CODES & STANDARDS
IDENTIFICATION, ADEQUACY, AND IMPLEMENTATION
SUPPLEMENTAL RESPONSE AND IMPLEMENTATION PLAN

1.0 INTRODUCTION

1.1 Supplemental Response to Recommendation 90-2

In supplemental response to Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 90-2, the Department of Energy (DOE) will:

(1) Identify the specific standards which the DOE considers apply to the design, construction, operation and decommissioning of defense nuclear facilities of DOE (including all applicable Departmental orders, regulations, and requirements) at the following defense nuclear facilities:
- o Savannah River Site: K, L, and P Reactors;
- o Rocky Flats Plant: Buildings 371, 374, 559, 707, 771, 774, 776, 777, and 779;
- o Hanford Site: Plutonium Finishing Plant; PUREX Facility, together with associated waste processing and storage facilities; N Reactor (including decommissioning); and K Reactor Storage Basins; and
- o Waste Isolation Pilot Plant (WIPP).

(2) Provide DOE's views on the adequacy of the standards identified in the above process for protecting the public health and safety at the defense nuclear facilities referred to, and determine the extent to which the standards have been implemented at these facilities.

1.2 Background

In prior years, DOE conducted its defense related nuclear operations as an oversight organization with respect to its operating contractors. In keeping with this management approach, individual contractors at defense programs facilities were responsible for formulating, selecting, and administering standards controlling design, construction, and conduct of operations. Due to the dearth of nuclear industry standards when these facilities were constructed and first operated, these contractors had to knowledgeably apply non-nuclear industry standards and, in many cases, formulate appropriate detailed technical standards to address their unique applications. As a result of isolation from commercial nuclear power and other industries, modern practices and standards were often not assessed or adopted as they became available. These are some of the reasons a well-documented body of codes and standards has not been maintained for DOE's defense nuclear facilities.

Recently, DOE transitioned to a more assertive management organization. Consistent with this approach, facility operations have become the subject of DOE orders controlling their design, construction, operation, and decommissioning. In recognition of the excellent resources available, DOE is attempting

to utilize nationally available consensus codes and standards as aids in achieving its mission. These DOE orders have not achieved the level of completeness, organization, and cohesiveness commensurate with the safe operation of nuclear facilities. DOE is currently drafting a set of rules to correct this situation.

1.3 Purpose

A complete, cohesive, and organized body of standards is necessary for ensuring that the safety and health of the public are being adequately protected at DOE defense nuclear facilities. As a significant intermediate and practical step in creating this body of standards, DOE will prepare an organized tabulation of the codes and standards DOE considers to apply to the named facilities, determine the extent of current compliance at the facilities, and make a comprehensive review of adequacy for protection of public health and safety. The full range of activities necessary to finalize these tasks may not be completed prior to or during operation of some of the named facilities. However, there is substantial activity currently underway to ensure that the health and safety of the public is adequately protected during facility operation. Examples of these activities include the ongoing seismic and thermal-hydraulic analyses for K, L, and P Reactors; revised operator training programs at both Savannah River and Rocky Flats; and comprehensive readiness reviews planned or underway at K, L, and P Reactors, Rocky Flats, and WIPP.

2.0 PROGRAM DESCRIPTION

The above information will be provided to the Board in five major reports:

1) DOE Order Compliance Programs at Savannah River and Rocky Flats.

2) Standards that apply to Savannah River K, L, and P reactors.

3) Standards that apply to Rocky Flats Buildings 371, 374, 559, 707, 771, 774, 776, 777, and 779.

4) DOE orders and other standards that apply to WIPP.

5) DOE orders and other standards that apply to Hanford.

These reports will be in a stand-alone format specifically directed at meeting DOE and the Board's needs. The codes and standards identified and assessed in these reports will consist of the following, to the extent that they concern the health and safety of the public:

(1) Codes and standards that were specifically invoked on the design, construction, and modification of the facility;

Westinghouse
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P.O. Box 1970 Richland, WA 99352

94:3605

February 28, 1994

Mr. John M. Clark, Acting Manager
Office of Characterization
Office of Tank Waste Remediation System
U.S. Department of Energy
Richland Operations Office
Richland, Washington 99352

Dear Mr. Clark:

TANK WASTE REMEDIATION SYSTEM MINIMUM/MAXIMUM LABORATORY CAPACITY STRATEGY

Reference: Recommendation 93-05 Implementation Plan, U.S. Department of Energy - Richland Operations Office, DOE/RL 94-0001, January 1994.

The attached strategy responds to Commitment Number 5.11 of the Reference, "Develop minimum/maximum laboratory capacity strategy," which includes schedules to bring off-site laboratory capacity on board. The strategy has been developed jointly with representatives of the Tank Waste Remediation System (TWRS) Characterization Program, Westinghouse Hanford Company (WHC) 222-S Laboratory, Pacific Northwest Laboratory (PNL) Analytical Chemistry Laboratory (ACL), Idaho National Engineering Laboratory's (INEL) Westinghouse Idaho Nuclear Company (WINCO) Analytical Chemistry section, Los Alamos National Laboratory's (LANL) CST-1 Analytical Laboratory, and Hanford Analytical Services (HAS) Program Management and Integration.

Highlights of the strategy include upgrade and utilization of:

1) Hanford's 222-S and ACL laboratories for safety screening, safety resolution and compliance support.

2) INEL's WINCO laboratories for waste treatment/disposal characterization and safety screening/resolution backup.

3) LANL's CST-1 for waste treatment/disposal characterization, safety screening/resolution backup and analytical process development support.

4) Additional Hanford facilities as required for sample archive.

Support activities include determination of National Environmental Policy Act (NEPA) requirements, procurement and certification of shipping containers for transport of tank waste samples to off-site laboratories. Program costs and schedules are presented.

The strategy includes the following commitments:

Issue INEL upgrade plan	January 1994 (complete)
Determination of NEPA Requirements	February 1994
Issue LANL Upgrade Plan	March 1994
Type A Containers and Type B Casks Available	October 1994
INEL Ready-to-Serve	October 1994
Type B Casks Certified	January 1995 (evaluating October 1994 completion)
LANL Ready-to-Serve	February 1995 (August 1994 for Process Development samples only)

Future revisions of this strategy will be made as characterization needs are further defined. Other uncertainties are the outcome of the NEPA determination and expediting Type B cask certification.

If you need additional information, please call Curtis Stroup on 372-0816.

Very truly yours,

C. DeFigh-Price

C. DeFigh-Price, Manager
Characterization Program
Tank Waste Remediation System Program Office

klh

Attachment (1)

RL - R. P. Carter
P. K. Clark
J. R. Noble-Dial
R. O. Puthoff (w/o attachment)

ATTACHMENT

TWRS CHARACTERIZATION PROGRAM MINIMUM/MAXIMUM LABORATORY CAPACITY STRATEGY

1.0 Objective

The following strategy defines the key actions, schedules, and costs for readying and use of analytical laboratories to support characterization of Hanford high level tank wastes. The characterization work is now being done in two analytical laboratories at the Hanford site, the 222-S Laboratory operated by Westinghouse Hanford Company (WHC) and the Analytical Chemistry Laboratory (ACL or 325) operated by Pacific Northwest Laboratories (PNL). Previous projections of waste characterization analytical needs for the next two years (Fiscal Years 1995 & 1996) have shown that additional capacity may be required.

This strategy supports Defense Nuclear Facility Safety Board (DNFSB) Recommendation 93-5 Implementation Plan, DOE/RL 94-0001 Commitment 5.11 (Reference 1), "Develop minimum/maximum laboratory capacity strategy, which includes schedules to bring off-site capacity on board to be issued in February 1994."

2.0 Summary

Safety related characterization will be accelerated to accomplish a comprehensive hazardous vapors, flammable gas, organic, ferrocyanide, and high heat safety screening sampling and analysis activity on each of the 177 High Level Waste (HLW) tanks within three years of 93-5 acceptance (October 1993) and to complete safety-related sampling and analysis of all Watch List tanks within two years.

TWRS has identified four planning cases for Safety, Waste Treatment/Disposal, and Compliance sample characterization for samples taken in FY 1994 (after March 1, 1994) through FY 1996. The four cases are identified as Minimum, Intermediate A, Intermediate B, and Maximum (see Appendix 1). The present TWRS plan uses the Minimum case. The TWRS Characterization Program has requested the laboratories establish strategies for supporting all four cases.

All TWRS Safety Screening and Resolution analyses will be performed at either the 222-S Laboratory or the ACL Laboratory. Both Hanford Laboratories will operate multiple shifts as required to meet TWRS needs for a specific analyses or activity such as sample extrusion. Backup capacity will be readied and available at INEL and LANL by 10/31/94 and 2/28/95 respectively. This strategy provides excess capacity for Safety Screening and Safety Resolution as shown by both the AEU and Laboratory Capacity and Utilization (Resource Management) Models.

Planned laboratory AEU capacities exceed all TWRS Characterization Safety Screening and Safety Resolution needs for all cases. A comparison of TWRS Characterization Program Safety Screening and Safety

Resolution needs by analysis type and laboratories capacities indicates that planned equipment analytical capacity will exceed TWRS needs. Multiple shift operations will be required to meet some analytical needs with the exception of the maximum case, use of all the Laboratories capacities, should exceed TWRS Characterization Program needs. Laboratories segment extrusion capacity is planned to be twice as great as the maximum needs in order to handle surges.

Core samples for shipment to INEL and LANL will be extruded at Hanford hot cells, sub sampled or composited and packaged in sample containers, inserted into shipping containers and loaded onto trucks for shipment to Idaho or New Mexico. The work at INEL and LANL consists of receiving and preparing the tank core samples for analysis, followed by leaching and/or dissolution; chemical separations; measurement of physical characteristics, inorganic, organic, and radionuclide analytes; and reporting of results. All of these activities will be performed per TWRS specifications, as given in the specific Tank Characterization Plans. LANL activities will focus on process development needs for waste treatment/disposal.

Review of NEPA requirements is in process and a strategy for meeting NEPA requirements is planned to be developed by February 28, 1994. Activities being reviewed for NEPA requirements include shipping and off-site facilities use. If an Environmental Assessment is required, the estimate is that it can be completed in less than a year (February 1995). Determination of NEPA requirements is the responsibility of DOE with assistance as required from the WHC NEPA Documentation group, INEL, and LANL.

The maximum storage inventory at WHC's 222-S Laboratory is estimated at 200 segments and at PNL's ACL at 150 segments. These capacities are preliminary estimates and must be confirmed. An engineering study will be funded for completion by June 1994 to identify sample archive capacity (Reference 2). Sample archive space must be identified, funded and readied by January 1995 (key item). Storage of all remaining hot cell core samples has not previously identified in laboratory upgrade plans.

To ensure that adequate capacity is available to meet Tank Waste Remediation System (TWRS) needs the following approach is being pursued. This approach includes: 1) Developing upgrade plans to increase analytical capacity by use of Idaho National Engineering Laboratories' (INEL) WINCO and Los Alamos National Laboratories'(LANL) CST-1 Laboratories , 2) Projecting minimum/maximum TWRS Characterization Program analytical needs baseline from the best available information as of 2/18/94 (Reference 2), 3) Based on 1 and 2 developing a minimum/maximum TWRS Analytical services strategy, and 4) Revising the laboratory capacity strategy as TWRS characterizations needs are further defined.

3.0 Background

The DNFSB Recommendation 93-5 Implementation Plan Task 5, "Improve the Quality and Quantity of Analyses", addresses the planning, performance, and assessment of analytical services to support the TWRS Characterization Program. The purpose of Task 5 is to develop and implement the analytical strategies, systems, and controls to ensure that the following Characterization Program objectives are met:

- Analytical data must meet applicable program and regulatory requirements
- Analytical data must be capable of withstanding critical technical reviews
- The Characterization Program must have access to sufficient analytical capacity to meet actual, and often changing needs
- Analytical development activities must be intrinsically linked to critical path program schedules

Since the technical bases [Data Quality Objectives (DQO's) and Tank Characterization Plans (TCP's)] upon which sampling and analyses will be conducted are not issued, the TWRS Characterization Program issued, on 2/18/94, a preliminary analytical laboratory requirements planning basis (Reference 2). As in Task 5 the planning basis states that:

- o Safety related characterization will be accelerated to accomplish a comprehensive hazardous vapors, flammable gas, organic, ferrocyanide, and high heat safety screening sampling and analysis activity on each of the 177 High Level Waste (HLW) tanks within three years of 93-5 acceptance (October 1993) and to complete safety-related sampling and analysis of all Watch List tanks within two years.
- o The integrated tank farm sample schedule (Reference 3) establishes the official sampling baseline for Characterization Program activities for FY 1994. The FY 1995 and FY 1996 schedules will be established by June 1994.
- o The maximum sampling rate is 192 cores per year
- o The safety screening module (primary analyses), including delivery of the final data will be completed within 45 days of laboratory receipt of the last core segment
- o Additional laboratory support will be required for vapor samples (not addressed in planning basis or this strategy), auger samples and grab samples (supernate compliance samples)

- o PNL (ACL) and WHC (222-S) laboratories will work multiple shifts as necessary

- o Off-site laboratories will be primarily used for waste treatment and disposal requirements

- o Off-site laboratory capacity will be expanded to ensure TWRS needs are met

Task 5 states that WHC will provide a minimum-maximum strategic assessment using information based on laboratory capacity as determined from Analytical Equivalent Units (AEU's) and capacity modeling using two, three, four, etc. cores per tank to determine the number of laboratories, the number of hot cells, the number of shifts, and a Type A/Type B off-site shipment strategy to meet the scaled minimum-maximum workload. This strategic assessment shall include maximum estimates of other TWRS laboratory support (e.g., vapor, grab, and auger sample analyses and other activities related to reporting final data), including other Hanford Site analytical support. Current schedules for bringing off-site facilities on line, evaluating transportation options and shipping strategies to obtain further increased capacity shall be included.

