-96-102

MILESTONE CLASS:	DELIVERABLE:	ADDRESSED TO:
[X] TPA M-44-09	[X] REPORT	[ ] DOE-HQ
[ ] DOE-HQ	[ ] LETTER	[X] DOE-RL
[ ] DOE-RL	[ ] DRAWINGS	[ ] OTHER (SPECIFY)
[ ] CONTRACTOR	[ ] OTHER (SPECIFY)	

Description and what constitutes completion of this commitment:

Generate and issue 40 Tank Characterization Reports (TCRs) (in accordance with the approved Tank Characterization Plans) in support of TPA milestone M-44-09. These TCRs will integrate tank waste historical data with tank waste analytical data. Update previously issued TCRs as necessary to incorporate new information. TCRs will be cleared for public release.

Acceptance Criteria

1) The Tank Characterization Reports must include both the relevant historical data and the information obtained by the characterization effort in accordance with the approved Tank Characterization Plans. The TCRs will be similar in content and format to that prepared for tank 241-AP-101 and issued as supporting documents. One copy of each TCR will be transmitted to RL for formal submittal to Ecology. All other internal and external distribution of the TCRs will be performed by the Characterization Program.

2) Characterization data for all 40 tanks must be accessible by onsite and offsite stakeholders through the Tank Characterization Database.

Deliverables: (Describe the specific products or condition)

1) Provide a draft to DOE-RL during review process so RL can perform concurrent review.

2) Transmit each new or revised TCR to DOE-RL as it is issued. Provide with each TCR a draft transmittal letter which DOE-RL may use to forward the document to EPA and Ecology.

3) Provide a final letter after transmission of all TCRs to DOE-RL, indicating completion of the milestone and the date that each TCR was transmitted.

FOR C. S. Haller Todd Brown 9/19/94
Cost Account Manager Date

C. DeFigh-Price 9-20-94
Program Element Manager Date

S. J. Eberlein 9-19-94
Activity Manager Date

R. E. Gerton
DOE Monitor Date

R. E. Gerton
DOE Manager (acceptance) Date

WESTINGHOUSE HANFORD COMPANY
TANK WASTE REMEDIATION SYSTEM DIVISION
MILESTONE DESCRIPTION SHEET

TITLE: SUBMIT INITIAL SINGLE SHELL TANK RETRIEVAL SEQUENCE DOCUMENT FOR ECOLOGY APPROVAL.

SCHEDULE ID: R00100A
REVISION: 0

ASSIGNED TO: Waste Retrieval
WBS DESIGNATOR: 1.1.1.2.05
MILESTONE CONTROL NO: T2E-96-101

ADS NO: 1210-0
COMPLETION DATE: 9-30-96

MILESTONE CLASS:	DELIVERABLE:	ADDRESSED TO:
[X] TPA M-45-02A	[X] REPORT	[ ] DOE-HQ
[ ] DOE-HQ	[ ] LETTER	[X] DOE-RL
[ ] DOE-RL	[ ] DRAWINGS	[ ] OTHER (SPECIFY)
[ ] CONTRACTOR	[ ] OTHER (SPECIFY)	

Description and what constitutes completion of this commitment:

Based on the TWRS flow sheet and system models, provide a single-shell tank retrieval sequence document that defines the tank selection criteria, tank selection rationale, reference retrieval methods for each tank, and the estimated retrieval schedules

Acceptance Criteria

The retrieval sequence document will reflect the latest revision of the TWRS flow sheet and provide a basis for retrieval project and operations schedules.

Deliverables:

Submit the single-shell tank retrieval document to DOE-RL for approval by Ecology.

L. A. Fort
Cost Account Manager: Date:

G. A. Meyer
Program Element Manager: Date:

K. E. McKinney
Activity Manager: Date:

W. R. Wrzesinski
DOE Manager (agreement): Date:

W. R. Wrzesinski
DOE Manager (acceptance) Date

WHC TWRS Milestone Description Sheet

Title: W-151 ORR/STARTUP COMPLETE

Schedule ID: R0D160-1

Revision: 0

Assigned to: Waste Retrieval

WBS Designator: 1.1.1.2.05

ADS No.: 1210-2

Milestone Control No.: T2E-96-102

Completion Date: 30SEP96

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[X] DOE-RL
[ ] CONTRACTOR

Deliverable:

[ ] REPORT
[X] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[ ] DOE-RL
[X] Other (Specify): WHC Retrieval Program

Description and what constitutes completion of this commitment:

This activity includes all work necessary to prepare for startup of the mixer pumps in tank 101-AZ, including readiness reviews, procedures, etc..

Acceptance Criteria:

Completion of the Operation Readiness Review and approval to begin operations.

Deliverables:

Issue a letter to the Waste Retrieval Program Office documenting completion of the ORR/Starting activities.

