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7. Abstract

A review of Hanford Underground Waste Storage Tank Chemistry, coupled with planned remediation actions and retrieval sequences was conducted in order to predict the chemistry of the waste to be stored in the MWTF tanks. All projected waste solutions to be transferred to the MWTF tanks were found to be in compliance with current tank chemistry specifications; therefore, the waste and the tank materials of construction are expected to be compatible.

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PROJECT W-236A MULTI-FUNCTION WASTE TANK FACILITY
WASTE FEED PROJECTIONS

ALVIN P. LARRICK

December 22, 1994

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1.0 INTRODUCTION

Current waste volume projections for the Hanford Site indicate a need for additional tank space on a priority basis (Koreski, 1994). This need for more tank space is to be met by constructing six new underground double-shell waste storage tanks (Groth, 1994). Two million gallons of tank space is to be provided in the 200W Area and four million gallons in the 200E Area. These tanks will provide safe, environmentally acceptable storage capacity, to handle wastes from single-shell and double-shell tank safety issues/mitigation and remediation activities (Groth, 1994).

An evaluation of materials for construction of the tanks was performed considering the advantages and disadvantages of using carbon steel, the 304L and 6% molybdenum series austenitic stainless steels, and the high-chromium-nickel alloys (Alloy 625 and Alloy C-276) (Carlos, 1994a). The first choice, 6% molybdenum stainless steel, was selected because it had superior corrosion resistance compared to carbon steel and Type 304L stainless steel but was considerably less expensive than the high Cr-Ni alloys. The superior corrosion resistance would allow the tanks to contain waste over a broad range of chemistry compositions. The second choice, carbon steel, was selected because it was the least expensive but would require specific operating limits or conditions to be imposed on chemistry, fabrication and corrosion control.

The carbon steel tank material selection was deemed an acceptable material provided that the following conditions were met:

- 1) the composition of waste placed in the tanks meets the present chemistry requirements for waste stored in the existing double-shell tanks,
- 2) a satisfactory resolution is achieved of the problem of preventing concrete degradation during the post-weld heat treatment of the carbon steel tanks,
- 3) the issue of pitting observed in carbon steel tanks at Savannah River is satisfactorily resolved, and
- 4) velocity profiles in the primary tank are such that there will be no erosion problem (Carlos, 1994a).

The final selection of carbon steel in preference to 6% molybdenum stainless steel for the tank material was made based on the ability of meeting the above requirements (Fritz, 1994). The type of carbon steel to be used was selected to be ASME SA 516, Grade 70 (Carlos, 1994b).

The chemistry of the wastes present in the Hanford underground storage tanks and the applicability of the waste meeting the Double Shell Tank (DST) chemistry specifications are reviewed in this document. Also, the planned fill and drain cycles are presented. The fill and drain cycle data show the sources of the waste to be placed into the Multi-Function Waste Tank Facility (MWTF) tanks, how long the waste is stored, and the disposition of the waste. Methods of fulfilling the requirements for post-weld heat treatment, pitting

corrosion, and erosion-corrosion have been completed and are presented elsewhere (Foster, 1994; Larrick, et.al., 1994; Carlos, 1994c).

2.0 SUMMARY AND CONCLUSIONS

Selection of carbon steel for the material of construction of the Multi-Function Waste Facility (MWTF) tanks was made contingent upon the chemistry of the waste feed into the tanks meeting the established chemistry requirements of the existing tanks, among other factors. The feed composition has been reviewed in this document and has been found to meet the established chemistry composition requirements.

The first planned use of the MWTF tanks is to store waste from Double-Shell Tank watch list tanks. Tanks 101-SY and 103-SY are the first of these tanks whose contents may be transferred to the MWTF tanks as part of the remediation process. During the removal and transfer operations, the waste in the watchlist tanks will be diluted by a factor of 0.5:1 to 3:1. The waste in these tanks currently meets the operating chemistry requirements, and will still meet the requirements after transfer to the MWTF tanks. Of the 28 DSTs, three tanks are known to not meet the DST chemistry requirements because of low sodium hydroxide content. Plans are in progress for correcting this deficiency; therefore, it is concluded that any waste feed from a DST entering the MWTF tanks will meet the chemistry requirement.