Task 5 notes that the task of resource planning to satisfy non-safety TWRS is more problematic. Analytical needs for other TWRS program elements (e.g., retrieval, pretreatment) are largely undefined, and subject to considerable change as the program matures. Safety analyses receive first priority for available TWRS analytical capacity. The uncertainty in other TWRS analytical needs will not compromise the Safety Program. The PAS-1 shipping cask being procured will be used to ship disposal program samples to the off-site laboratories for evaluation.

Two techniques are used to assess laboratory capability and capacity; the Analytical Equivalency Unit (AEU), and a laboratory capacity and resource management analysis model. The Hanford Site-generated AEU is defined as the analytical work needed to perform a specific suite of analyses on a waste tank core sample. Early use of the AEU technique identified needs for additional hot cells and data management and reporting capacity. However, the AEU analysis does not ensure that adequate capacity will be available for any specific analytical requirement.

To initiate the assessment of capacity for specific analytical requirements, a laboratory capacity and resource management analysis model was applied to the preliminary TWRS needs. Some shortfalls in specific areas were projected, and are being addressed. For example, additional equipment for energetics analysis is a limiting factor. Additional equipment is being procured to address this shortfall. Hanford Analytical Services will continue to access potential laboratory

capacity in this manner, and will expand the capability to meet TWRS programmatic needs.

To date, analytical services for high-level waste samples have been provided exclusively by the Hanford Site's two on-site laboratories with high-level radioactive sample handling capabilities (the 222-S Laboratory at WHC and the ACL Laboratory at PNL). The Characterization Program has accepted responsibility for maintaining laboratory resources to support their program, regardless of their actual usage. In consideration of the Characterization Program's analytical needs, the present capabilities of candidate high-level laboratory facilities have been evaluated, and operational constraints have been identified.

A meeting at Hanford in November 1992 (Reference 4) reviewed TWRS needs for characterizing tank wastes and discussed off-site capabilities to support these needs. Based on startup requirements, capability, cost projections, and resource availability, INEL was identified as the preferred site. Argonne East and LANL were identified as the only other alternate sites. Oak Ridge and Savannah River required significant modifications and existing laboratory capacities were utilized. Subsequent discussions with Argonne East identified that significant modifications in their safety and environmental documentation would be required. Argonne East asked to be removed from consideration. WHC has continued to exchange information with both INEL and LANL laboratories to define specific facility requirements and availability for TWRS usage. Both sites are working to resolve issues such as disposal of INEL secondary laboratory mixed waste. Issues which need to be resolved prior to using off-site laboratories include:

- Transportation. Functional specifications have been developed for sample shipping containers, and available Type B casks are being identified. Type A containers will be identified for shipping lower activity TWRS samples.

- Waste Handling. Receipt and analysis of high-level TWRS samples will result in mixed waste generation, and may require concurrence for disposal of secondary waste from the responsible operations office and regulatory authorities.

- National Environmental Policy Act (NEPA). Environmental Assessments may be required for transporting and using off-site laboratories. If an Environmental Impact Statement is required, it may not be possible to bring off-site laboratories online in time to support safety screening analyses.

Successfully resolving these institutional issues is a prerequisite to developing and demonstrating specific capabilities at off-site laboratories. WHC and the DOE Richland Field Office (DOE/RL) are working with laboratory managers and operations office personnel at the candidate sites to close these issues. Although preparation of upgrade

plans is presently funded, it is the expectation of DOE that both facilities will be able to receive and perform analyses on actual TWRS waste in October 1995. The focus at LANL will be on analytical process development.

Productivity improvements are also being pursued by the laboratories to enhance quality and capacity. These include improvements in laboratory operations and automated data collection (implementation, evaluation, reporting, and improved usage of analytical resources).

4.0 Characterization Analytical Needs

Reference 2 summarizes the analytical requirements and planning basis for the TWRS Characterization Program Guidance is provided for initial tank sample analyses (cores, augers, and supernate samples) and longer-term guidance is included for laboratory planning. The initial or interim guidance is for planning laboratory activities in support of safety screening. Although the guidance may be recognized as being more restrictive than draft DQO's it bounds the interim laboratory work scope. This guidance does not include vapor sampling analyses.

Confirmation of this guidance will be provided by the Tank Characterization Plans (TCPs) which are jointly approved by the Characterization Program and laboratories for each tank prior to sampling (see Appendix 2). Analytical requirements for safety screening may be modified through the DQO process.

- Characterization Program sampling and analysis activities are prioritized into three groups:
  - Safety - The highest near-term priority for the Characterization Program is the sampling and analysis of those tanks with unreviewed safety questions (USQs) and other safety issues. The current waste tank sampling and analysis strategy employs a safety screening module to screen the 177 Hanford Site underground storage tanks for imminent safety concerns. Sample requirements will be identified in two categories; 1) safety screening and 2) safety resolution.
  - Compliance - Includes activities such as the 242-A Evaporator operation, emergency pumping of Single Shell Tanks (SSTs), Double Shell Tank (DST) *Resource Conservation and Recovery Act* (RCRA) sampling and analysis, and Tri-Party Agreement compliance.
  - Waste Treatment/Disposal and Technology Development - Includes those sampling and analysis activities associated with retrieval, pretreatment, and the low-level or high-level vitrification of the tank waste.

The guidance states that:

- Tank core samples will be taken for safety screening and safety resolution

- Additional analyses for Waste Treatment/Disposal characterization and technology development will be preformed per future Characterization Program guidance using any remaining stored/archived tank core samples

- All core and auger samples will be subject to safety screening

- Liquid grab samples are not subject to safety screening requirement

- The laboratory will attempt to achieve precision and accuracy values of +/-10%. It is recognized that the ability to achieve this desired precision and accuracy depends on sample integrity, matrix effects, and relative concentration of the species

- 100% duplicates should be performed, although this objective may not be feasible in all cases, e.g., adiabatic calorimetry due to sample size restrictions

- At a minimum, spikes will be performed on the basis of once per matrix and/or core

- Preparation blanks will be performed once per preparation batch

- The DQO planning process will determine tank specific characterization requirements

- The Quality Assurance Project Plan (QAPjP) will provide a standardized set of QA/QC sample analyses requirements

- The Tank Waste Analysis Plan will be the high-level document that establishes the framework each fiscal year for sampling and analysis activities (see Appendix 2)

- TCPs will integrate the various decision-based DQOs into a tank-specific analytical requirements plan and will be issued prior to each sampling event. TCPs will be the primary interface document between the Characterization Program and the laboratories

- Any subsequent modifications to TCPs from the DQO planning process will be through a formal change control process

- The TCP formal change control process will allow timely (2-3 days) modifications to analytical requirements; however, laboratory reporting ('clocktime') accountability will be based on six-week formal pre-notification from the Characterization Program to the laboratories for safety screening analysis.

- All unused core and auger samples and sub-samples will be stored

- Sample preparation solutions will be disposed

TWRS has identified four planning cases for Safety, Waste Treatment/Disposal, and Compliance sample characterization for samples taken in FY 1994 (after March 1, 1994) through FY 1996. The four cases are identified as Minimum, Intermediate A, Intermediate B, and Maximum (see Appendix 1). The present TWRS baseline plan uses the Minimum case. The TWRS Characterization Program has requested the laboratories establish strategies for supporting all four cases.

An average of two cores will be taken from each of the tanks. Each core contains an average of 5 segments (see Appendix 3).

Appendices 4, 5, 6, and 7 provide the number of cores, the analyses, the analyses requested, and AEU's required. Appendices 4, 5, 6, and 7 are based on the fiscal year that core analysis is initiated, not necessarily the Fiscal Year that analysis is completed. Appendices 8, 9, and 10 provide the number of samples analyzed, the analyses performed, and AEU's. Appendices 8, 9, and 10 are based on the projected year that sample analysis will be completed.

Appendix 11 provides the number of tanks sampled by tank type (FeCN watchlist, remaining watchlist, non-watchlist non-200 series, and 200 series) per fiscal year. Twenty tanks are FeCN watchlist, 33 tanks are remaining watchlist, 59 are non-watchlist non-200 series tanks, and 16 tanks are 200 series.

Appendix 12 provides the number of samples per tank type. Eight hundred samples are required for FeCN watchlist tanks, 660 samples for remaining watchlist tanks, 1,180 for non-watchlist non-200 series tanks, and 160 samples for 200 series tanks.

Appendix 13 provides the number of hot cell segment extrusions per fiscal year. In the Minimum and Intermediate A cases 1,280 extrusions are required. In the Intermediate B case 1,810 extrusions are required. In the Maximum case 3,330 extrusions are required.

The TWRS Characterization Program recognizes the need to attempt to level load the laboratories. The TWRS Characterization Program has committed to work closely with the laboratories to effective plan and schedule work.

Safety Analytical Requirements

One hundred and twenty eight tanks require safety screening and will be core sampled. An additional 17 tanks requiring safety screening will be sampled by auger. All samples will be delivered to either the 222-S or ACL laboratories within 24 hours of the sampling event. Final validated results and supporting documentation will be issued within 216 days of receiving the last segment of each core at the laboratories.

-Safety Screening

Three primary screening analyses (DSC, TGA, and Total alpha) are required on each sample. If total alpha limits are exceeded, additional secondary analyses may be required for safety screening (Pu-239/Pu-240 and ICP/AES for U and Fe).

Remaining sample material will be stored or archived for safety resolution and waste treatment/disposal characterization pending further guidance from the Characterization Program.

Primary safety screening analyses require reporting within 45 days from delivery of the last core segment. The format for the 45 day report will be per level III identified in the Tank Waste Analysis Plan (Reference 5). Secondary analyses will be reported within 90 days, using the 45-day format. Extensions may be required and will be negotiated with the Characterization Program.

--Watchlist Tanks

Hanford's TWRS program has committed to complete safety screening analysis on 53 Watchlist tanks by the end of Fiscal Year 1995 (Reference 1). Twenty of the 53 tanks are FeCN tanks requiring quarter segment screening (800 samples). Half segment screening is required on the remaining 33 Watchlist tanks (660 samples). One hundred samples will be analyzed during FY 94 and 1,360 samples will be analyzed during FY 95 (see Appendix 8). For projecting analytical needs it was assumed that secondary screening will be required on each Watchlist tank sample.

To meet this need approximately 32 AEU's of Laboratory capacity are required for the Minimum case (~0.3 AEU's per core). Approximately 0.2 of the 0.3 AEU's is Hot Cell work. No additional requirements exists for the other three cases.

--Nonwatchlist Tanks (Non 200 series)

Hanford's TWRS program has committed to complete safety screening analysis on all 59 Nonwatchlist (Non 200 series) tanks by the end of FY 1996 (reference 1). Half segment screening is required on the 59 tanks (1,180 samples).

Eighty samples will be analyzed during FY 1994, 80 samples in FY 1995, and 1,020 samples in FY 1996. For projecting *analytical needs it was assumed that for all cases no secondary screening analyses will be required.

To meet this need approximately 35 AEU's of Laboratory capacity are required for the Minimum case (~0.3 AEU's per core). Approximately 0.2 of the 0.3 AEU's is Hot Cell work. No additional requirements are exist for the other three cases.

--200 series

Hanford's TWRS program has committed to complete safety screening analysis on all 16 Nonwatchlist tanks 200 series by the end of FY 1996 (Reference 1). Full segment screening is required on the 16 tanks (160 samples) in FY 1996. For projecting analytical needs it was assumed that for all cases no secondary screening analyses will be required.