E. M. Nordquist — Date
Cost Account Manager

G. A. Meyer — Date
Program Element Manager

L. A. Fort — Date
Activity Manager

W. R. Wrzesinski — Date
DOE Manager (agreement)

W. R. Wrzesinski — Date
DOE Manager (acceptance)

WHC TWRS Milestone Description Sheet

Title: Submit Report Summarizing the Testing of Enhanced Sludge Washing and Related Tank Waste Sludge Pretreatment Methods for Samples of Tank Waste Sludge

Schedule ID: PSW04760A/PXW04-2A

Revision: 0

Assigned to: Process Technology

WBS Designator: 1.1.1.3.01.04.03.43

ADS No.: 1220-00-AF

Milestone Control No.: T3A-96-100

Completion Date: 09/30/96

Milestone Class:

[X] TPA M-50-03-T2B
[ ] DOE-HQ
[ ] DOE-RL
[ ] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[X] DOE-RL
[ ] Other (Specify):

Description and what constitutes completion of this commitment:

Perform testing of enhanced sludge washing and related tank waste sludge pretreatment methods using actual tank waste samples. Document and issue results of testing completed to that time. This annual report will also document preliminary candidate tank waste pretreatment sequence and tank blending strategies. Goals for both early progress on waste immobilization and minimization of the production of high level glass will be addressed in these strategies.

These preliminary strategies will be utilized to predict the production of high level waste glass associated with candidate enhanced sludge washings and related tank waste sludge pretreatment methods. The prediction of the HLW glass volume production will be updated.

Acceptance Criteria:

The report will include the latest laboratory data available on sludge washing and enhanced sludge washing through second quarter of FY 1996 and the expected impacts on HLW glass volume will be provided.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverables are:

- Contractor approved report to DOE-RL for review and comment by 07/31/96.
- Final WHC-approved report for external publication and transmittal by 09/01/96.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Preliminary Recommendation on Evaluation of Enhanced Sludge Washing to Determine Whether Advanced Sludge Separation Process are Required

Schedule ID: PSW04418A

Revision: 0

Assigned to: TWRS Strategic Analysis

WBS Designator: 1.1.1.3.01.04

ADS No.: 1220-00-AF

Milestone Control No.: T3A-96-110

Completion Date: 09/30/96

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[X] DOE-RL
[ ] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[X] DOE-RL
[ ] Other (Specify):

Description and what constitutes completion of this commitment:

This milestone supports completion of TPA M-50-03 "Complete evaluation of enhanced sludge washing to determine whether advanced sludge separation processes are required" by 03/31/98. The performance of sludge washing and related tank waste sludge pretreatment methods will be evaluated to determine if these processes will be capable of satisfying criteria which will be established during FY 1995. A decision methodology will be developed with stakeholder participation and implemented. A preliminary recommendation will be developed based on data available during FY 1996 which will:

- Provide a basis for a decision on the need for advanced sludge separations if a decision is required earlier than the planned date of 03/31/98.
- Provide programmatic guidance to prioritize testing, engineering, and development efforts required to reduce the uncertainty of factors affecting the decision.

Acceptance Criteria:

The acceptance criteria, including the plan for accomplishing this milestone, will be documented i the deliverable submitted to DOE-RL to fulfill TPA Milestone M-50-03A by 09/30/94. A draft of the deliverable will be submitted three months prior to the completion date for review by DOE and stakeholders. A final report approved for external publication will be transmitted to DOE-RL one month prior to the completion date for transmittal to WDOE by the completion date.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverable are:

- A contractor approved draft report transmitted to DOE-RL for review b 06/30/96.
- A final report approved for external publication transmitted to DOE-RL by 08/31/96.

W.B. Barton
Cost Account Manager — Date

K. A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WESTINGHOUSE HANFORD COMPANY
TANK WASTE REMEDIATION SYSTEM DIVISION
MILESTONE DESCRIPTION SHEET

TITLE: M-43-01, Project W-030, Tank Farm Ventilation Upgrade

SCHEDULE ID: N3G24F5M
REVISION: 0

ASSIGNED TO: Tank Farm Upgrades

ADS NO: 1120-2

PROGRAM WBS DESIGNATOR: 1.1.1.2.03.10.01

COMPLETION DATE: 12/31/96

MILESTONE CONTROL NO: T2C-97-100

MILESTONE CLASS:	DELIVERABLE:	ADDRESSED TO:
[X] TPA	[] Report	[] DOE-HQ
[ ] DOE-HQ	[X] Letter**	[X] DOE-RL
[ ] DOE-RL	[ ] Drawings	[ ] Other (Specify)
[ ] WHC Key	[ ] Other (Specify)	

Description and what constitutes completion of this commitment:
Project W-030 will replace the ventilation system for the AY and AZ Tank Farm. This project will provide the essential safety class systems for the AY and AZ Tank Farms to provide safe and efficient storage of radioactive liquid high-level waste. Upgrades and improvements will be made to the ventilation and cooling, electrical standby power and instrumentation/control systems.

Acceptance Criteria:
Completion of M-43-01C, "Begin Operations". This last interim milestone will complete the requirements of M-43-01.