The second planned use of the MWTF tanks is to intermediately store waste retrieved from Single-Shell tanks in preparation for disposal of the waste via pretreatment to remove cesium and solidification in the Low-Level Vitrification Plant. Waste from the TX, SX, U, and BY tank farms is currently planned as the source of feed to the MWTF tanks for this processing. The retrieval process incorporates collection of the retrieved waste into 20,000-gallon accumulation tanks where the waste chemistry is adjusted to meet Hanford transfer and chemistry requirements. Thus, all waste originating from the retrieval operation will be compatible with the new MWTF tank material.

A third planned use is for one of the MWTF tanks to act as a receiver tank for evaporator concentrates. The solutions evaporated originate from the planned sludge washing operations. These concentrates will also meet Hanford tank chemistry requirements, and are therefore considered compatible with the new MWTF tanks.

The current plan for TWRS waste processing does not include sludge washing in the MWTF tanks. The design of the MWTF tanks includes a corrosion allowance for erosion-corrosion, enhancement of the chromium content of the steel to provide better erosion-corrosion resistance, and inclusion of a drip ring and vapor phase inhibitor addition equipment to reduce pitting corrosion potentially present when dilute solutions are processed. All of these design features makes the MWTF tanks inherently more suited for sludge washing than existing tanks and should be a consideration in future planning. During review

of the literature for preparation of this document, data were found showing that at dilute chemistry conditions that are within the Hanford tank chemistry specification stress-corrosion cracking could occur. Additional work should better define these conditions, and the existing specifications changed to preclude operation of either existing tanks or the new MWTF tanks at the conditions at which this stress-corrosion cracking can occur.

3.0 DISCUSSION

3.1 MWTF Functional Design Criteria Chemistry Compositions

The Functional Design Criteria (FDC) document, Rev. 1, (Groth, 1994) provides the chemical compositions of the retrieved waste expected to be stored in the MWTF tanks for use in design of the tanks. This compendium of compositions is shown in Table 1. Table 1 presents the maximum and minimum compositions for the Double Shell Tanks and the Single Shell Tanks, the High-Level Waste Vitriification Plant (HWVP) design feed stream, and the Initial Pretreatment Module design feed stream. The latter two listings are for information; these plants are to be constructed in the future. The original FDC, Rev. 0, had a much more restricted design chemistry based only on the feed stream composition for the HWVP, as the original mission for the MWTF tanks was to support the HWVP. The current MWTF design chemistry allows the MWTF tanks to support a broader mission including storage of retrieved double-shell tank (DST) waste, storage of retrieved single-shell tank (SST) waste, water or caustic washing of sludge and solids or receipt of these solutions from other tanks, storage of wastes from processing at the IPM, or storage of waste feed to the HWVP.

The bases for the values used in Table 1 were documented by Divine, et.al., (1993) and are quoted below:

"The DST data are a composite of DST waste solids and supernatant (Garfield, 1992) and (if needed) retrieval water that could be sent to the MWTF. Minimum and maximum concentrations for each element for DST wastes are shown."

"The columns labeled SST are the bulk composition ranges for SST waste in the 12 different SST farms (Boomer, 1993). Since much of the aqueous phase has been removed from the SSTs, the compositions listed include additional water (approximately two times the mass of the solids in the SST waste), assumed to be needed for retrieval of the waste. Because of the lack of characterization information for SST wastes, the Table does not distinguish between water insoluble solid phases and water soluble or supernatant phases. It should be noted that Boomer (Boomer, 1993) uses data from TRAC that has been adjusted so that the total inventory agrees with that in the EIS."

"If the concentration of a particular element is not known, a blank space is shown in the table. This does not necessarily indicate the absence of that element. There may be cases where waste from individual tanks may not represent the average compositions for certain components shown. These isolated cases can, under certain conditions, result in an increase in the corrosion to the tank material of construction."