To meet this need approximately 9 AEU's of Laboratory capacity are required for the Minimum case (~0.3 AEU's per core). Approximately 0.2 of the 0.3 AEU's is Hot Cell work. No additional requirements exists for the other three cases.

--Auger Samples

Seventeen additional tanks will be auger sampled (25 samples). All auger samples will be subject to safety screening. To meet this need approximately one AEU of laboratory capacity is required (~0.03 AEU's per auger sample).

-Safety Resolution

Safety resolution analyses requirements are as specified in applicable DQO and TCP. Analyses are assumed to consist of Pu isotopics, total uranium, nickel by ICP using acid digestion, nickel by ICP using total dissolution, cesium-137 by gamma energy analysis, adiabatic calorimetry, percent moisture, total cyanide, Nitrogen (nitrate and nitrite), total organic carbon, strontium-90, and ICP/AES (Mn, Na, Cr, Ni, and Al). Safety resolution analyses will be validated and supporting documentation issued within 216 days from delivery of the last core segment. It is assumed 10% of safety resolution samples require Pu isotopics, adiabatic calorimetry, and Ni by ICP using total dissolution.

--Watchlist Tanks

In all cases safety resolution analyses will be performed on each of the 53 Watchlist tank (1460 samples). In addition,

in the Intermediate B and Maximum cases it is assumed that: 1) one core, in storage or archive, from each of the Watchlist tanks is reanalyzed and 2) one additional core is taken from each of the tanks for safety resolution analyses (total of 2,920 samples). In the Minimum and Intermediate A cases 170 samples will be analyzed in FY 1994, 920 in FY 1995, and 370 in FY 1996. In Intermediate B and Maximum cases 170 samples will be analyzed in FY 1994, 970 in FY 1995, 1,340 in FY 1996, and 440 in FY 1997.

To meet this need approximately 53 AEU's of Laboratory capacity are required for the Minimum and the Intermediate A case (~0.5 AEU's per core). In the Intermediate B and Maximum cases approximately 122 AEU's are required (~0.8 AEU's on new cores).

--Nonwatchlist Tanks (Non 200 series)

It is assumed that safety resolution analyses will be performed on Nonwatchlist tanks (Non 200 series) in the Intermediate A, B, and maximum cases. In the Intermediate A case it is assumed that 17 tanks require safety resolution analyses (340 samples). In the Intermediate B and Maximum cases it is assumed that 17 tanks and 22 additional cores require safety resolution analyses (560 samples). In the Intermediate A case 70 samples will be analyzed in FY 1995, 240 in FY 1996, and 30 in FY 1997. In Intermediate B and Maximum cases 70 samples will be analyzed in FY 1995, 390 in FY 1996, and 100 in FY 1997.

To meet this need approximately 17 AEU's of Laboratory capacity are required for the Intermediate A case (~0.5 AEU's per core). In the Intermediate B and Maximum cases approximately 28 AEU's are required (~0.8 AEU's on new cores).

--200 series

It is assumed that no safety resolution analyses will be performed on Nonwatchlist 200 series tanks.

--Auger Samples

It is assumed that no safety resolution analyses will be performed on augured tanks.

Waste Treatment/Disposal

It is assumed that an average of 12 analyses per sample are required for Waste Treatment/Disposal. In the Minimum case 12 of the 128 tanks will be analyzed (240 samples), 17 tanks in the

Intermediate A case (340 samples), and 41 tanks in the Intermediate B case (820 samples). In the Maximum case 64 tanks will be analyzed, 152 additional tank cores are taken, and 150 cores are re-analyzed (2,055 samples). In the Minimum case 50 samples will be analyzed in FY 1995, 140 samples in FY 1996, and 50 samples in FY 1997. In the Intermediate A case 95 samples will be analyzed in FY 1995, 195 samples in FY 1996, and 50 samples in FY 1997. In the Intermediate B case 200 samples will be analyzed in FY 1995, 380 samples in FY 1996, and 240 samples in FY 1997. In the Maximum case 450 samples will be analyzed in FY 1995, 1,670 samples in FY 1996, and 660 samples in FY 1997.

To meet this need approximately 5 AEU's of Laboratory capacity are required for the Minimum case (~0.2 AEU's per core), 7 AEU's in the Intermediate A, 17 AEU's in the Intermediate B case, and 118 AEU's in the Maximum case (~0.4 AEU's on new cores).

Turnaround times will be established on a case-by-case basis as defined in Characterization Plans. At the laboratories option, safety screening, safety resolution, and waste treatment analysis can be combined for improved efficiency when one analytical technique can meet all program requirements.

Compliance

A list of potential supernate (liquid grab) sample compliance characterization analyses is included in Appendix 14. In all cases 95 samples will require analyses in FY 1994, 200 samples in FY 1995, 190 samples in FY 1996, and 50 samples in FY 1997. To meet this need approximately 56 AEU's of Laboratory capacity are required.

5.0 Laboratory Capacity

Appendix 15 provides the planned AEU capacity available per fiscal year. In FY 1994 (March 1, 1994 through September 30, 1994) 31 AEU's are available, 88 AEU's in FY 1995, 96 AEU's in FY 1996, and 34 AEU's in FY 1997 (October 1, 1996 through January 31, 1997). A total of 249 AEU's are available. The potential exists to increase to 277 AEU's by doubling INEL and LANL staffs for support in FY 1996 and FY 1997.

A comparison of TWRS Characterization Program needs in AEU's and laboratories capacities is provided in Appendix 16. Appendix 16 is based on the projected year that sample analysis will be completed. Planned laboratories AEU capacities exceed all TWRS Characterization Safety Screening and Safety Resolution needs for all cases. Planned laboratories AEU capacities slightly exceed all TWRS Characterization needs in FY 1994 (all cases), FY 1996 (Minimum and Intermediate A cases), and FY 1997 [Minimum, Intermediate A, and Intermediate B (assumes maximum usage strategy for INEL and LANL)]. Characterization Program needs exceed laboratory AEU capacities in FY 1995 (all cases-in

Minimum by 3 AEU's, in Intermediate A by 6 AEU's, and in Intermediate B by 12 AEU's), in FY 1996 (Intermediate B and Maximum cases), and in FY 1997 Maximum case.

The February 18, 1994 TWRS Characterization Program analytical requirements and planning basis data needs were placed into the Laboratory Capacity and Utilization Model. A equipment resources analysis was performed using available information from the 222-S, ACL, and LANL (initial capacity data received February 2, 1994). Capacity model data from INEL is due April 30, 1994 and from LANL by May 31,1994. The results of the analyses capacities for one shift operations are shown in Appendix 17.

The comparison of TWRS Characterization Program Safety Screening and Safety Resolution needs by analysis type and laboratories capacities indicates that planned equipment analytical capacity will exceed TWRS needs. After February 25, 1994 additional equipment was recommended for Total Cn and percent water (moisture) in FY 1995. Multiple shift operations will be required to meet some analytical needs. Analyses of all TWRS needs based on the 2/18/94 TWRS Characterization Planning guidance has not been completed.

The laboratories segment extrusion capacities are provided in Appendix 12 (note - each segment extrusion is assumed to require 6 hours). A comparison of TWRS Characterization Program segment extrusion needs and planned laboratories capacities is provided in Appendix 18. Laboratories segment extrusion capacity is planned to be twice as great as the maximum needs in order to accommodate surge in demands.

The maximum storage inventory at WHC's 222-S Laboratory is estimated at 200 segments and at PNL's ACL at 150 segments. These capacities are preliminary estimates and must be verified by the laboratories.

6.0 Strategy

All TWRS Safety Screening and Resolution analyses will be performed at either the 222-S Laboratory or the ACL Laboratory. Both Hanford Laboratories will operate multiple shifts as required to meet TWRS needs for a specific analyses or activity such as sample extrusion. Backup capacity will be readied and available at INEL (Reference 6) and LANL by 10/31/94 and 2/28/95 respectively. This strategy provides excess capacity for Safety Screening and Safety Resolution as shown by the AEU and Laboratory Capacity and Utilization Model.

With the exception of the maximum case use of the 222-S, ACL, INEL, and LANL laboratories should exceed TWRS Characterization Program needs (The Laboratory Capacity and Utilization Model indicates that AEU shortfalls identified can be eliminated with addition manpower).

A thorough evaluation of TWRS waste treatment/disposal needs is required when additional DQO data is available.

Core samples for shipment to INEL and LANL will be extruded at Hanford hot cells, sub sampled or composited and packaged in sample containers, inserted into shipping containers and loaded onto trucks for shipment to Idaho or New Mexico. The work at INEL and LANL consists of receiving and preparing the tank core samples for analysis, followed by leaching and/or dissolution; chemical separations; measurement of physical characteristics, inorganic, organic, and radionuclide analytes; and reporting of results. All of these activities will be performed per TWRS specifications, as given in the specific Tank Characterization Plans. LANL activities will focus on process development needs for waste treatment/disposal.

Type B casks will be the primary shipping mode, even though Type A containers may be utilized (this is due to inability to forecast tank sample activity). Shipments to INEL available in Type A containers is planned prior to Type B cask certification on January 31, 1995. Tank sample screening will be performed to identified potential samples for shipment to INEL. Both 222-S and 325 will be readied to load Type A containers and Type B PAS-1 casks for shipment to INEL and LANL. The 222-S Laboratory will be the primary laboratory for loading samples and receiving unused samples back from INEL and LANL.

All remaining core samples and sub-samples and sub-samples will be removed from 222-S and ACL six weeks after data reporting; when 222-S exceeds 150 segments and ACL exceeds 125 segments, subject to verification of the storage capacities. An engineering study will be completed by June 1994 to identify sample archive capacity (Reference 2). Sample archive space must be identified, funded and readied by January 1995 (key item). Storage of all remaining hot cell samples was not previously identified in laboratory upgrade plans.

The following are actions for obtaining off-site laboratory support:

- Fund procurement of licensed shipping casks for shipping wastes off-site
- Investigate the NEPA issues associated with off-site shipments and
- Fund INEL and LANL to provide the needed off-site support

Subsequent progress on these actions is summarized below:

Procurement and licensing of shipping casks and containers

The action to obtain licensed shipping casks has been focused on procurement of two PAS-1 casks, with three sets of shielded sample carriers. Responsibility for this task, including actions required to revise the PAS-1 certificate of compliance, has been assigned to WHC's Packaging Safety Engineering group. Progress to date includes issuance

of the Packaging Design Criteria, and preparation of a pre-procurement plan for fabrication of the casks and modification of the Safety Analysis Report for Packaging, which is required for revising the existing Certificate of Compliance. In addition, inspection of the INEL and LANL hot cells confirmed that there will be no lifting capacity problems, dimensional interferences, or other operational difficulties resulting from use of this cask. Delivery of the first cask to Hanford is scheduled for October 1994. The Certificate of Compliance (COC) is expected to be approved by Nuclear Regulatory Commission (NRC) by January 1995.

A work plan and schedule will be developed by the end of April for the acquisition of 20 Type A liquid containers. Initial shipments of small samples of tank waste are expected to utilize this type of container. Funding has been provided to the WHC Packaging Safety Engineering Group to procure the PAS-1 casks and sample carriers, complete COC revision and to acquire type A containers.

LANL will be readied by August 31, 1994 for receiving small quality (less than 10 grams of tank waste) shipments and performing special development testing on a as need bases for the TWRS Hanford Characterization Program.

Resolution of NEPA Issues

Review of NEPA requirements is in process and a strategy for meeting NEPA requirements is planned to be developed by February 28, 1994. Activities being reviewed for NEPA requirements include shipping and off-site facilities use. If an Environmental Assessment is required, the estimate is that it can be completed in less than a year (February 1995). Determination of NEPA requirements is the responsibility of DOE with assistance as required from the WHC NEPA Documentation group, INEL, and LANL.

Planning Basis

The following identifies the present planning basis to be used in upgrading and using INEL's WINCO and LANL's CST-1 operated laboratories in support of Hanford's TWRS mission. The scope of these bases may change as future TWRS Data Quality Objective (DQO) requirements are identified.

- All upgrade funding will be provided by Hanford and will be made available no later than March 1994 for INEL and May 1994 for LANL.
- WHC will be able to achieve and maintain core sampling rates consistent with Defense Nuclear Facility Safety Board (DNFSB) planning assumptions.

- INEL and LANL capacity will be upgraded such that priority conflicts with planned INEL and LANL site workscope are minimized and Hanford TWRS Program turnaround times are achieved.

- A Statement of Work (SOW) will be provided to INEL and LANL which will identify FY 1995 type of samples, required analyses, schedule and quality requirements by October 1994.

- All core samples sent to INEL and LANL will be extruded and packaged for shipment at Hanford laboratories.