Deliverables:
Complete Definitive Design, Start Construction, Complete Construction, Begin Operations

** One letter will be written to document completion of M-43-01C, "Begin Operations. Included in this letter, will be notification of completion of the entire milestone M-43-01, "Project W-030 Tank Farm Ventilation Upgrade"

K. A. Colosi
Cost Account Manager: Date:

J. D. Thomson
Program Element Manager: Date:

K. L. Morris
Activity Manager: Date:

A. Hon
DOE Monitor: Date:

DOE Manager (acceptance) Date

September 28, 1994

WESTINGHOUSE HANFORD COMPANY

Tank Waste Remediation System Division

Milestone Description Sheet

Title: Documention of Potential Feed Composition Ranges Estimate

Schedule ID: SDW1100 1
Revision: 0

Assigned To: High Level Waste
WBS Designator: 1.1.1.3.03.04
Milestone Control No.: T3C-97-109

ADS No.: 1240-0
Completion Date: 10/01/96

Milestone Class:	Deliverable	Addressed to:
[ ] TPA	[X] Report	[ ] DOE-HQ
[ ] DOE-HQ	[ ] Letter	[ ] DOE-RL
[ ] DOE-RL	[ ] Drawings	[X] Other (Specify)
[X] Contractor Key	[ ] Other (Specify)	WHC Management

Description:

Critically review available data. Consider uncertainties in tank waste inventory, pretreatment performance, and blending alternatives. Provide estimates of the potential range of feed compositions to the HLW vitrification plant.

Acceptance Criteria:

Issuance of the report to WHC senior management.

Deliverables:

Report detailing estimates of potential feed composition ranges.

Signatures:

Cost Account Manager — Date T. W. Crawford	Program Element Manager — Date R. W. Powell
Activity Manager — Date R. W. Powell	DOE Manager (Agreement) — Date J. C. Peschong

DOE Manager (Acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Initiate Tank AZ-101 Sludge Washing Process Test

Schedule ID: PSW49019A

Revision: 0

Assigned to: TWRS Process Design

WBS Designator: 1.1.1.3.01.04.02.15

ADS No.: 1220-00-AF

Milestone Control No.: T3A-97-114

Completion Date: 01/02/97

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[ ] DOE-RL
[X] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[X] DOE-RL
[ ] Other (Specify):

Description and what constitutes completion of this commitment:

The first test of sludge washing tank waste will be conducted in tank AZ-101. This test will be a joint effort between the Waste Retrieval and Waste Pretreatment program elements. Waste Retrieval will install two mixer pumps in the tank. Waste Pretreatment will install additional instrumentation, e.g. turbidity profilers, some interface analyzers, and thermal dispersion probes. In addition, the computer control system installed to support the decanting operation will be expanded to support the new instrumentation. The pumps will be tested and simultaneously the sludge washing process test will be carried out. Process Design will measure waste suspended solids and dissolved solids concentrations before and after the operation of the mixer pumps. This milestone commitment will be completed when the measurements have been made and the tank is ready for mixer pump operation.

Acceptance Criteria:

Suspended solids measurements have been made and samples have been taken to measure dissolved solids concentrations.

Deliverables:

A transmittal letter documenting readiness to initiate the mixer pump (supplied by Project W-151, DST Retrieval Pumps) and sludge washing tests.

W.B. Barton
Cost Account Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (acceptance) — Date

K.A. Gasper
Program Element Manager — Date

L. Erickson
DOE Manager (agreement) — Date

WESTINGHOUSE HANFORD COMPANY

Tank Waste Remediation System Division

Milestone Description Sheet

Title: Recommend Design Basis Feeds for Conceptual Design

Schedule ID: SDW2200
Revision: 0

Assigned To: High Level Waste
WBS Designator: 1.1.1.3.03.04
Milestone Control No.: T3C-97-107

ADS No.: 1240-0
Completion Date: 01/03/97

Milestone Class:	Deliverable	Addressed to:
[ ] TPA	[X] Report	[ ] DOE-HQ
[ ] DOE-HQ	[ ] Letter	[ ] DOE-RL
[ ] DOE-RL	[ ] Drawings	[X] Other (Specify)
[X] Contractor Key	[ ] Other (Specify)	WHC Management

Description:

Identify and develop strategies for controlling critical components through blending pretreatment or glass formulation and dilution to maximize the waste oxide loading and optimize melter and plant performance characteristics. Produce specific recommendations for design basis feeds for Conceptual Design.

Acceptance Criteria:

Issuance of recommended design basis feed specifications to WHC management.

Deliverables:

Recommended design basis feed specifications to WHC management.

Signatures:

Cost Account Manager — Date T. W. Crawford	Program Element Manager — Date R. W. Powell
Activity Manager — Date R. J. Powell	DOE Manager (Agreement) — Date J. C. Peschong

DOE Manager (Acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Retrieval Sequence (b) Selected

Schedule ID: PSW04004A

Revision: 0

Assigned to: TWRS Process Technology

WBS Designator: 1.1.1.3.01.04.02.25

ADS No.: 1220-0-AF

Milestone Control No.: T3A-97-110

Completion Date: 04/03/97

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[ ] DOE-RL
[X] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[ ] DOE-RL
[X] Other (Specify): WHC-Internal

Description and what constitutes completion of this commitment:

Background: TPA milestone number M-45-02B "Initial Retrieval Sequence Report" calls for the transmittal of the initial SST retrieval sequence to Ecology for their approval by September 30, 1997. Although not required by the TPA milestone, the report will include the retrieval sequence of all 177 SSTs and DSTs. The preparation of that report is the responsibility of the Retrieval Program. The technical basis for that report is the subject of this milestone description sheet.