"Water washing DST waste solids in the new tank farm would remove a significant percentage (up to 97%) of the Na^+ , NO_2^- , NO_3^- , and OH^- . Thus,

after several washes with water the pH of the wash solution should approach approximately 7. For conservatism, a minimum pH of 5 should be assumed. Also, pH 5 has been chosen as the minimum specification value for the cross-site transfer line Operating Specifications Document. Water washing SST sludge would also remove significant amounts of the sodium salts; however, washing efficiencies may not be as high as with DST waste since significant mineralization has occurred in SST waste to form sodium aluminosilicate and insoluble phosphate phases. The compositions of both DST and SST washed wastes are encompassed by the minimum and maximum concentrations shown in the table."

The concerns expressed by the authors of the above quote for compositions and pH for the dilute wash solutions are no longer of a concern for the MWTF as one of the main criterion for selection of carbon steel as the tank material was to specify that only waste meeting the existing Operating Specification Document chemical composition be allowed to enter the tank. This waste specification is shown in Table 2 (Harris, 1992). Further, the wash solutions may not be water; instead, they are planned to contain 3M NaOH for the first wash solution and water containing 0.01M NaOH and 0.01M NaNO₃ for subsequent washes (Orme, 1994).

Since Table 1 shows only the maximum and minimum concentration found in the existing tanks, a more detailed description of the planned waste chemistry for the tanks is presented in the following sections of this document for use in planning corrosion tests, reviewing compatibility issues, and preparing other documentation such as permitting, safety and environmental reports.

3.2 Double-Shell Tank Compositions

Radioactive wastes are added to the DSTs by direct additions from the various operating facilities at the Hanford Site or by transfers from the SSTs primarily from salt well pumping operations. The sources and compositions of these wastes are described below.

3.2.1 Double-Shell Tank Compositions by Source

Westinghouse Hanford Company issues a monthly report giving the status of the 177 DSTs and SSTs and 49 smaller catch tanks at the Hanford Site (Hanlon, 1994). This report is the official inventory for radioactive waste stored in underground tanks in the 200 Areas at the Hanford Site. A summary chart that pictorially shows the volume and major waste type in each DST is reproduced from the latest monthly status report and is shown in Figure 1.

As may be seen in Figure 1, the DSTs contain waste from a variety of sources. An accurate inventory of the source of each waste addition and the volume of each addition to the DSTs has been maintained since 1980. A breakdown of the waste content for each DST was prepared in 1990 and is shown in Table 3 (Shaver, 1990). A few changes have been made to source data shown in Table 3

and these are incorporated in the computer records from which Figure 1 is generated. The major changes are annotated in the margins in Table 3 to show current status. At the time of this report preparation, the current 242-A Evaporator campaign is in the process of evaporating the waste contained in Tanks 101-, 107- and 108-AP. It is planned to have this table updated after current higher priority work is completed. As may be seen from Table 3 a considerable wealth of information exists on the waste sources in the DSTs. As will be seen later, a less exact data base exists for the SSTs. The compositions of the major waste sources in the DSTs are presented in the next section.

Figure 1 and Table 3 contain a large quantity of acronyms and abbreviations in order to consolidate the information. A glossary of terms is given in Table 4 for use in interpreting the information.

3.2.2 Double-Shell Tank Compositions by Chemical Constituents

A summary table of the chemical inventory of the major waste types found in the DSTs is given in Table 5. This table shows the inventory, for both liquid and solid forms of waste, for NCAW, DSS/DSSF, NCRW, PFP, and CC waste types (See Table 4 for definitions of waste types).

An extensive data base of the chemical and radiochemical components in each double shell tank has been compiled (Shelton, 1994). These data are presented in Tables 6-11. The data base has been divided into two tables for each tank, the first table containing the liquid phase inventories, and the second table containing the solid phase inventories. Blank columns, particularly for the solid phase, generally mean that this phase does not exist.