- INEL and LANL will upgrade facilities, equipment, procedures, and staff to support TWRS analytical needs equating to approximately 10 AEUs during fiscal years 1995 and 1996 (LANL – 6 AEU's in FY 1995). Known analytical methods used for these determinations will be in accordance to Hanford analytical procedures provided in early January 1994 to INEL and LANL.

- Nominal sample receiving rate should be planned at two casks/month. Each cask will contain an equivalent of 2-3 cores.

- INEL and LANL will hold samples one month after sample data is reported prior to shipping unused samples back to Hanford.

- Hanford Analytical Services (HAS) will perform a quality assurance assessment on INEL's analytical laboratories by August 1994 and LANL by December 1994. This will allow two months to close any open issues ensuring TWRS analytical needs are met.

Additional Support Efforts

The Hanford Analytical Services (HAS) organization is working with WHC's

222-S, PNL (ACL), INEL's (WINCO) and LANL's (CST-1) in utilizing the Laboratory Capacity and Resource Management Model to ensure that the laboratories will be able to support TWRS program needs after the planned upgrades are completed. In addition, when firm data quality requirements are established, WHC will assess all laboratories quality assurance program with respect to their ability to meet the requirements.

7.0 Responsibilities

The Hanford TWRS Program is responsible for the overall characterization effort including defining overall program direction and funding. Hanford Analytical Services is responsible to ensure TWRS analytical needs can be met including: upgrade and use of Analytical Laboratories to support TWRS needs. WHC's Hanford Analytical Services, PNL's Analytical Chemistry section, INEL's WINCO Analytical Chemistry section, and LANL's CST-1 Analytical Chemistry Group is responsible for upgrading and operation in support of Hanford TWRS needs.

The WHC Packaging Safety Engineering group is responsible to procure the PAS-1 casks and sample carriers, complete COC revision and to acquire type A containers. Determination of NEPA requirements is the responsibility of DOE with assistance as required from the WHC NEPA Documentation group, INEL, and LANL. DOE and WHC with assistance from PNL, INEL and LANL will identify requirements and establish funding for decontamination costs at the end of this project.

8.0 Cost and Off-Site Laboratory Readiness Schedule

Analytical Laboratories upgrade and operational costs are provided in Appendix 19. Five hundred thousand dollars per laboratory has been identified in FY 1997 for project decommissioning at INEL and LANL. Overall costs including shipping, NEPA, and program management and integration are provided in Appendix 20.

An Off-site Laboratory Readiness Schedule is provided in Appendix 21. The INEL Upgrade Plan (Reference 7) was issued on January 28, 1994. The LANL Upgrade Plan is currently being drafted and will be issued by March 31, 1994. INEL will be ready-to-serve by October 31, 1994. LANL will be ready-to-serve by February 28, 1995. Type A containers and two Type B PAS-1 casks will be available by October 31, 1994. Certification on the PAS-1 cask will be completed by January 31, 1995. WHC is exploring opportunities to complete PAS-1 cask certification by October 31, 1994. Attempts to accelerate have been unsuccessful to date.

References

1. Recommendation 93-5 Implementation Plan, DOE/RL 94-0001

2. Internal Memo, C. DeFigh-Price to M. L. Bell, et al., "TWRS Characterization Program Analytical Requirements Planning Basis," 7E140-94-020, dated February 28, 1994.

3. Letter 7E130-94-001, D.N. Price, WHC, to Those Listed, "Core, Grab, Vapor, Push, and Rotary Mode Sampling", dated February 3, 1994

4. Letter, R. J. Bliss, WHC, to J. R. Hunter and J. H. Anttonen, RL, "Analytical Services Support for Tank Waste Remediation System (TWRS)", dated December 2, 1992

5. Letter 7E120-94-103, C.S. Haller, WHC, to Those Listed, "Review of the Tank Waste Remediation System Tank Waste Analysis Plan", dated January 26,1994

6. Letter 9450735, C. DeFigh-Price, WHC, to J.M. Clark, RL, "Completion of Recommendation 93-05 Implementation Plan, U.S. Department of Energy - Richland Operations Office 94-0001, Commitment No. 5.9", dated February 8, 1994

APPENDIX 1

PLANNING BASES FOR MINIMUM THROUGH MAXIMUM CASES

BASES FOR MINIMUM CASE

- 128 tanks require safety screening
- Average of 2 cores per tank
- 0.3 AEUs per core for safety screening
- 17 additional tanks requiring safety screening will be sampled by auger
- Average of 1.5 auger samples per tank
- 0.03 AEUs per auger sample for safety screening
- 53 of the 128 tanks require safety resolution
- 0.5 AEUs per core required for safety resolution
- 12 of the 128 tanks require waste treatment/disposal
- 0.2 AEUs per core for waste treatment/disposal
- 56 AEUs for other TWRS support

BASES FOR INTERMEDIATE CASE A

- 128 tanks require safety screening
- Average of 2 cores per tank
- 0.3 AEUs per core for safety screening
- 17 tanks requiring safety screening will be sampled by auger
- Average of 1.5 auger samples per tank
- 0.03 AEUs per auger sample for safety screening
- 70 of the 128 tanks require safety resolution
- 0.5 AEUs per core for safety resolution
- 17 of the 128 tanks require waste treatment/disposal
- 0.2 AEUs per core for waste treatment/disposal characterization
- 56 AEUs for other TWRS support

BASES FOR INTERMEDIATE CASE B

- 128 tanks require safety screening
- Average of 2 cores per tank
- 0.3 AEUs per core for safety screening
- 17 tanks required safety screening will be sampled by auger
- Average of 1.5 auger samples per tank
- 0.03 AEUs per auger sample for safety screening
- 70 of the 128 tanks require safety resolution

BASES FOR INTERMEDIATE CASE B (continued)

- 53 additional tank cores taken for safety resolution
- 75 cores are re-analyzed for safety resolution
- 0.5 AEUs per core for safety resolution (note: add 0.3 AEUs per core for additional tank cores taken)
- 41 of the 128 tanks require waste treatment/disposal
- 0.2 AEUs per core for waste treatment/disposal characterization
- 56 AEUs for other TWRS support

BASES FOR MAXIMUM CASE

- 128 tanks require safety screening
- Average of 2 cores per tank
- 0.3 AEUs per core for safety screening
- 17 additional tanks requiring safety screening will be auger sampled
- Average of 1.5 auger samples per tank
- 0.03 AEUs per auger sample for safety screening
- 70 of the 128 tanks require safety resolution
- 53 additional tank cores are taken for safety resolution

BASES FOR MAXIMUM CASE (continued)

- 75 cores are re-analyzed for safety resolution
- 0.5 AEUs per core for safety resolution (note: add 0.25 AEUs per core for additional tank cores taken)
- 64 of the 128 tanks require waste treatment/disposal
- 152 additional tank cores are taken for waste treatment/disposal
- 150 cores are re-analyzed for waste treatment/disposal
- 0.2 AEUs per core for waste treatment/disposal characterization
- 56 AEUs for other TWRS support

NUMBER OF SAMPLES PER TANK

TANK TYPE	NUMBER OF TANKS	AVERAGE NUMBER OF CORES PER TANK	AVERAGE NUMBER OF SEGMENTS PER CORE	AVERAGE NUMBER OF SUB-SEGMENTS (OR SAMPLES) PER CORE	NUMBER OF SAMPLES
FeCN WATCHLIST	20	2	5	4	800
REMAINING WATCHLIST	33	2	5	2	660
NON-WATCHLIST NON 200 SERIES	59	2	5	2	1,180
200 SERIES	16	2	5	1	160
TOTAL	128	2	5	2.2*	2,800

* APPROXIMATELY

TWRS CORES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
MINIMUM	SCREENING	PRIMARY (ORIGINAL CORES)	24	116	116	256
		SECONDARY (ORIGINAL CORES)	20	86	0	106
	SAFETY RESOLUTION	ORIGINAL CORES	20	86	0	106
		NEW CORES	0	0	0	0
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	12	12	24
		NEW CORES	0	0	0	0
	TOTALS	ORIGINAL CORES	24	116	116	256
		NEW CORES	0	0	0	0
		TOTAL CORES	24	116	116	256

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS CORES PER YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
INTERMEDIATE A	SCREENING	PRIMARY (ORIGINAL CORES)	24	116	116	256
		SECONDARY (ORIGINAL CORES)	20	86	0	106
	SAFETY RESOLUTION	ORIGINAL CORES	20	92	28	140
		NEW CORES	0	0	0	0
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	17	17	34
		NEW CORES	0	0	0	0
	TOTALS	ORIGINAL CORES	24	116	116	256
		NEW CORES	0	0	0	0
		TOTAL CORES	24	116	116	256

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS CORES PER YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
INTERMEDIATE B	SCREENING	PRIMARY (ORIGINAL CORES)	24	116	116	256
		SECONDARY (ORIGINAL CORES)	20	86	0	106
	SAFETY RESOLUTION	ORIGINAL CORES	20	102	93	215
		NEW CORES	0	0	53	53
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	41	41	82
		NEW CORES	0	0	0	0
	TOTALS	ORIGINAL CORES	24	116	116	256
		NEW CORES	0	0	53	53
		TOTAL CORES	24	116	169	309

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS CORES PER YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
MAXIMUM	SCREENING	PRIMARY (ORIGINAL CORES)	24	116	116	256
		SECONDARY (ORIGINAL CORES)	20	86	0	106
	SAFETY RESOLUTION	ORIGINAL CORES	20	102	93	215
		NEW CORES	0	0	53	53
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	64	214**	278**
		NEW CORES***	0	76	76	152
	TOTALS	ORIGINAL CORES	24	116	116	256
		NEW CORES	0	76	76	152
		TOTAL CORES	24	192	192	408

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

** INCLUDES RE-ANALYSIS ON ORIGINAL CORES

*** 76 CORES INCLUDES 53 CORES FOR SAFETY RESOLUTION

TWRS SAMPLES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
MINIMUM	SCREENING	PRIMARY (ORIGINAL CORES)	360	1,440	1,000	2,800
		SECONDARY (ORIGINAL CORES)	320	1,140	0	1,460
	SAFETY RESOLUTION	ORIGINAL CORES	320	1,140	0	1,460
		NEW CORES	0	0	0	0
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	120	120	240
		NEW CORES	0	0	0	0
	COMPLIANCE	-	135	200	200	535
	TOTALS	ORIGINAL CORES	1,000	3,840	1,120	5,960
		NEW CORES	0	0	0	0
		COMPLIANCE	135	200	200	535
		TOTAL SAMPLES	1,135	4,040	1,320	6,495

* BASED ON FISCAL YEAR ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLES PER YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
INTERMEDIATE A	SCREENING	PRIMARY (ORIGINAL CORES)	360	1,440	1,000	2,800
		SECONDARY (ORIGINAL CORES)	320	1,140	0	1,460
	SAFETY RESOLUTION	ORIGINAL CORES	320	1,200	280	1,800
		NEW CORES	0	0	0	0
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	170	170	340
		NEW CORES	0	0	0	0
	COMPLIANCE	-	135	200	200	535
	TOTALS	ORIGINAL CORES	1,000	3,950	1,450	6,400
		NEW CORES	0	0	0	0
		COMPLIANCE	135	200	200	535
		TOTAL SAMPLES	1,135	4,150	1,650	6,935

* BASED ON FISCAL YEAR ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLES PER YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
INTERMEDIATE B	SCREENING	PRIMARY (ORIGINAL CORES)	360	1,440	1,000	2,800
		SECONDARY (ORIGINAL CORES)	320	1,140	0	1,460
	SAFETY RESOLUTION	ORIGINAL CORES	320	1,200	1,180	2,700
		NEW CORES	0	0	780	780
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	410	410	820
		NEW CORES	0	0	0	0
	COMPLIANCE	-	135	200	200	535
	TOTALS	ORIGINAL CORES	1,000	4,190	2,590	7,780
		NEW CORES	0	0	780	780
		COMPLIANCE	135	200	200	535
		TOTAL SAMPLES	1,135	4,390	3,570	9,095

* BASED ON FISCAL YEAR ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLES PER YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
MAXIMUM	SCREENING	PRIMARY (ORIGINAL CORES)	360	1,440	1,000	2,800
		SECONDARY (ORIGINAL CORES)	320	1,140	0	1,460
	SAFETY RESOLUTION	ORIGINAL CORES	320	1,200	1,180	2,700
		NEW CORES	0	0	780	780
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	640	2,140	2,780
		NEW CORES	0	760	760	1,520
	COMPLIANCE	-	135	200	200	535
	TOTALS	ORIGINAL CORES	1,000	4,420	4,320	9,740
		NEW CORES	0	760	1,540	2,300
		COMPLIANCE	135	200	200	535
		TOTAL SAMPLES	1,135	5,380	6,060	12,575