The sequence selected for this milestone is an update of the retrieval sequence to be established circa May 1996 (Retrieval Sequence (a) Selected) and documented in the Retrieval Sequence Report to be issued by the Retrieval Program circa September 1996. This sequence shall be selected from alternatives based upon the metrics estimated by a computer simulation of the TWRS. In the event that the computer simulation is not ready on time, the retrieval sequence (b) can be based upon manual estimation of a subset of the metrics. The selected sequence shall be documented in a report.

Acceptance Criteria:

The retrieval sequence shall:

- Be approved by appropriate organizations within WHC,
- Be cleared for public release,
- Provide the order and estimated timing of the retrieval of all 177 SSTs and DSTs,
- Be based upon the metrics estimated by a computer simulation of the behavior of the Tank Waste Remediation System (TWRS) to alternative retrieval sequences and blending strategies, or manual estimates thereof,
- Be developed using assumptions consistent with the current TWRS baseline.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverable is one or more supporting documents, that together meet the above acceptance criteria.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Update of Determine Waste Processing Strategy and Waste Separations Process (4.2.2/4.2.2.1)

Schedule ID: PSW00117A

Revision: 0

Assigned to: TWRS Process Design

WBS Designator: 1.1.1.3.01.04.02

ADS No.: 1220-00-AF

Milestone Control No.: T3A-97-111

Completion Date: 08/29/97

Milestone Class:

[ ] TPA
[ ] DOE-HQ
[ ] DOE-RL
[X] CONTRACTOR

Deliverable:

[X] REPORT
[ ] LETTER
[ ] DRAWINGS
[ ] Other (Specify):

Addressed to:

[ ] DOE-HQ
[ ] DOE-RL
[X] Other (Specify): WHC-Internal

Description and what constitutes completion of this commitment:

This activity will provide for the second update to the current technical justification (via a trade study) for the "case Beta" separations strategy and establish the basis for additional development work for advance separations. The study assessed four categories of separations alternatives consistent with environmental impact statement (EIS) preparation including no pretreatment, treatment of waste to an intermediate form, enhanced sludge washing, and extensive pretreatment separations (e.g., CLEAN). A trade study report was prepared in FY 1995, and updated in FY 1996, which included information gathering, draft document preparation, WHC review, and WHC approval. This update to that document will be complete with WHC appoval of the updated study document according to the appropriate Impact Level (assumed to be N/A or level 4).

Acceptance Criteria:

Acceptance will be provided by WHC approval of the update to the study document.

Deliverables:

Annual update to previous study document which incorporates latest data.

W.B. Barton
Cost Account Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (acceptance) — Date

K.A. Gasper
Program Element Manager — Date

L. Erickson
DOE Manager (agreement) — Date

Westinghouse Hanford Company
Tank Waste Remediation System
Milestone Description Sheet

Rev. 0

Title: Collect Rotary and Push Mode Core Samples from High Level Waste Tanks

Schedule ID: N4C32A132A

Revision: 0

Assigned to: Waste Tank Sampling Engineering

ADS No.: 1130-0C

Program WBS Designator: 1.1.1.2.04.03.02

Completion Date: 09-25-97

Milestone Control No.: T2D-97-109

Milestone Class:	Deliverables:	Addressed To:
[ ] TPA	[ ] Report	[ ] DOE-HQ
[ ] DOE-HQ	[X] Letter	[X] DOE-RL
[X] DOE-RL	[ ] Drawings	[ ] Other(Specify):
[ ] CONTRACTOR	[ ] Other(Specify)	

Description and what constitutes completion of this commitment (What work is specifically going to be done to accomplish this milestone):

High level tank waste surface to tank bottom core samples will be collected using Push and Rotary mode coring systems. The number of cores identified for Rotary mode sampling is 88 (assumes 2 cores/tank). The number of cores identified for Push mode sampling is 20 (assumes 2 cores/tank). However, other tanks can be substituted via appropriate WHC change control to the integrated operations schedule. Waste samples will be transported and relinquished to an onsite laboratory. Relinquishment of all required* waste samples to the laboratory via a transportation chain of custody document constitutes completion of the sampling commitment. In the event any of the above tanks cannot be sampled, contingency tanks will be selected.

This assumes $19.7M for Rotary and $4.0M for Push sampling. All 4 trucks are required with 6 crews of operators.
* See acceptance criteria below.

Acceptance Criteria:

Waste sampling in direct accordance with an approved (WHC) Tank Characterization Plan (TCP). Sampling must meet recovery requirements specified in the TCP.

Deliverables (Describe the specific products or conditions):

Quarterly performance reports will be transmitted by the Characterization Program Element manager to DOE-RL manager as part of the DNFSB 93-5 Commitment 1.10. The reports will identify sampling performance based on a fiscal year-to-date percent complete scheme. Additionally, any non-recoverable schedule variance will be reported and consequential impacts identified.