The data are based on a combination of sample data on samples removed from the tanks and on analysis/process knowledge of the streams added to the tanks. An extensive inventory of the radionuclide and chemical concentrations in the double shell tanks based upon the results of laboratory analyses of the most recent tank samples has been published (Van Vleet, 1993).

3.3 Single-Shell Tank Compositions

Radioactive wastes added to the SSTs originated from a variety of sources and their compositions and physical properties were modified in many cases by subsequent retrieval and treatment operations. Thus, the compositions now existing in the SSTs are varied, non homogeneous, and not completely characterized. Numerous efforts have been completed during past years to characterize and compile the composition of the waste in the SSTs. The sources and compositions of these wastes are briefly described below. For more complete descriptions the reader is referred to the references (Jones, 1994; Gaddis, 1994a; Gaddis, 1994b; Agnew, 1994;).

3.3.1 Single-Shell Tank Compositions by Source

The majority of the waste in the SSTs originated from the dissolution of nuclear reactor fuel elements to recover uranium and plutonium. The first recovery process from fuel elements used at Hanford was the Bismuth Phosphate Process. This process was performed in the B-Plant (1945-1952) and the T-Plant (1944-1956). The wastes from the B-Plant were discharged to the B, BX, and BY tank farms while the wastes from the T-Plant were discharged to the T, TX, and TY tank farms (Agnew, 1994). The bismuth phosphate process was a multi-step process consisting of cladding dissolution, uranium metal dissolution, plutonium extraction on a bismuth phosphate precipitate, and several oxidation, reduction, precipitation and redissolution steps. Nineteen different chemical compounds have been reported to have been used in the process (Jones, 1994). The wastes were neutralized with sodium hydroxide and sodium carbonate before disposal to the SSTs. The SSTs were operated in a series of three tanks in a cascade with the waste cascading from the first, then to the second, then to a third tank with the solids precipitating in each tank and the clarified liquids overflowing the last tank to a crib. Three major waste streams were generated: the metal waste containing most of the uranium and considerable fission products, and the first cycle and second cycle decontamination waste containing the remainder of the fission products. Cladding waste from fuel element cladding dissolution, was included in the second cycle decontamination waste from 1945-1950, and was included in the first cycle decontamination waste from 1951-1956 (Agnew, 1993).

The rather inefficient bismuth phosphate process was replaced by a more efficient method known as the REDOX process. This process was performed in the Redox or S-Plant from 1952 to 1966. The REDOX process extracted the plutonium and uranium from the declad and dissolved fuel element solutions in an aqueous aluminum nitrate/sodium dichromate solution in a column using hexone (methyl isobutyl ketone). The plutonium and uranium were separated in two subsequent stripping columns using ferrous sulfate to strip plutonium and nitric acid to strip uranium. The stripped constituents were then processed in additional purification steps. The neutralized waste from the REDOX process were placed in tanks in the S, SX and U tank farms. The major waste streams were the coating (cladding) waste and the neutralized extraction column waste.

Both the bismuth phosphate process and REDOX process were replaced with the PUREX liquid-liquid extraction process, a much improved organic solvent extraction based on a mixture of NPH (normal paraffinic hydrocarbon or kerosene) and TBP (Tri-butyl phosphate) contacting an aqueous nitric acid solution. The PUREX process was performed in the Hot Semiworks (C Plant) in the early 1950s and in the PUREX Plant (1956-1972 and 1983-1988). Seventeen distinct waste types have been identified from the PUREX campaign from 1956 to 1972 (Agnew, 1994). The three primary waste streams were the cladding removal waste stream, the PUREX high level waste stream, and the organic wash waste stream. The neutralized waste, including later strontium recovery waste, primarily was placed in tanks in the A, AX, C, SY, AN, and AY tank farms.

Numerous minor waste sources are included in the tank waste inventories including wastes from the UO₃ Plant, PFP (Z Plant), Strontium Semiworks, B

Plant, reactor area wastes, T-Plant decontamination wastes, and laboratory wastes.