* BASED ON FISCAL YEAR ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

AEU's REQUIRED PER FISCAL YEAR*

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
MINIMUM	SCREENING	ORIGINAL CORES	7	35	34	76
	SAFETY RESOLUTION	ORIGINAL CORES	10	43	0	53
		NEW CORES	0	0	0	0
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	2	3	5
		NEW CORES	0	0	0	0
	COMPLIANCE	-	14	21	21	56
	TOTALS	ORIGINAL CORES	17	80	37	134
		NEW CORES	0	0	0	0
		COMPLIANCE	14	21	21	56
		TOTAL AEUs	31	101	58	190

* BASED ON FISCAL YEAR ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

AEU's REQUIRED PER FISCAL YEAR*
(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
INTERMEDIATE A	SCREENING	ORIGINAL CORES	7	35	34	76
	SAFETY RESOLUTION	ORIGINAL CORES	10	46	14	70
		NEW CORES	0	0	0	0
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	3	4	7
		NEW CORES	0	0	0	0
	COMPLIANCE	-	14	21	21	56
	TOTALS	ORIGINAL CORES	17	84	52	153
		NEW CORES	0	0	0	0
		COMPLIANCE	14	21	21	56
		TOTAL SAMPLES	31	105	73	209

* BASED ON FISCAL YEAR ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

AEU's REQUIRED PER FISCAL YEAR*
(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
INTERMEDIATE B	SCREENING	ORIGINAL CORES	7	35	34	76
	SAFETY RESOLUTION	ORIGINAL CORES	10	51	47	108
		NEW CORES	0	0	42	42
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	8	9	17
		NEW CORES	0	0	0	0
	COMPLIANCE	-	14	21	21	56
	TOTALS	ORIGINAL CORES	17	94	90	201
		NEW CORES	0	0	42	42
		COMPLIANCE	14	21	21	56
		TOTAL SAMPLES	31	115	153	299

* BASED ON FISCAL YEAR ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

AEU's REQUIRED PER FISCAL YEAR*
(CONT)

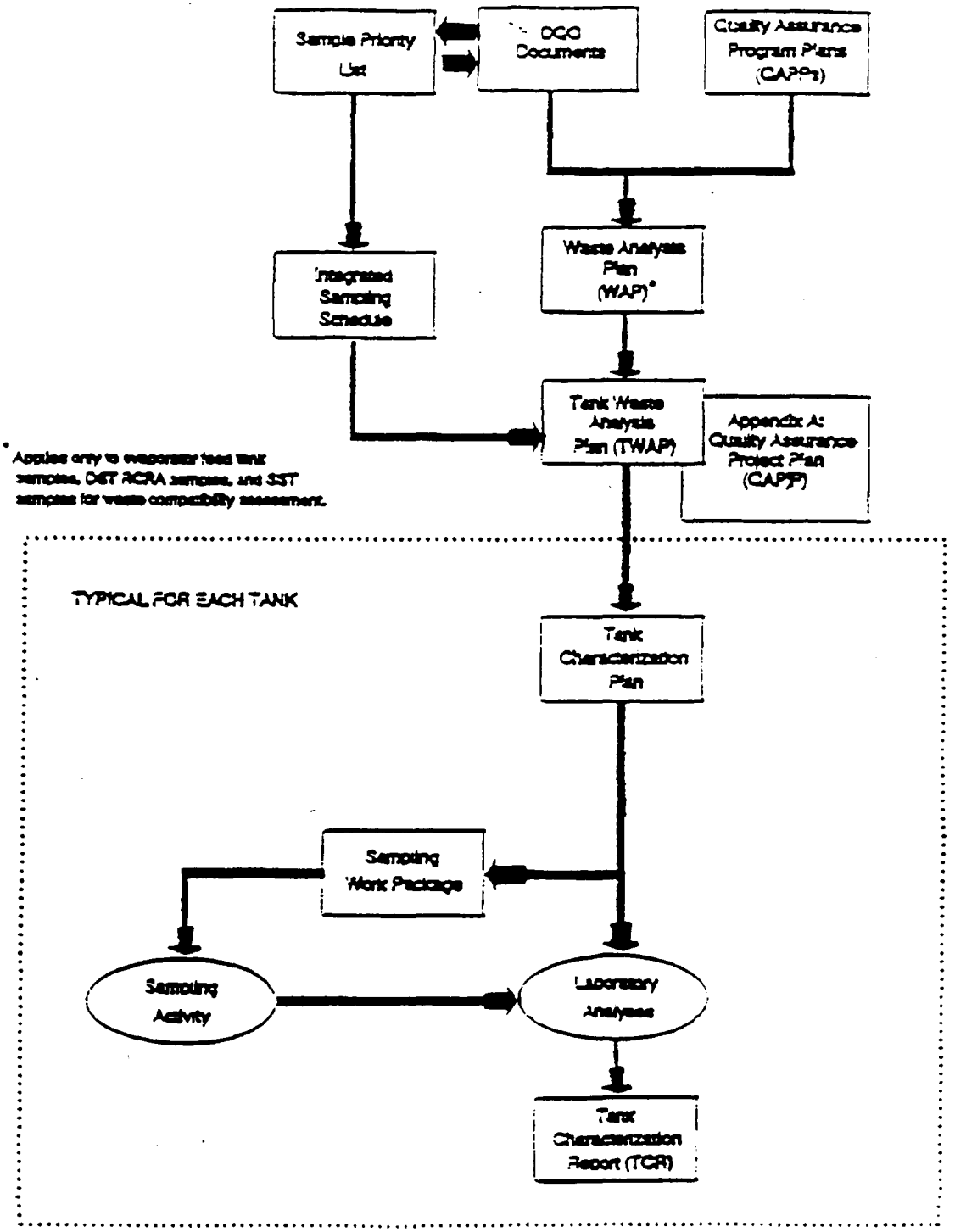
CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	TOTALS
MAXIMUM	SCREENING	ORIGINAL CORES	7	35	34	76
	SAFETY RESOLUTION	ORIGINAL CORES	10	51	47	108
		NEW CORES	0	0	42	42
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	13	44	57
		NEW CORES	0	38	23	61
	COMPLIANCE	-	14	21	21	56
	TOTALS	ORIGINAL CORES	17	99	125	241
		NEW CORES	0	38	65	103
		COMPLIANCE	14	21	21	56
		TOTAL SAMPLES	31	158	211	400

* BASED ON FISCAL YEAR ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

APPENDIX 2

CHARACTERIZATION DOCUMENTATION HIERARCHY

CHARACTERIZATION DOCUMENTATION HIERARCHY



APPENDIX 6

NUMBER OF TWRS SAMPLE ANALYSES PER FISCAL YEAR*

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLE ANALYSES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP	ANALYSIS	FY 94	FY 95	FY 96	TOTALS
MINIMUM	SCREENING (PRIMARY)	DSC	360	1,440	1,000	2,800
		TGA	360	1,440	1,000	2,800
		TOTAL APLHA	360	1,440	1,000	2,800
	SCREENING (SECONDARY)	Pu 239-240	320	1,140	0	1,460
		ICP/AES(U,Fe)	320	1,140	0	1,460
	SAFETY RESOLUTION	Pu Isotopic	22	80	44	146
		Mn, Na, Cr, Ni and Al	0	0	0	0
		Total U	320	1,140	0	
		Ni by total dissolution	32	114	0	146
		Cesium-137 by GEA	320	1,140	0	1,460
		Adiabatic Calorimetry	32	114	0	146
		Percent Moisture	320	1,140	0	1,460
		Total CN	320	1,140	0	1,460
		IC (Nitrate and Nitrite)	320	1,140	0	1,460
		TOC	320	1,140	0	1,460
		Sr-90	320	1,140	0	1,460
	WASTE TREATMENT DISPOSAL	Approx. 12 new analyses TBD	0	1440	1440	2880
	COMPLIANCE	IC	135	200	200	535
		Nitrite - Spectra	135	200	200	535
		Hg	135	200	200	535
		ICP/AES	135	200	200	535
		CN	135	200	200	535
		CO3	135	200	200	535
		OH	135	200	200	535
		pH	135	200	200	535
		NH4	135	200	200	535
		TOC	135	200	200	535
		VOA	135	200	200	535
		Semi-VOA	135	200	200	535
		DSC	135	200	200	535
		TEA	135	200	200	535
		Viscosity	135	200	200	535
		Cs by AAS	135	200	200	535
		Total U	135	200	200	535
		TOD	135	200	200	535
		Total dissolved Solids	135	200	200	535
		GEA(Co-60, Cs-137)	135	200	200	535
		Am/Cm 241	135	200	200	535
		Rh-Ru 106	135	200	200	535
		H-3	135	200	200	535
		C-14	135	200	200	535
		Se-79	135	200	200	535
		Sr 90	135	200	200	535
		Tc-99	135	200	200	535
		I-129	135	200	200	535
		Np-237	135	200	200	535
		Pu 239/240	135	200	200	535
		Cm 244	135	200	200	535
		Total Alpha	135	200	200	535
		Total Beta	135	200	200	535
		Specific Gravity	135	200	200	535
		Complexants	135	200	200	535
		TOTALS:	8,771	23,328	11,484	42,123

* BASED ON FISCALYEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLE ANALYSES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP	ANALYSIS	FY 94	FY 95	FY 96	TOTALS
INTERMEDIATE A	SCREENING (PRIMARY)	DSC	360	1,440	1,000	2,800
		TGA	360	1,440	1,000	2,800
		TOTAL APLHA	360	1,440	1,000	2,800
	SCREENING (SECONDARY)	Pu 239-240	320	1,140	0	1,460
		ICP/AES(U,Fe)	320	1,460	56	1,836
	SAFETY RESOLUTION	Pu Isotopic	32	120	28	180
		Mn, Na, Cr, Ni and Al.	0	0	0	0
		Total U	320	1,200	280	1,800
		Ni by total dissolution	32	120	28	180
		Cesium-137 by GEA	320	1,200	280	1,800
		Adiabatic Calorimetry	32	120	28	180
		Percent Moisture	320	1,200	280	1,800
		Total CN	320	1,200	280	1,800
		IC (Nitrate and Nitrite)	320	1,200	280	1,800
		TOC	320	1,200	280	1,800
		Sr-90	320	1,200	280	1,800
	WASTE TREATMENT DISPOSAL	Approx. 12 new analyses TBD	0	2040	2040	4080
	COMPLIANCE	IC	135	200	200	535
		Nitrite - Spectra	135	200	200	535
		Hg	135	200	200	535
		ICP/AES	135	200	200	535
		CN	135	200	200	535
		CO3	135	200	200	535
		OH	135	200	200	535
		pH	135	200	200	535
		NH4	135	200	200	535
		TOC	135	200	200	535
		VOA	135	200	200	535
		Semi-VOA	135	200	200	535
		DSC	135	200	200	535
		TEA	135	200	200	535
		Viscosity	135	200	200	535
		Cs by AAS	135	200	200	535
		Total U	135	200	200	535
		TOD	135	200	200	535
		Total dissolved Solids	135	200	200	535
		GEA(Co-60, Cs-137)	135	200	200	535
		Am/Cm 241	135	200	200	535
		Rh-Ru 106	135	200	200	535
		H-3	135	200	200	535
		C-14	135	200	200	535
		Se-79	135	200	200	535
		Sr 90	135	200	200	535
		Tc-99	135	200	200	535
		I-129	135	200	200	535
		Np-237	135	200	200	535
		Pu 239/240	135	200	200	535
		Cm 244	135	200	200	535
		Total Alpha	135	200	200	535
		Total Beta	135	200	200	535
		Specific Gravity	135	200	200	535
		Complexants	135	200	200	535
		TOTALS:	8,781	24,720	14,140	47,641