P. A. Young
Cost Account Manager — Date

C. DeFigh-Price
Program Element Manager — Date

G. A. Stanton
Activity Manager — Date

R. E. Gerton
DOE Manager (agreement) — Date

R. E. Gerton
DOE Manager (acceptance) — Date

WESTINGHOUSE HANFORD COMPANY

Tank Waste Remediation System Division

Milestone Description Sheet

Title: Incorporate Pretreatment CDR & Sludge Wash Decision

Schedule ID: CDW1050
Revision: 0

Assigned To: High Level Waste
WBS Designator: 1.1.1.3.03.05.04
Milestone Control No.: T3C-97-100

ADS No.: 1240-0
Completion Date: 09/29/97

Milestone Class:	Deliverable	Addressed to:
[ ] TPA	[ ] Report	[ ] DOE-HQ
[ ] DOE-HQ	[X] Letter	[ ] DOE-RL
[ ] DOE-RL	[ ] Drawings	[X] Other (Specify)
[X] Contractor Key	[ ] Other (Specify)	A-E contractor

Description:

An interface with the Pretreatment program detailing final selection of pretreatment processes to be used in the HLW facility Conceptual Design.

Acceptance Criteria:

Transmittal of the pretreatment process selection decision to the HLW facility A-E contractor.

Deliverables:

Letter transmitting the pretreatment CDR and sludge wash decision to the A-E contractor.

Signatures:

Cost Account Manager — Date

Program Element Manager — Date
R. W. Powell

Activity Manager — Date
R. W. Powell

DOE Manager (Agreement) — Date
J. Peschong

DOE Manager (Acceptance) — Date

WESTINGHOUSE HANFORD COMPANY
TANK WASTE REMEDIATION SYSTEM DIVISION
MILESTONE DESCRIPTION SHEET

TITLE: ISSUE 40 TANK CHARACTERIZATION REPORTS IN ACCORDANCE WITH THE APPROVED TANK CHARACTERIZATION PLANS. COMPLETE INPUT OF CHARACTERIZATION INFORMATION FOR 40 HLW TANKS TO ELECTRONIC DATABASE(S) (M-44-10)

SCHEDULE ID: N4E54A03A
REVISION: 0

ASSIGNED TO: Characterization Support
WBS DESIGNATOR: 1.1.1.2.04.05.04
MILESTONE CONTROL NO: T2D-97-102

ADS NO: 1130-0-OE
COMPLETION DATE: 9/30/97

MILESTONE CLASS:	DELIVERABLE:	ADDRESSED TO:
[x] TPA M-44-10	[x] REPORT	[ ] DOE-HQ
[ ] DOE-HQ	[ ] LETTER	[x] DOE-RL
[ ] DOE-RL	[ ] DRAWINGS	[ ] OTHER (SPECIFY)
[ ] CONTRACTOR	[ ] OTHER (SPECIFY)	

Description and what constitutes completion of this commitment:

Generate and issue 40 Tank Characterization Reports (TCRs) (in accordance with the approved Tank Characterization Plans) in support of TPA milestone M-44-10. These TCRs will integrate tank waste historical data with tank waste analytical data. Update previously issued TCRs as necessary to incorporate new information. TCRs will be cleared for public release.

Acceptance Criteria

1) The Tank Characterization Reports must include both the relevant historical data and the information obtained by the characterization effort in accordance with the approved Tank Characterization Plans. The TCRs will be similar in content and format to that prepared for tank 241-AP-101 and issued as supporting documents. One copy of each TCR will be transmitted to RL for formal submittal to Ecology. All other internal and external distribution of the TCRs will be performed by the Characterization Program.

2) Characterization data for all 40 tanks must be accessible by onsite and offsite stakeholders through the Tank Characterization Database.

Deliverables: (Describe the specific products or condition)

1) Provide a draft to DOE-RL during review process so RL can perform concurrent review.

2) Transmit each new or revised TCR to DOE-RL as it is issued. Provide with each TCR a draft transmittal letter which DOE-RL may use to forward the document to EPA and Ecology.

3) Provide a final letter after transmission of all TCRs to DOE-RL, indicating completion of the milestone and the date that each TCR was transmitted.

For C. S. Haller Todd Brown 9/19/94
Cost Account Manager Date

C. DeFigh-Price C. DeFigh-Price 9-20-94
Program Element Manager Date

S. O. Eberlein 9-19-94
Activity Manager Date

R. E. Gerton
DOE Monitor Date

R. E. Gerton
DOE Manager (acceptance) Date

WESTINGHOUSE HANFORD COMPANY
TANK WASTE REMEDIATION SYSTEM DIVISION
MILESTONE DESCRIPTION SHEET

TITLE: SUBMIT ANNUAL UPDATE OF SINGLE SHELL TANK RETRIEVAL SEQUENCE DOCUMENT FOR ECOLOGY APPROVAL.