In addition, the wastes in the tanks have been subjected to major physical transformation processes such as evaporation, precipitation, transfers to other tanks, and retrieval for additional processing. Major evaporation operations were carried out in the 242-B, 242-T, 242-S, 242-A evaporators and by self evaporation in some of the tanks.

The solids formed in the tanks were accumulated in the tanks but in many cases the supernate was disposed to the ground. All of these operations make it very difficult to definitively quantify the type of waste in the SSTs. In addition to the evaporation operations which changed waste characteristic another past major process was the sluicing of the bismuth phosphate metal waste, which contained most of the uranium from the dissolved fuel, to the U-Plant for uranium recovery. The sluicing operation was not always complete and heels remained. The uranium recovery process generated much more waste volume than was originally present. This resulted in adoption of ferrocyanide precipitation of cesium with the solids retained in the tanks and supernate released to cribs. Selected tanks in BX, BY, C, T, TX, and TY farms contain ferrocyanide wastes.

3.3.2 Single-Shell Tank Compositions by Chemical Constituents

There have been a number of key reports describing the compositions of wastes in the Hanford Single-Shell Tanks. Three major methods of establishing waste compositions have been used: Knowledge of Process, Chemicals Used and Waste Volumes Produced, and Analysis of Characteristic Waste. One of the first of these key reports was by Allen (Allen, 1976). Allen estimated the total chemicals used in each of several waste types, and derived sludge compositions for various waste types. He assumed that the insoluble components in each waste type ended up in the tank sludge. Allen also presented analytical data for a series of tanks with sludge, and data for salt cake compositions produced by 242-S and in-tank solidification.

Anderson, in 1979, published a report that updated and expanded the information on waste types, but more importantly tracked the waste volumes of each waste addition to each tank over time, providing a historical trace of a tank's fill history. He updated his report in 1990 (Anderson, 1990).

Jungfleisch developed an elaborate computer program using a similar tank fill strategy as Anderson known as TRAC (Jungfleisch, 1984). In addition, Jungfleisch expanded the waste types by adding several waste streams not used by previous workers. The TRAC computer program/data base is an extensive compilation of the chemical data derived from operating data where known types of waste and volumes were input from historic records. The computer program calculates the amounts of chemicals precipitated within the tanks in order to estimate the composition of the sludge and salt components. Very little actual

sample data are available to verify the TRAC program calculated compositions but a current program to obtain sample data is in place.

The TRAC (acronym for Tracks Radioactive Components) program provides estimates of 30 chemical components and 60 radioactive components by tank location. The program incorporates calculations of radionuclides from nine Hanford production reactors using ten fuel types and two types of cladding. The program incorporates the chemistry of the bismuth phosphate, uranium recovery, REDOX, PUREX, Z-Plant Chemical Processes and Fission Product Recovery Processes into the calculations. It also considers the complex intermingling of wastes, cascade process for waste handling, twenty six primary distinct waste streams, and rework/recovery processes.

A summary table of the maximum concentrations of chemicals expected in the SSTs is given in Table 13 (Walter, 1993); the data are primarily derived from the TRAC computer model for Hanford tank waste inventories (Jungfleisch, 1984). This table shows the maximum expected chemical concentration, in moles/liter, for each SST tank farm.

Lucas further expanded the data base by adding the compositions of many additional waste streams to those of previous workers (Lucas, 1989). Many of the compositions were based on analytical results in contrast to flowsheet or chemicals-used information previously used.

Hanlon publishes a status report of all Hanford underground waste storage tanks that includes pertinent chemistry information such as volumes of sludge, saltcake, and supernate in each tank and major waste type (Hanlon, 1994). A schedule is shown for when sampling for chemical analyses is to be conducted for each of the tanks for additional data.