* BASED ON FISCALYEAR CORE ANALYSIS INITIATED. NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLE ANALYSES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP	ANALYSIS	FY 94	FY 95	FY 96	TOTALS
INTERMEDIATE B	SCREENING (PRIMARY)	DSC	360	1,440	1,000	2,800
		TGA	360	1,440	1,000	2,800
		TOTAL APLHA	360	1,440	1,000	2,800
	SCREENING (SECONDARY)	Pu 239-240	320	1,140	2,925	4,385
		ICP/AES(U,Fe)	320	1,460	2,925	4,705
	SAFETY RESOLUTION	Pu Isotopic	32	120	196	348
		Mn, Na, Cr, Ni and Al	0	0	0	0
		Total U	320	1,200	1,960	3,480
		Ni by total dissolution	32	120	196	348
		Cesium-137 by GEA	320	1,200	1,960	3,480
		Adiabatic Calorimetry	32	120	196	348
		Percent Moisture	320	1,200	1,960	3,480
		Total CN	320	1,200	1,960	3,480
		IC (Nitrate and Nitrite)	320	1,200	1,960	3,480
		TOC	320	1,200	1,960	3,480
		Sr-90	320	1,200	1,960	3,480
	WASTE TREATMENT DISPOSAL	Approx. 12 new analyses TBD	0	4920	4920	9840
	COMPLIANCE	IC	135	200	200	535
		Nitrite - Spectra	135	200	200	535
		Hg	135	200	200	535
		ICP/AES	135	200	200	535
		CN	135	200	200	535
		CO3	135	200	200	535
		OH	135	200	200	535
		pH	135	200	200	535
		NH4	135	200	200	535
		TOC	135	200	200	535
		VOA	135	200	200	535
		Semi-VOA	135	200	200	535
		DSC	135	200	200	535
		TEA	135	200	200	535
		Viscosity	135	200	200	535
		Cs by AAS	135	200	200	535
		Total U	135	200	200	535
		TOD	135	200	200	535
		Total dissolved Solids	135	200	200	535
		GEA(Co-60, Cs-137)	135	200	200	535
		Am/Cm 241	135	200	200	535
		Rh-Ru 106	135	200	200	535
		H-3	135	200	200	535
		C-14	135	200	200	535
		Se-79	135	200	200	535
		Sr 90	135	200	200	535
		Tc-99	135	200	200	535
		I-129	135	200	200	535
		Np-237	135	200	200	535
		Pu 239/240	135	200	200	535
		Cm 244	135	200	200	535
		Total Alpha	135	200	200	535
		Total Beta	135	200	200	535
		Specific Gravity	135	200	200	535
		Complexants	135	200	200	535
		TOTALS:	8,781	27,600	35,078	71,459

* BASED ON FISCALYEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLE ANALYSES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP	ANALYSIS	FY 94	FY 95	FY 96	TOTALS
MAXIMUM	SCREENING (PRIMARY)	DSC	360	1,440	1,000	2,800
		TGA	360	1,440	1,000	2,800
		TOTAL APLHA	360	1,440	1,000	2,800
	SCREENING (SECONDARY)	Pu 239-240	320	1,140	2,920	4,380
		ICP/AES(U,Fe)	320	1,460	2,920	4,700
	SAFETY	Pu Isotopic	32	120	196	348
		Mn, Na, Cr, Ni and Al	0	0	0	0
	RESOLUTION	Total U	320	1,200	1,960	3,480
		Ni by total dissolution	32	120	196	348
		Cesium-137 by GEA	320	1,200	1,960	3,480
		Adiabatic Calorimetry	32	120	196	348
		Percent Moisture	320	1,200	1,960	3,480
		Total CN	320	1,200	1,960	3,480
		IC (Nitrate and Nitrite)	320	1,200	1,960	3,480
		TOC	320	1,200	1,960	3,480
		Sr-90	320	1,200	1,960	3,480
	WASTE TREATMENT DISPOSAL	Approx. 12 new analyses TBD	0	16,800	34,800	51,600
	COMPLIANCE	IC	135	200	200	535
		Nitrite - Spectra	135	200	200	535
		Hg	135	200	200	535
		ICP/AES	135	200	200	535
		CN	135	200	200	535
		CO3	135	200	200	535
		OH	135	200	200	535
		pH	135	200	200	535
		NH4	135	200	200	535
		TOC	135	200	200	535
		VOA	135	200	200	535
		Semi-VOA	135	200	200	535
		DSC	135	200	200	535
		TEA	135	200	200	535
		Viscosity	135	200	200	535
		Cs by AAS	135	200	200	535
		Total U	135	200	200	535
		TOD	135	200	200	535
		Total dissolved Solids	135	200	200	535
		GEA(Co-60, Cs-137)	135	200	200	535
		Am/Cm 241	135	200	200	535
		Rh-Ru 106	135	200	200	535
		H-3	135	200	200	535
		C-14	135	200	200	535
		Se-79	135	200	200	535
		Sr 90	135	200	200	535
		Tc-99	135	200	200	535
		I-129	135	200	200	535
		Np-237	135	200	200	535
		Pu 239/240	135	200	200	535
		Cm 244	135	200	200	535
		Total Alpha	135	200	200	535
		Total Beta	135	200	200	535
		Specific Gravity	135	200	200	535
		Complexants	135	200	200	535
		TOTALS:	8,781	39,480	64,948	113,209

* BASED ON FISCALYEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

APPENDIX 8

NUMBER OF TWRS SAMPLES TO BE ANALYZED PER FISCAL YEAR*

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED.

TWRS SAMPLES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	FY 97	TOTALS
MINIMUM	SCREENING	PRIMARY (ORIGINAL CORES)	180	1,380	1,240	0	2,800
		SECONDARY (ORIGINAL CORES)	170	920	370	0	1,460
	SAFETY RESOLUTION	ORIGINAL CORES	170	920	370	0	1,460
		NEW CORES	0	0	0	0	0
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	50	140	50	240
		NEW CORES	0	0	0	0	0
	COMPLIANCE	-	95	200	190	50	535
	TOTALS	ORIGINAL CORES	520	3,270	2,120	50	5,960
		NEW CORES	0	0	0	0	0
		COMPLIANCE	95	200	190	50	535
		TOTAL SAMPLES	615	3,470	2,310	100	6,495

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED.

TWRS SAMPLES PER YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	FY 97	TOTALS
INTERMEDIATE A	SCREENING	PRIMARY (ORIGINAL CORES)	180	1,380	1,240	0	2,800
		SECONDARY (ORIGINAL CORES)	170	920	370	0	1,460
	SAFETY RESOLUTION	ORIGINAL CORES	170	990	610	30	1,800
		NEW CORES	0	0	0	0	0
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	95	195	50	340
		NEW CORES	0	0	0	0	0
	COMPLIANCE	-	95	200	190	50	535
	TOTALS	ORIGINAL CORES	520	3,385	2,415	80	7,400
		NEW CORES	0	0	0	0	0
		COMPLIANCE	95	200	190	50	535
		TOTAL SAMPLES	615	3,585	2,605	130	7,935

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED.

TWRS SAMPLES PER YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	FY 97	TOTALS
INTERMEDIATE B	SCREENING	PRIMARY (ORIGINAL CORES)	180	1,380	1,240	0	2,800
		SECONDARY (ORIGINAL CORES)	170	920	370	0	1,460
	SAFETY RESOLUTION	ORIGINAL CORES	170	1,040	1,220	270	2,700
		NEW CORES	0	0	510	270	780
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	200	380	240	820
		NEW CORES	0	0	0	0	0
	COMPLIANCE	-	95	200	190	50	535
	TOTALS	ORIGINAL CORES	520	3,640	3,210	510	7,780
		NEW CORES	0	0	510	270	780
		COMPLIANCE	95	200	190	50	535
		TOTAL SAMPLES	615	3,740	3,910	830	9,095

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED.

TWRS SAMPLES PER YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	FY 97	TOTALS
MAXIMUM	SCREENING	PRIMARY (ORIGINAL CORES)	180	1,380	1,240	0	2,800
		SECONDARY (ORIGINAL CORES)	170	920	370	0	1,460
	SAFETY RESOLUTION	ORIGINAL CORES	170	1,040	1,220	270	2,700
		NEW CORES	0	0	510	270	780
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	450	1,670	660	2,780
		NEW CORES	0	670	700	150	1,520
	COMPLIANCE	-	95	200	190	50	535
	TOTALS	ORIGINAL CORES	520	2,790	4,500	930	9,740
		NEW CORES	0	670	1,210	420	2,300
		COMPLIANCE	95	200	190	50	535
		TOTAL SAMPLES	**615**	**4,660**	**5,900**	**1,400**	**12,575**

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED.

AEU's REQUIRED PER FISCAL YEAR*

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	FY 97	TOTALS
MINIMUM	SCREENING	ORIGINAL CORES	5***	31***	40	0	[illegible]
	SAFETY RESOLUTION	ORIGINAL CORES	7	38	8	0	[illegible]
		NEW CORES	0	0	0	0	[illegible]
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	1	3	1	[illegible]
		NEW CORES	0	0	0	0	[illegible]
	COMPLIANCE	-	10	21	20	5**	[illegible]
	[illegible] TOTALS	ORIGINAL CORES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		NEW CORES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		COMPLIANCE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		TOTAL AEUs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED

** FY 97 NEEDS NOT AVAILABLE

*** 32 AEUs ARE REQUIRED IN FY 94/ FY 95 TO COMPLETE SAFETY SCREENING ON THE 53 WATCHLIST TANKS

AEU's REQUIRED PER FISCAL YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	FY 97	TOTALS
INTERMEDIATE A	SCREENING	ORIGINAL CORES	5	31	40	0	76
	SAFETY RESOLUTION	ORIGINAL CORES	7	40	19	4	70
		NEW CORES	0	0	0	0	0
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	2	4	1	7
		NEW CORES	0	0	0	0	0
	COMPLIANCE	-	10	21	20	5**	66*
	TOTALS	ORIGINAL CORES	12	73	63	5	153
		NEW CORES	0	0	0	0	0
		COMPLIANCE	10	21	20	5	66
		TOTAL AEU	22	94	83	10	209

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED

** FY 97 NEEDS NOT AVAILABLE

AEU's REQUIRED PER FISCAL YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	FY 97	TOTALS
INTERMEDIATE B	SCREENING	ORIGINAL CORES	5	31	40	0	[redacted]
	SAFETY RESOLUTION	ORIGINAL CORES	7	44	41	16	[redacted]
		NEW CORES	0	0	30	12	[redacted]
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	4	8	5	[redacted]
		NEW CORES	0	0	0	0	[redacted]
	COMPLIANCE	-	10	21	20	5**	[redacted]
	[redacted]	ORIGINAL CORES	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		NEW CORES	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		COMPLIANCE	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		TOTAL AEU's	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED

** FY 97 NEEDS NOT AVAILABLE

AEU's REQUIRED PER FISCAL YEAR*

(CONT)

CASE	SAMPLE ANALYSIS GROUP		FY 94	FY 95	FY 96	FY 97	TOTALS
MAXIMUM	SCREENING	ORIGINAL CORES	5	31	40	0	[illegible]
	SAFETY RESOLUTION	ORIGINAL CORES	7	44	41	16	108
		NEW CORES	0	0	30	12	42
	WASTE TREATMENT/ DISPOSAL	ORIGINAL CORES	0	9	34	14	57
		NEW CORES	0	27	28	6	61
	COMPLIANCE	-	10	21	20	5**	56[illegible]
	TOTALS	ORIGINAL CORES	12	84	115	30	244
		NEW CORES	0	27	58	18	103
		COMPLIANCE	10	21	20	5**	56**
		TOTAL AEU	22	132	193	53*	403*

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED

** FY 97 NEEDS NOT AVAILABLE

NUMBER OF TANKS SAMPLED BY FISCAL YEAR*

TANK TYPE	FY 1994	FY 1995	FY 1996	TOTAL
FeCN WATCHLIST**	6	14	0	20
REMAINING WATCHLIST**	4	29	0	33
NON-WATCHLIST NON 200 SERIES***	2	15	42	59
200 SERIES***	0	0	16	16
TOTAL	12	58	58	128

*ASSUMES NO CORE FOR SAFETY RESOLUTION OR WASTE TREATMENT/DISPOSAL

** SAMPLING COMPLETED BY 6/30/95

*** SAMPLING COMPLETE BY 6/30/96

APPENDIX 9

NUMBER OF TWRS SAMPLE ANALYSES PER FISCAL YEAR*

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED.