SCHEDULE ID: R00100C
REVISION: 0

ASSIGNED TO: Waste Retrieval
WBS DESIGNATOR: 1.1.1.2.05
MILESTONE CONTROL NO: T2E-97-104

ADS NO: 1210-0
COMPLETION DATE: 9-30-97

MILESTONE CLASS:	**DELIVERABLE:**	**ADDRESSED TO:**
[X] TPA M-45-02B	[X] REPORT	[ ] DOE-HQ
[ ] DOE-HQ	[ ] LETTER	[X] DOE-RL
[ ] DOE-RL	[ ] DRAWINGS	[ ] OTHER (SPECIFY)
[ ] CONTRACTOR	[ ] OTHER (SPECIFY)	

Description and what constitutes completion of this commitment:

Based on the TWRS flow sheet and system models, provide a single-shell tank retrieval sequence document that defines the tank selection criteria, tank selection rationale, reference retrieval methods for each tank, and the estimated retrieval schedules.

Acceptance Criteria

The retrieval sequence document will reflect the latest revision of the TWRS flow sheet and provide a basis for retrieval project and operations schedules.

Deliverables:

Submit the single-shell tank retrieval document to DOE-RL for approval by Ecology.

L.A. Fort
Cost Account Manager: Date:

G. A. Meyer
Program Element Manager: Date:

K. E. McKinney
Activity Manager: Date:

W. R. Wrzesinski
DOE Manager (agreement): Date:

W. R. Wrzesinski
DOE Manager (acceptance) Date

WHC TWRS Milestone Description Sheet

Title: Submit Report Summarizing the Testing of Enhanced Sludge Washing and Related Tank Waste Sludge Pretreatment Methods for Samples of Tank Waste Sludge

Schedule ID: PSW04790A/PW05-0A

Revision: 0

Assigned to: Process Technology

WBS Designator: 1.1.1.3.01.04.03.44

ADS No.: 1220-00-AF

Milestone Control No.: T3A-97-101

Completion Date: 09/30/97

Milestone Class:		Deliverable:		Addressed to:	
[X]	TPA M-50-03-T2C	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[X]	DOE-RL
[ ]	DOE-RL	[ ]	DRAWINGS	[ ]	Other (Specify):
[ ]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

Perform testing of enhanced sludge washing and related tank waste sludge pretreatment methods using actual tar waste samples. Document and issue results of testing completed to that time. This annual report will also documer preliminary candidate tank waste pretreatment sequence and tank blending strategies. Goals for both early progress c waste immobilization and minimization of the production of high level glass will be addressed in these strategies.

These preliminary strategies will be utilized to predict the production of high level waste glass associated with candida enhanced sludge washings and related tank waste sludge pretreatment methods. The prediction of the HLW glas volume production will be updated.

Acceptance Criteria:

The report will include the latest laboratory data available on sludge washing and enhanced sludge washing (throug second quarter of FY 1997) and the expected impacts on HLW glass volume will be provided.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverables are:

- Contractor approved report to DOE-RL for review and comment by 07/31/97.
- Final WHC-approved report for external publication and transmittal by 09/01/97.

W.B. Barton
Cost Account Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (acceptance) — Date

K.A Gasper
Program Element Manager — Date

L. Erickson
DOE Manager (agreement) — Date

WHC TWRS Milestone Description Sheet

Title: Issue Draft Recommendation on Evaluation Sludge Washing To Determine if Advanced Sludge Separation Process are Required

Schedule ID: PSW04423A

Revision: 0

Assigned to: TWRS Strategic Analysis

WBS Designator: 1.1.1.3.01.04.02.22

ADS No.: 1220-00-AF

Milestone Control No.: T3A-97-105

Completion Date: 09/30/97

Milestone Class:		Deliverable:		Addressed to:	
[ ]	TPA	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[X]	DOE-RL
[X]	DOE-RL	[ ]	DRAWINGS	[ ]	Other (Specify):
[ ]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

This milestone provides the basis for completing TPA M-50-03 "Complete evaluation of enhanced sludge washing determine whether advanced sludge separation processes are required" by 03/31/98. The performance of sludge washing and related tank waste sludge pretreatment methods will be evaluated to determine if these processes will established during FY 1995. A decision methodology will be developed with stakeholder participation and implemente A draft recommendation will be developed based on data available during FY 1997 which will:

- Provide a basis for a decision on the need for advanced sludge separations if a decision is required earlier than t planned date of 03/31/98.
- Be revised consistent with results from all testing, engineering, and development efforts completed during FY 19 and serve as the review and comment draft for the Final Recommendation.

Acceptance Criteria:

The acceptance criteria, including the plan for accomplishing this milestone, will be documented in the deliverabl submitted to DOE-RL to fulfill TPA Milestone M-50-03A by 09/30/94. A draft of the deliverable will be submitted thr months prior to the completion date for review by DOE and stakeholders. A final report approved for external publication will be transmitted to DOE-RL one month prior to the completion date for transmittal to WDOE by the completion date.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverables are:

- A contractor approved draft report transmitted to DOE-RL for review by 06/30/97.
- A final report approved for external publication transmitted to DOE-RL by 08/31/97.