Currently, an extensive effort is underway to conduct a historical waste characterization of the radioactive mixed waste on a tank-by-tank basis in the SST underground storage tanks (Gaddis, 1994c). A team is producing the four-part Historical Tank Content Estimation Report. The team is composed of members from ICF Kaiser Hanford Company, Los Alamos National Laboratory, and Westinghouse Hanford Company. The reports for the Northeast Quadrant of the 200-E Area (Tank farms A, AX, B, BX, and C) and for the Southwest Quadrant of the 200-W Area (Tank farms S, SX, and U) have been completed and the remaining two reports are planned to be issued by March 1995 (Gaddis, 1994a, 1994b, 1994c). ICF Kaiser assembled information on tank-level histories, waste temperature, waste sampling, in-tank photos, surface levels, drywell information, riser locations, and tank configuration and construction (Gaddis, 1994c). Los Alamos concentrated on waste transfers, tank layering and the in-depth chemical and radiological analysis of the process waste (Gaddis, 1994c, Agnew 1994). A supporting document for each tank farm is being prepared. These provide in-depth data and graphs as well as the actual data used in generating the report (Gaddis, 1994c). Reports for the A, AX, B, BX, C, S, SX, and U Tank Farms have been issued (Gaddis, 1994c).

As discussed below under the topic of DST/SST waste tank retrieval sequence, the majority of the wastes that will enter the MWTF tanks will originate from 101-SY and 103-SY DSTs and from the TX, U, SX, and BY SST farms. While TRAC data are available for the single shell tanks, it has some limitations. The best data are those data being assembled in the effort described by Gaddis (Gaddis, 1994c), but these are not yet complete. The data for the U and SX tank farms are available, however, and these are reproduced in Tables 14-22 for the three tanks from SX farm and the six tanks from U farm destined to enter the MWTF tanks. These data may be considered as being partially representative of the SST waste compositions to be processed in the MWTF tanks. The TRAC data for the TX and BY farms in Table 13 also should be used for MWTF projections until the Gaddis data become available.

3.4 Planned Operations for MWTF Tanks

The retrieval sequences for the Hanford high-level waste tanks reflecting current commitments of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) and technical strategies for the Tank Waste Remediation System have been prepared and published (Williams, 1994). These sequences support remediation of the flammable gas tanks 101-SY and 103-SY and other watchlist tanks, as well as retrieval of wastes from the tanks for processing in accordance with the Tank Waste Remediation System Functions and Requirements (DOE, 1994).

The six MWTF double-shell underground high-level waste storage tanks will be utilized for a variety of storage missions as defined in the above retrieval sequence document. A summary of these missions is shown graphically in Figures 2-7. These figures show the planned fill/drain cycles for the MWTF tanks only through the years 2010-2012 for simplicity in presenting the information; actual cycles through the years 2018-2024 have been defined (Williams, 1994).

Each figure shows the waste volume contained in each MWTF tank as a function of time and indicates the source of the waste. As an example, Figure 2, showing the planned mission for Tank 241-SN-101, a tank located in the 200-W Area, shows several fill and drain cycles between the years 1998 and 2010. The first fill cycle consists of an addition to Tank 101-SN of 110,000 gallons of waste from Tank 241-SY-101, followed by another addition to Tank 101-SN of a mixture of 220,000 gallons of waste and 220,000 gallons of dilution water from Tank 101-SY, and finally by another addition of a mixture of 220,000 gallons of waste and 220,000 gallons of dilution water from Tank 101-SY. These additions are shown in the figure with arrows at the left vertical line for each cycle with the labels showing the volume of waste in thousands and the source of the waste. The dilution water addition for this sequence may be different from the manner of addition described below in Section 3.5 for SST retrieval operations because it may be possible to add the dilution water directly to the in-tank discharge line since the mixer pump eliminates the necessity of sluicing this tank. The labelled arrows at the top of the chart show the total volume in thousands of gallons and the source of each type of waste at the time the tank is filled. As soon as Tank 101-SN is filled, the

waste is shown graphically in the figure to be transferred to one of the new MWTF tanks in 200-E Area. The tank to which the transfer is made is Tank 241-HN-101, and is labelled on the Figure as Tank MWT1E, a shorthand for 242-HN-101.