TWRS SAMPLE ANALYSES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP	ANALYSIS	FY 94	FY 95	FY 96	FY 97	TOTALS
'INIMUM	SCREENING (PRIMARY)	DSC	180	1,380	1,240	0	2,800
		TGA	180	1,380	1,240	0	2,800
		TOTAL APLHA	180	1,380	1,240	0	2,800
	SCREENING (SECONDARY)	Pu 239-240	170	920	370	0	1,460
		ICP/AES(U,Fe)	170	920	370	0	1,460
	SAFETY	Mn, Na, Cr, Ni and Al	0	0	0	0	0
	RESOLUTION	Pu Isotopic	17	92	37	0	146
		Total U	170	920	370	0	1,460
		Ni by total dissolution	17	92	37	0	146
		Cesium-137 by GEA	170	920	370	0	1,460
		Adiabatic Calorimetry	17	92	37	0	146
		Percent Moisture	170	920	370	0	1,460
		Total CN	170	920	370	0	1,460
		IC (Nitrate and Nitrite)	170	920	370	0	1,460
		TOC	170	920	370	0	1,460
		Sr-90	170	920	370	0	1,460
	WASTE TREATMENT DISPOSAL	Approx. 12 new analyses TBD	0	580	1,730	570	2,880
	COMPLIANCE	IC	95	200	190	50	535
		Nitrite - Spectra	95	200	190	50	535
		Hg	95	200	190	50	535
		ICP/AES	95	200	190	50	535
		CN	95	200	190	50	535
		CO3	95	200	190	50	535
		OH	95	200	190	50	535
		pH	95	200	190	50	535
		NH4	95	200	190	50	535
		TOC	95	200	190	50	535
		VOA	95	200	190	50	535
		Semi-VOA	95	200	190	50	535
		DSC	95	200	190	50	535
		GEA	95	200	190	50	535
		Viscosity	95	200	190	50	535
		Cs by AAS	95	200	190	50	535
		Total U	95	200	190	50	535
		TOD	95	200	190	50	535
		Total dissolved Solids	95	200	190	50	535
		GEA(Co-60, Cs-137)	95	200	190	50	535
		Am/Cm 241	95	200	190	50	535
		Rh-Ru 106	95	200	190	50	535
		H-3	95	200	190	50	535
		C-14	95	200	190	50	535
		Se-79	95	200	190	50	535
		Sr 90	95	200	190	50	535
		Tc-99	95	200	190	50	535
		I-129	95	200	190	50	535
		Np-237	95	200	190	50	535
		Pu 239/240	95	200	190	50	535
		Cm 244	95	200	190	50	535
		Total Alpha	95	200	190	50	535
		Total Beta	95	200	190	50	535
		Specific Gravity	95	200	190	50	535
		Complexants	95	200	190	50	535
		TOTALS	5,446	20,276	15,541	2,320	43,583

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLE ANALYSES PER YEAR*

CASE *	SAMPLE ANALYSIS GROUP	ANALYSIS	FY 94	FY 95	FY 96	FY 97	TOTALS
ITERMEDIATE A	SCREENING (PRIMARY)	DSC	180	1,380	1,240	0	2,800
		TGA	180	1,380	1,240	0	2,800
		TOTAL APLHA	180	1,380	1,240	0	2,800
	SCREENING (SECONDARY)	Pu 239-240	170	920	370	0	1,460
		ICP/AES(U,Fe)	170	920	370	0	1,460
	SAFETY RESOLUTION	Mn, Na, Cr, Ni and Al	0	0	0	0	0
		Pu Isotopic	17	99	61	3	180
		Total U	170	990	610	30	1,800
		Ni by total dissolution	17	99	61	3	180
		Cesium-137 by GEA	170	990	610	30	1,800
		Adiabatic Calorimetry	17	99	61	3	180
		Percent Moisture	170	990	610	30	1,800
		Total CN	170	990	610	30	1,800
		IC (Nitrate and Nitrite)	170	990	610	30	1,800
		TOC	170	990	610	30	1,800
		Sr-90	170	990	610	30	1,800
	WASTE TREATMENT DISPOSAL	Approx. 12 new analyses TBD	0	1,140	2,320	620	4,080
	COMPLIANCE	IC	95	200	190	50	535
		Nitrite - Spectra	95	200	190	50	535
		Hg	95	200	190	50	535
		ICP/AES	95	200	190	50	535
		CN	95	200	190	50	535
		CO3	95	200	190	50	535
		OH	95	200	190	50	535
		pH	95	200	190	50	535
		NH4	95	200	190	50	535
		TOC	95	200	190	50	535
		VOA	95	200	190	50	535
		Semi-VOA	95	200	190	50	535
		DSC	95	200	190	50	535
		GEA	95	200	190	50	535
		Viscosity	95	200	190	50	535
		Cs by AAS	95	200	190	50	535
		Total U	95	200	190	50	535
		TOD	95	200	190	50	535
		Total dissolved Solids	95	200	190	50	535
		GEA(Co-60, Cs-137)	95	200	190	50	535
		Am/Cm 241	95	200	190	50	535
		Rh-Ru 106	95	200	190	50	535
		H-3	95	200	190	50	535
		C-14	95	200	190	50	535
		Se-79	95	200	190	50	535
		Sr 90	95	200	190	50	535
		Tc-99	95	200	190	50	535
		I-129	95	200	190	50	535
		Np-237	95	200	190	50	535
		Pu 239/240	95	200	190	50	535
		Cm 244	95	200	190	50	535
		Total Alpha	95	200	190	50	535
		Total Beta	95	200	190	50	535
		Specific Gravity	95	200	190	50	535
		Complexants	95	200	190	50	535
		TOTALS:	5,446	21,347	17,883	2,589	47,265

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLE ANALYSES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP	ANALYSIS	FY 94	FY 95	FY 96	FY 97	TOTALS
INTERMEDIATE B	SCREENING (PRIMARY)	DSC	180	1,380	1,240	0	2,800
		TGA	180	1,380	1,240	0	2,800
		TOTAL APLHA	180	1,380	1,240	0	2,800
	SCREENING (SECONDARY)	Pu 239-240	220	1,100	2,060	1,000	4,380
		ICP/AES(U,Fe)	220	1,200	2,210	1,070	4,700
	SAFETY RESOLUTION	Mn, Na, Cr, Ni and Al	0	0	0	0	0
		Pu Isotopic	17	104	173	54	348
		Total U	170	1,040	1,730	540	3,480
		Ni by total dissolution	17	104	173	54	348
		Cesium-137 by GEA	170	1,040	1,730	540	3,480
		Adiabatic Calorimetry	17	104	173	54	348
		Percent Moisture	170	1,040	1,730	540	3,480
		Total CN	170	1,040	1,730	540	3,480
		IC (Nitrate and Nitrite)	170	1,040	1,730	540	3,480
		TOC	170	1,040	1,730	540	3,480
		Sr-90	170	1,040	1,730	540	3,480
	WASTE TREATMENT DISPOSAL	Approx. 12 new analyses TBD	0	2,300	4,500	3,040	9,840
	COMPLIANCE	IC	95	200	190	50	535
		Nitrite - Spectra	95	200	190	50	535
		Hg	95	200	190	50	535
		ICP/AES	95	200	190	50	535
		CN	95	200	190	50	535
		CO3	95	200	190	50	535
		OH	95	200	190	50	535
		pH	95	200	190	50	535
		NH4	95	200	190	50	535
		TOC	95	200	190	50	535
		VOA	95	200	190	50	535
		Semi-VOA	95	200	190	50	535
		DSC	95	200	190	50	535
		GEA	95	200	190	50	535
		Viscosity	95	200	190	50	535
		Cs by AAS	95	200	190	50	535
		Total U	95	200	190	50	535
		TOD	95	200	190	50	535
		Total dissolved Solids	95	200	190	50	535
		GEA(Co-60, Cs-137)	95	200	190	50	535
		Am/Cm 241	95	200	190	50	535
		Rh-Ru 106	95	200	190	50	535
		H-3	95	200	190	50	535
		C-14	95	200	190	50	535
		Se-79	95	200	190	50	535
		Sr 90	95	200	190	50	535
		Tc-99	95	200	190	50	535
		I-129	95	200	190	50	535
		Np-237	95	200	190	50	535
		Pu 239/240	95	200	190	50	535
		Cm 244	95	200	190	50	535
		Total Alpha	95	200	190	50	535
		Total Beta	95	200	190	50	535
		Specific Gravity	95	200	190	50	535
		Complexants	95	200	190	50	535
		TOTALS:	5,546	23,332	31,769	10,802	71,449

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

TWRS SAMPLE ANALYSES PER YEAR*

CASE	SAMPLE ANALYSIS GROUP	ANALYSIS	FY 94	FY 95	FY 96	FY 97	TOTALS
MAXIMUM	SCREENING (PRIMARY)	DSC	180	1,380	1,240	0	2,800
		TGA	180	1,380	1,240	0	2,800
		TOTAL APLHA	180	1,380	1,240	0	2,800
	SCREENING (SECONDARY)	Pu 239-240	220	1,100	2,060	1,000	4,380
		ICP/AES(U,Fe)	220	1,200	2,210	1,070	4,700
	SAFETY RESOLUTION	Mn, Na, Cr, Ni and Al	0	0	0	0	0
		Pu Isotopic	17	104	173	54	348
		Total U	170	1,040	1,730	540	3,480
		Ni by total dissolution	17	104	173	54	348
		Cesium-137 by GEA	170	1,040	1,730	540	3,480
		Adiabatic Calorimetry	17	104	173	54	348
		Percent Moisture	170	1,040	1,730	540	3,480
		Total CN	170	1,040	1,730	540	3,480
		IC (Nitrate and Nitrite)	170	1,040	1,730	540	3,480
		TOC	170	1,040	1,730	540	3,480
		Sr-90	170	1,040	1,730	540	3,480
	WASTE TREATMENT DISPOSAL	Approx. 12 new analyses TBD	0	11,870	23,700	16,030	51,600
	COMPLIANCE	IC	135	200	190	50	575
		Nitrite - Spectra	135	200	190	50	575
		Hg	135	200	190	50	575
		ICP/AES	135	200	190	50	575
		CN	135	200	190	50	575
		CO3	135	200	190	50	575
		OH	135	200	190	50	575
		pH	135	200	190	50	575
		NH4	135	200	190	50	575
		TOC	135	200	190	50	575
		VOA	135	200	190	50	575
		Semi-VOA	135	200	190	50	575
		DSC	135	200	190	50	575
		GEA	135	200	190	50	575
		Viscosity	135	200	190	50	575
		Cs by AAS	135	200	190	50	575
		Total U	135	200	190	50	575
		TOD	135	200	190	50	575
		Total dissolved Solids	135	200	190	50	575
		GEA(Co-60, Cs-137)	135	200	190	50	575
		Am/Cm 241	135	200	190	50	575
		Rh-Ru 106	135	200	190	50	575
		H-3	135	200	190	50	575
		C-14	135	200	190	50	575
		Se-79	135	200	190	50	575
		Sr 90	135	200	190	50	575
		Tc-99	135	200	190	50	575
		I-129	135	200	190	50	575
		Np-237	135	200	190	50	575
		Pu 239/240	135	200	190	50	575
		Cm 244	135	200	190	50	575
		Total Alpha	135	200	190	50	575
		Total Beta	135	200	190	50	575
		Specific Gravity	135	200	190	50	575
		Complexants	135	200	190	50	575
		TOTALS:	6,946	32,902	50,969	23,792	114,609

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

APPENDIX 22

MAXIMUM SEGMENT EXTRUSIONS PER FISCAL YEAR

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

MAXIMUM SEGMENT EXTRUSIONS PER YEAR

LABORATORY	1 EXTRUDER			2 EXTRUDERS		
	1 SHIFT* *	2 SHIFTS**	4 SHIFTS**	1 SHIFT*	2 SHIFTS*	4 SHIFTS*
222-S	332	664	1,328	664	1,328	2,656
ACL	249	498	996	498	996	1,992
TOTAL	581	1,162	2,324	1,162	2,324	4,648

* 5 DAYS PER WEEK
**7 DAYS PER WEEK

APPENDIX 13

NUMBER OF SEGMENT EXTRUSIONS PER FISCAL YEAR

* BASED ON FISCAL YEAR CORE ANALYSIS INITIATED, NOT NECESSARILY FISCAL YEAR ANALYSIS COMPLETED.