W.B. Barton
Cost Account Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (acceptance) — Date

K.A. Gasper
Program Element Manager — Date

L. Erickson
DOE Manager (agreement) — Date

WHC TWRS Milestone Description Sheet

Title: Complete In-Tank Sludge Washing Process Test and Issue Report (Tank AZ-101)

Schedule ID: PSW49030A

Revision: 0

Assigned to: TWRS Process Design

WBS Designator: 1.1.1.3.01.04.02.15

ADS No.: 1220-00-AF

Milestone Control No.: T3A-97-107

Completion Date: 09/30/97

Milestone Class:		Deliverable:		Addressed to:	
[ ]	TPA	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[X]	LETTER	[X]	DOE-RL
[X]	DOE-RL	[ ]	DRAWINGS	[ ]	Other (Specify):
[ ]	CONTRACTOR	[X]	Other (Specify):		

Description and what constitutes completion of this commitment:

The solids/liquids separation will be done by decanting off liquid from DSTs (including salt cake which has been dissolved in SSTs and transferred to the DSTs). The solids treatment will consist of In-Tank Processing (sludge washing with water and sodium hydroxide solution) to remove solubles including some of the aluminum and zirconium) to reduce the volume of solids going to the HLW immobilization facility.

A sludge washing test will be conducted to determine if sludge can be adequately mobilized with two mixer pumps, and if the sludge can be washed and separated from the waste solution as assumed in the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement).

Completion of this activity includes accomplishing the following activities in Tank 241-AZ-101:

- Installation of a decant pump and control system
- Decanting the neutralized current acid waste (NCAW) supernatant to another tank
- Adding dilute low-activity supernatant from another tank
- Installing and testing mixer pumps supplied by Project W-151, Tank 241-AZ-101 Waste Retrieval System (performed by others)
- Allowing the washed solids to settle
- Measuring the suspended solids profile before and after the mixer pump/sludge washing test
- Sampling and analyzing the supernatant before and after the mixer pump/sludge washing test
- Updating computer model for simulating solid-liquid separation and leaching based on analytical results
- Preparing a report documenting efficiency of a single sludge wash of NCAW

WHC TWRS Milestone Description Sheet

Acceptance Criteria:

The acceptance criteria includes issuing a contractor approved test plan describing the planned waste retrieval mixer pump and sludge washing process tests prior to initiating the process tests. Status report documenting activities accomplished and planned accomplishments will be submitted in FY 1995 and FY 1996. A contractor approved report documenting the results of the sludge washing demonstration in Tank 241-AZ-101 will be transmitted to DOE-RL on the completion date.

Deliverables:

The deliverables are:

- Contractor approved test plan by 04/30/95
- Sludge washing test status report by 09/30/95
- Sludge washing test status report by 09/30/96
- Contractor approved report documenting results of the sludge washing test in Tank 241-AZ-101 by 09/30/97

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title:	Complete Evaluation of Enhanced Sludge Washing to Determine if Advanced Sludge Separation Processes are Required	**Schedule ID:**	PSW04429A/ PHW26F
		Revision:	0
Assigned to:	TWRS Strategic Analysis		
WBS Designator:	1.1.1.3.01.04.03	**ADS No.:**	1220-00-AF
Milestone Control No.:	T3A-98-100	**Completion Date:**	3/31/98

Milestone Class:		**Deliverable:**		**Addressed to:**	
[X]	TPA M-50-03	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[ ]	LETTER	[ ]	DOE-RL
[ ]	DOE-RL	[ ]	DRAWINGS	[ ]	Other (Specify):
[ ]	CONTRACTOR	[ ]	Other (Specify):		

Description and what constitutes completion of this commitment:

The performance of sludge washing and related tank waste sludge pretreatment methods will be evaluated to determine if these processes will be capable of satisfying criteria which will be established by the three parties prior to the milestone date. The criteria will include such items as volume of HLW resulting from pretreatment, compatibility with HLW and LLW vitrification processes, and processing rates. For example, sludge washing and enhanced sludge washing must result in the production of a "reasonable" volume of HLW requiring repository disposal such that other established sludge treatment processes will not result in overall cost savings or schedule improvements. If the predicted performance does not meet the criteria, the need for more advanced sludge separations processes will be re-examined and changes to the HLW Program will be proposed accordingly. Key elements of this evaluation include:

- Pretreatment process testing using actual tank waste. These tanks will be chosen to represent the expected range of sludge composition. Candidate processes are those, such as water washing, caustic washing, and selective leaching, which do not require complex processing systems and which can be implemented within tanks or relatively simple facilities.
- Developing candidate tank treatment and blending sequences to minimize the volume of immobilized HLW.
- Modeling systems performance to predict the volumes of immobilized HLW produced and processing rates for candidate pretreatment processes.
- Assessing the uncertainties related to the HLW volume predictions.
- Issuing annual reports summarizing the status of testing of enhanced sludge washing and advanced separations methods.
- Decision analysis process based on inputs from stakeholders.

Acceptance Criteria:

The acceptance criteria, including the decision analysis process and plan for achieving this milestone will be documented in the deliverable submitted to DOE-RL to fulfill Milestone M-50-03A by 9/30/94. The deliverable will b contractor report approved for external publication. The report must be ready for transmittal to the WDOE by DOE- All comments received from reviewers of this report will be addressed. A decision analysis process based on inp from stakeholders and approved by DOE-RL will be used to explain the decision documented in the report.