The second fill cycle for 101-SN is shown as a continuous one-step fill operation with 500,000 gallons of waste and 500,000 gallons of dilution water being transferred from 101-SY to 101-SN. As soon as 101-SN is filled the waste is then transferred to the second new MWTF tank in the 200-E Area, Tank 241-HN-102. The third fill cycle for 101-SN is similar to the second fill cycle, except for this cycle the waste remains in Tank 101-SN over six years until the new Pretreatment Plant comes on line.

Subsequent planned fill and drain cycles for Tank 101-SN are somewhat different than the first three cycles. The subsequent cycles consist of adding dilution water to accumulation tanks in a new Retrieval Annex, using this water to sluice the tank solids, and pumping the sluiced waste to a DST as described in Section 3.5. For the waste that goes to the MWTF 101-SN tank, the labelled arrows at the bottom of charts shows the waste being transferred to several other tanks in the new 200-E Area MWTF tanks (HN Farm) and the 241-AN Tank farm. The fill and drain cycles for Tank 102-SN are shown graphically in Figure 3 to be very similar to those shown in Figure 2 for Tank 101-SN, except that some of the waste will originate from the 241-U Tank Farm as well as the 241-TX Tank Farm.

The fill and drain cycles for the first three MWTF tanks in the 200-E Area, HN-101, -102, and -103, are all very similar. Each tank will receive waste from various tanks in the 200-W Area, store the waste for varying time periods and then transfer the waste to the new Pretreatment Plant for cesium removal. In some cases the sequence of transfer goes through, or originates from, several tanks; for these cases the figures show just the tank the waste originates from and the last tank in which the waste is contained before it is transferred to the 241-HN tank farm.

The fill and drain cycles for the fourth MWTF tank in 200-E Area, 241-HN-104, do not start until the year 2005. Up till then, the tank will be held in reserve as a destination for emergency use such as a location to route waste from other leaking tanks. The planned use for 104-HN is to receive and store the concentrated bottoms from an evaporator. The evaporator will evaporate dilute waste and sludge wash liquids from various tanks as shown in Figure 7. The concentrated waste will be transferred from Tank 104-HN to the Low Level Waste Vitrification Plant, identified on the figure by the abbreviation LLWV.

3.5 Application of Chemistry Compositions and Planned Operation to MWTF

The chemistry of the DST and SST tank contents that are slated to be transferred to the MWTF tanks was described above in Section 3.2. The sequencing of which tank contents will enter the MWTF tanks was discussed in Section 3.3. This section discusses the methods planned for retrieving the

waste from the existing tanks, the planned sludge washing of the solids that are not dissolved during retrieval, and the chemistry of these operations as it affects the MWTF tanks.

The Tank Waste Remediation System (TWRS) was established in December 1991, when the Secretary of Energy recognized the need to better manage the tank waste management activities at the Hanford Site (DOE, 1994). In 1992, Systems Engineering was adopted as the paradigm for development and management of the TWRS program (DOE, 1994). The Systems Engineering process is a sequence of activities that transforms an identified mission into a description of system performance parameters and a preferred system configuration. The TWRS mission is to dispose of Hanford's DST and SST wastes. The top four levels of functions, requirements, and architectural concepts necessary to accomplish the TWRS mission have been completed (DOE, 1994). The methods and processes for the characterization, retrieval, pretreatment, immobilization and disposal of Hanford's tank waste are described by Orme in the Tank Waste Remediation System (TWRS) flowsheet (Orme, 1994). The processes for retrieval and sludge washing described in this flowsheet are summarized below in respect to how these processes will affect MWTF tank operation.