NUMBER OF SEGMENT EXTRUSIONS PER YEAR

CASE	FY 1994	FY 1995	FY 1996	TOTALS
MINIMUM	120	580	580	1,280
INTERMEDIATE A	120	580	580	1,280
INTERMEDIATE B	120	580	1,110	1,810
MAXIMUM	120	1,340	1,870	3,330

APPENDIX 14

TYPICAL SUPERNATE SAMPLE ANALYSES

TYPICAL LIQUID GRAB SAMPLE FOR DST - PART B

SAMPLE POINT:	TANK 241-AN-107
SAMPLING DATE:	09/01/94 - 09/16/94
SAMPLE USE:	RCRA Compliance Sample
SAMPLE TYPE:	Liquid Grab Sample
SAMPLE FREQUENCY:	15
SAMPLE VOLUME:	100 ml Bottle-On-a-String
TESTING FREQUENCY:	No Duplications/No Replications

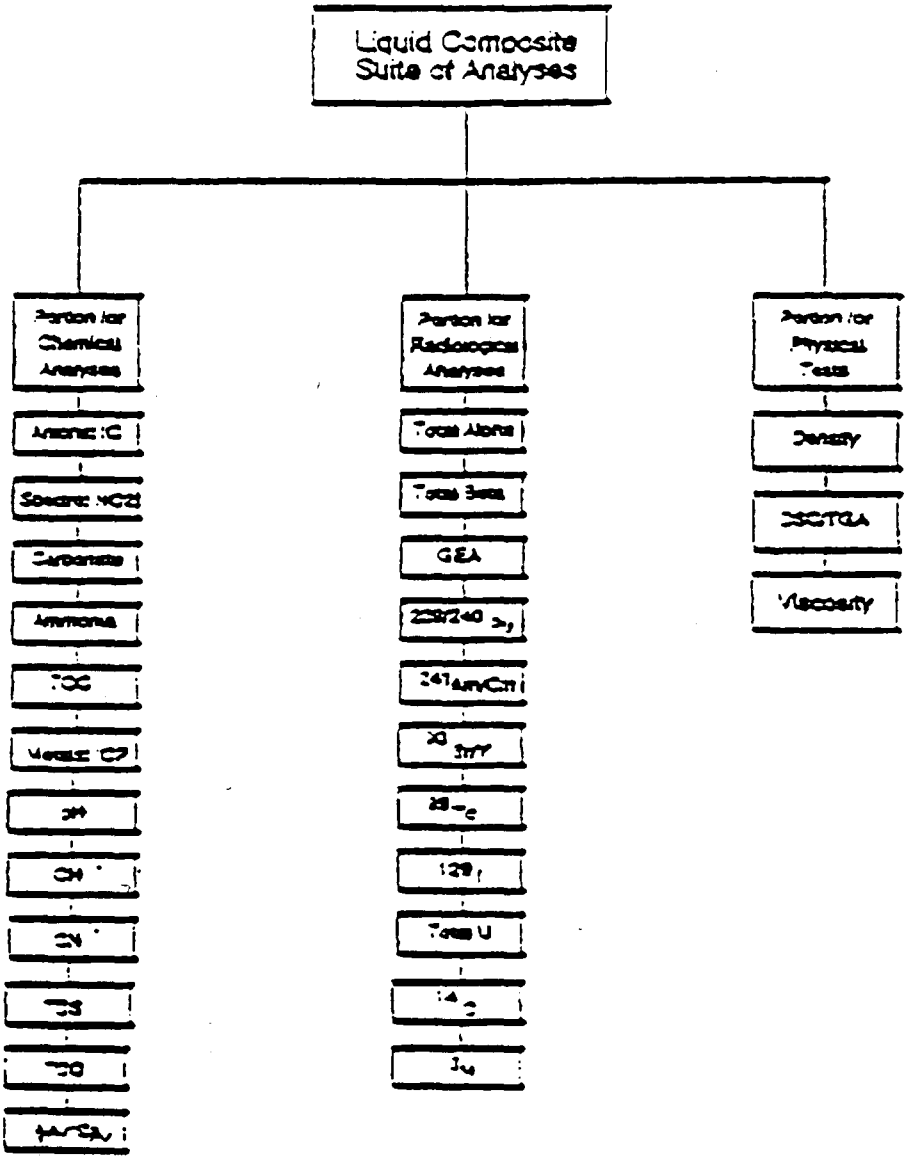
ANALYSIS:

Ag	F	Methanol
Al	Cl	Methyl Ethyl Katone
As	CN	Methyl Isobutyl Katone
Ba	NO2	Oxalic Acid
Bi	NO3	Tributyl Phosphate
Ca	PO4	Specific Gravity
Cd	SO4	Co_{60}
Cr (total)	CO3	Cs^{137}
Cu	OH	Ru-Ru^{106}
Fe	NH4	H^3
Hg	TOC	C^{14}
Pb	VOA	Se^{79}
Mg	Semi-VOA	Sr^{90}
Mn	BSC	Tc^{99}
Mo	Butanol	I^{129}
P	Cresol (total)	Am^{241}
K	Dibutyl Phosphate	Np^{237}
Se	EDTA	$Pu^{239/240}$
Si	Ethyl Ether	Cm^{244}
Na	Formaldehyde	Total Alpha
Ti	HEDTA	Total Beta
Zn	Kerosene (Inhibited) (NPH)	TCA
Zr		

TYPICAL LIQUID GRAB FOR STABILIZATION AND ISOLATION

Module A

Process Design Characterization



APPENDIX 15

POTENTIAL CAPACITY AVAILABLE PER FISCAL YEAR

POTENTIAL AEU CAPACITY AVAILABLE PER FISCAL YEAR

LABORATORY	FY 94 (3/1/94-9/30/94)	FY 95	FY 96	FY 97 (10/1/96-1/31/97)	TOTAL
222-S	18	48	50	17	133
ACL	13	24	26	9	72
INEL	-	10	10*	4*	24
LANL	-	6	10*	4*	20
TOTAL	**31**	**88**	**96**	**26**	249

* POTENTIAL TO INCREASE TO 20 AEUs PER YEAR
* POTENTIAL TO INCREASE TO 8 AEUs PER YEAR

APPENDIX 16

COMPARISON OF TWRS CHARACTERIZATION PROGRAM NEEDS IN AEUs AND LABORATORIES CAPACITIES*

* BASED ON PROJECTED YEAR THAT SAMPLE ANALYSIS WILL BE COMPLETED.

COMPARISON OF TWRS EXTRUSION NEEDS AND LABORATORIES CAPACITY

FISCAL YEAR	PROGRAM CASE NEEDS				LABORATORY CAPACITY		
	MINIMUM	INTERMEDIATE A	INTERMEDIATE B	MAXIMUM	1 EXTRUDER PER LAB/ 2 SHIFTS	2 EXTRUDER IN 222-S AND 1 EXTRUDER IN ACL LAB/ 2 SHIFTS	2 EXTRUDERS IN BOTH LABS/ 2 SHIFTS
1994 (3/1/94-9/30/94)	120	120	120	120	500	400	400
1995	680	680	680	1,340	1,162	1,826	2,324
1996	680	680	1,110	1,870	1,162	1,826	2,324
TOTALS	1,280	1,280	1,810	3,330	2,824	4,052	5,048

* 1 EXTRUDER PER LAB AND 2 SHIFTS

APPENDIX 17

POTENTIAL CAPACITY AVAILABLE BY SAMPLE ANALYSIS PER FISCAL YEAR

Planned Laboratories* Analysis Capacity

SAFETY ACTIVITY	Analysis	Operating Mode		FY 1994 (3/1/94 - 9/30/94)	FY 1995 (10/94 - 9/30/95)	FY 1996 (10/95 - 9/30/96)	FY 1997 (10/96 - 1/31/97)	TOTAL
		WHC 222-S	PNL ACL					
Primary Screening	DSC	4 shift	1 shift	290**	1400**	1400**	460**	3200**
	TGA	4 shift	1 shift	290**	1400**	1400**	460**	3200**
	Total Alpha	4 shift	1 shift	3800	9300	9300	3100	25500
Secondary Screening	Pu 239-240	4 shift	2 shift	2700	5800	5800	1800	16100
	ICP/AES	1 shift	1 shift	2500	7000	7000	2300	18800
Safety Resolution	Pu Isotopic	--	1 shift	>20	900	900	300	2100
	Total U	4 shift	1 shift	1200	4200	4200	1400	11000
	Ni - total dissolution	1 shift	1 shift	100	400	400	130	1030
	GEA	4 shift	1 shift	6700	15000	15000	5000	41700
	Adiabatic Calorimetry	1 shift	--	42	430**	430**	140**	1040**
	Percent Water (Moisture)	1 shift	2 shift	170**	2000	2000	700	4870**
	Total CN	4 shift	4 shift	980	2100	2100	700	5880
	IC	1 shift	1 shift	4400	8900	8900	2900	25100
	Total Organic Carbon	4 shift	1 shift	1000**	3000**	3000**	1000**	8000**
	Sr-90	4 shift	1 shift	2600	5600	5600	1800	15600

* INEL Data not available.

** Assumes planned additional equipment in use.

-- Laboratory has no capability in this area.

APPENDIX 1B

POTENTIAL CAPACITY AVAILABLE BY SAMPLE ANALYSIS PER FISCAL YEAR

AEU COMPARISON OF TWRS NEEDS AND LABORATORIES CAPACITIES

FISCAL YEAR	PROGRAM CASE NEEDS				LABORATORY CAPACITY		CASE COMPARISON							
							CAPACITY SURPLUS				LAB CAPACITY SHORTFALL			
	MINIMUM	INTERMEDIATE A	INTERMEDIATE B	MAXIMUM	PLANNED LABORATORY CAPACITY	MAXIMUM STRATEGY	MINIMUM	INTERMEDIATE A	INTERMEDIATE B	MAXIMUM	MINIMUM	INTERMEDIATE A	INTERMEDIATE B	MAXIMUM
1994 (3/1/94-9/30/94)	22	22	22	22	31	31	9	9	9	9	-	-	-	-
1995	91	94	100	132	88	88	-	-	-	-	3	6	12	44
1996	71	83	139	193	96	116	25	13	-	-	-	-	23*	77*
1997 (10/1/96-1/31/97)	6	10	38	53	34	42	28	24	4*	-	-	-	-	11*
TOTALS	190	209	299	400	249	277								

* ASSUMES MAXIMUM USAGE OF INEL AND LANL IN FY 1996 AND FY 1997

APPENDIX 19

LABORATORY COSTS*

*IN FY 1994 DOLLARS

COST FOR TWRS SAMPLE CHARACTERIZATION*

(MILLIONS OF DOLLARS)

LABORATORY	FY 94 (3/1/94-9/30/94)		FY 95		FY 96		FY 97		TOTAL	
	EXPENSE	CAPITAL	EXPENSE	CAPITAL	EXPENSE	CAPITAL	EXPENSE	CAPITAL	EXPENSE	CAPITAL
222-S****	6.1	0.5	13.6	0	14	0	3.6	0	33.7	0.5
ACL****	5.6	0	11.7	0.5	12.8	0	3.3	0	30.1	0.5
INEL*****	0.8**	0.2**	6.5	0.3	6.5	0.3	1.8	0	15.6	0.8
LANL*****	0.5**	0.5**	8.1***	0.8	8.5	0.3	2.2	0	19.3	1.3
TOTAL	13	1.2	39.9	1.6	41.8	0.6	10.9	0	98.7	3.1

* For all TWRS samples taken from 3/1/94 through 9/30/96
** Upgrade Costs
*** Includes $4.9M for upgrade Oct. 1994 -Feb. 1995
**** Laboratory base funding costs not included
***** INEL and LANL base funding cost not included

COST PER AEU*

LABORATORY	FY 94 (3/1/94-9/30/94)	FY 95	FY 96	FY 97
222-S**	$770K	$580K	$580K	$650K
ACL**	$730K	$770K	$650K	$800K
INEL***	-	$650K	$760K	$900K
LANL***	-	$850K	$850K	$1,100K

*BASED ON EXPENSE DOLLARS ONLY, AND MINIMUM CASE

**LABORATORY BASE FUNDING COSTS INCLUDED

*** SHIPPING AND WHC PROGRAM MANAGEMENT AND INTEGRATION COSTS AND INEL AND LANL BASE FUNDING COSTS NOT INCLUDED

APPENDIX 20

OVERALL TWRS ANALYTICAL SERVICES COSTS*

*IN FY 1994 DOLLARS

OVERALL TWRS ANALYTICAL SERVICES COSTS*

(IN MILLIONS OF DOLLARS)

	FY 1994		FY 1995		FY 1996		FY 1997		TOTAL	
	EXPENSE (3/1/94-9/30/94)	CAPITAL	EXPENSE	CAPITAL	EXPENSE	CAPITAL	EXPENSE (10/1/96-1/31/97)	CAPITAL	EXPENSE	CAPITAL
ANALYTICAL LABORATORIES										
UPGRADE	1.3	0.7	8.1	0	0	0	0	0	9.4	0.7
OPERATING	9.5	1.8	52.9	3.8	63.6	3.3	16.5	0.9	142.5	9.8
SHIPPING										
UPGRADE	0.5	0.7	0.1	0	0	0	0	0	0.6	0.7
OPERATING*	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
NEPA**	0.15	0	0.15	0	0	0	0	0	0.3	0
SAMPLE ARCHIVE										
UPGRADE	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
OPERATING	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
PROGRAM MANAGEMENT AND INTEGRATION & QUALITY OVERSITE	1.3	0	1.4	0	1.4	0	1.5	0	5.6	0
TOTAL	12.75	3.2	62.65	3.8	65	3.3	18	0.9	158.4	11.2

* INCLUDES LOADING, TRANSPORTATION AND SAMPLE DISPOSAL COSTS

** ASSUMES ENVIRONMENTAL ASSESSMENT IS NOT REQUIRED

APPENDIX 21

OFF-SITE LABORATORY READINESS SCHEDULE

OFF-SITE LABORATORY READINESS