WHC TWRS Milestone Description Sheet

Deliverables:

- A contractor approved report will be transmitted to DOE-RL by 12/31/97 for review by DOE-RL and Stakeholders.
- A final contractor report approved for external publication will be transmitted to DOE-RL by 02/28/98 for DOE-RL transmittal to WDOE by 03/31/98.

W.B. Barton
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

I.E. Reep
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Submit Conceptual Design of HLW Pretreatment Facility

Schedule ID: PHW09160A/PDW0400A

Revision: 0

Assigned to: TWRS Projects

WBS Designator: 1.1.1.3.01.06

ADS No.: 1220-00-AC

Milestone Control No.: T3A-98-101

Completion Date: 03/31/98

Milestone Class:			Deliverable:			Addressed to:	
[X]	TPA	M-50-04-T01	[X]	REPORT		[ ]	DOE-HQ
[ ]	DOE-HQ		[X]	LETTER		[X]	DOE-RL
[ ]	DOE-RL		[ ]	DRAWINGS		[ ]	Other (Specify):
[ ]	CONTRACTOR		[X]	Other (Specify):	Validation Package		

Description and what constitutes completion of this commitment:

To the extent that additional facilities are needed for the solids treatment beyond In-Tank Processing (sludge wash with water and sodium hydroxide solution), they will be provided by a HLW pretreatment facility, WBS element 1.1.1.3.01.06, which may be a stand-alone facility or may be combined with the LLW pretreatment facility or with HLW immobilization facility. This capability is scheduled to be operational by June, 2008, TPA Milestone 50-04, support the HLW immobilization activity.

A Conceptual Design Report (CDR) will be prepared to support a Request for Project Authorization for design an construction of the HLW pretreatment facility.

Acceptance Criteria:

The acceptance criteria includes issuing a Conceptual Design Plan (CDP) in accordance with RL 4700.1, Project Management System, which identifies the work elements and schedule required to achieve project validation. T criterion for completion of this milestone is a contractor approved CDR for the HLW pretreatment facility.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverables are:

- Contractor approved CDP by 04/30/96
- Contractor approved CDR by 03/31/98

K.A. Gasper
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

K.A. Gasper
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

WHC TWRS Milestone Description Sheet

Title: Initiate Definitive Design of HLW Pretreatment Facility

Schedule ID: PDW0409A

Revision: 0

Assigned to: TWRS Projects

WBS Designator: 1.1.1.3.01.06

ADS No.: 1220-00-AC

Milestone Control No.: T3A-99-100

Completion Date: 11/30/98

Milestone Class:		Deliverable:		Addressed to:	
[X]	TPA M-50-04-T02	[X]	REPORT	[ ]	DOE-HQ
[ ]	DOE-HQ	[X]	LETTER	[X]	DOE-RL
[ ]	DOE-RL	[ ]	DRAWINGS	[ ]	Other (Specify):
[ ]	CONTRACTOR	[X]	Other (Specify): Validation Package		

Description and what constitutes completion of this commitment:

To the extent that additional facilities are needed for the solids treatment beyond In-Tank Processing (sludge washi with water and sodium hydroxide solution), they will be provided by a HLW pretreatment facility, WBS element 1.1.1.3.01.06, which may be a stand-alone facility or may be combined with the LLW pretreatment facility or with t HLW immobilization facility. This capability is scheduled to be operational by June, 2008, TPA Milestone 50-04, support the HLW immobilization activity.

A Conceptual Design Report (CDR), Justification for New Start documentation and project validation package are prepared and submitted to support Key Decision 1, Approve New Start. Following budget approval, a request fo Project Authorization is submitted to DOE-RL for approval to initiate definitive design.

A sludge washing test will be conducted if sludge can be adequately mobilized with two mixer pumps, and if the slud can be washed and separated from the waste solution as assumed in the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement).

Acceptance Criteria:

The acceptance criteria includes issuing a Conceptual Design Plan (CDP) in accordance with RL 4700.1, Project Management System, which identifies the work elements and schedule required to achieve project validation. Th criterion for completion of this milestone is DOE approval of the CDR; completion of Key Decision 1, Approve Ne Start; and, approval of Project Authorization to commence Title I design of the HLW pretreatment facility. To achie this milestone, A-E staff must be mobilized and working on definitive design of HLW pretreatment facility.

WHC TWRS Milestone Description Sheet

Deliverables:

The deliverables are:

- Contractor approved CDR by 03/31/98.
- Project validation package by 04/30/98.
- DOE-RL approval of the CDR by 04/30/98.
- Approval of the Project Authorization to proceed with Title I design by 10/31/98.
- Letter to DOE-RL documenting mobilization of A-E and initiation of Title I by 11/30/98.

K.A. Gasper
Cost Account Manager — Date

K.A. Gasper
Program Element Manager — Date

K.A. Gasper
Activity Manager — Date

L. Erickson
DOE Manager (agreement) — Date

L. Erickson
DOE Manager (acceptance) — Date

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