3.5.1 TWRS Flowsheet Retrieval Process

The retrieval process consists of the following facilities and operations as described in the TWRS flowsheet (Orme, 1994, p.39):

"Retrieval Annexes will be provided near the tank farms with each annex capable of supporting one or two tank farms with one sluicing operation in each farm. Two sluicing operations in the same tank farm generally cannot be supported unless additional transfer lines to that farm are provided. Each Retrieval Annex has three 20,000 gallon accumulation tanks. Sluicing liquid is pumped from the tanks while sluiced waste is simultaneously received. Feed to the sluice nozzle is pumped directly from the accumulation tank at rates that can exceed 300 gal/min. Accumulation tanks are prepared for sluicing by transferring the proper water volume for a new sluicing cycle. Water pumped from the accumulation tank to the sluice nozzle is directed through jet action or hydraulic gradient to the inlet of the slurry transfer pump. The pump carries the waste from the sluiced tank to the accumulation tank. The accumulation tank is agitated to aid in further dissolution of the soluble wastes and keep the undissolved solids in suspension. Large particles and debris are screened from the system at the pump inlets. The recirculation of the sluice solution continues until the prescribed solids concentration and/or a 5 M sodium solution is reached. When the accumulation tank reaches a limit condition, the slurry returning from the tank being sluiced is diverted to a newly prepared accumulation tank and feed to the sluice nozzle is switched to originate from the same tank. The "full" accumulation tank is agitated, sampled, and may be conditioned further to satisfy transfer requirements. It may be diluted further and agitated, heated, etc. to encourage further dissolution and particle size reduction. Any debris or tramp material mixed with the waste will be separated through settling and screening and removed as

solid, mixed waste. The conditioned waste stream is then pumped to the Waste Staging and Sampling Facility or directly to separations facilities."

The SST waste will be retrieved into DSTs (Orme, 1994, p.13). The DST system provides lag storage for feed to pretreatment operations. In the 200-W Area, this storage is provided in the SY Tank Farm and in the two new DSTs of the Multi-Function Waste Facility Project (W-236A) (Orme, 1994, p.13). In the 200-E Area, the AN, the AW or the HN (MWF) tank farms are designated for receiving retrieved waste, and performing the initial steps of in-tank pretreatment.

Note that the sluicing operation is specific for the SSTs. DSTs are retrieved by first mobilizing the sludge with mixer pumps (Orme, 1994, p.40). Once mobilized, the slurries are transferred with the same kind of transfer pumps used for other inter-tank transfers. The retrieved volume of waste is 595×10^6 L (157×10^6 gal) of nominal 5M Na solution carrying 17,200 MT of undissolved solids (Orme, 1994, p.11).

Waste retrieval utilizes primarily recycled water that has been treated in the 242A/PUREX Condensate Treatment Facility, and bulk water from site services. Minor amounts of chemicals may be required in the unlikely event that retrieved waste does not contain enough hydroxide or nitrite for corrosion control (Orme, 1994, p.76).

3.5.2 TWRS Flowsheet Sludge Washing Process

The solids in the retrieved waste will be settled from the waste and the supernate decanted. The solids will be leached with concentrated NaOH, and then washed with a dilute caustic solution (Orme, 1994, p.13). This process is called enhanced sludge washing, or pretreat in-tank, in the flowsheet. Enhanced sludge washing takes advantage of the amphoteric property of certain waste components, $\text{Al}(\text{OH})_3$ and $\text{Cr}(\text{OH})_3$, to leach them from the solids. It also exploits the relative solubility of certain compounds to metathesize PO_4^{3-} from the solids. The enhanced sludge washing process reduces 17,200 MT of solids to 12,000 MT of washed solids (Orme, 1994, p.14).

Enhanced sludge washing (ESW) consists of the initial wash with retrieval solution, followed by at least one wash with concentrated caustic leaching solution, followed by dilute caustic washing to minimize the soluble metals carried in the interstitial liquid (Orme, 1994, p.30). The first leach/metathesis wash is made by adding water and caustic to result in a 3 M NaOH solution; the slurry is 8 wt% solids. Agitation with mixer pumps heats the slurry as required. A second leach/metathesis wash may be required but is not assumed for the purposes of this flowsheet. The leach/metathesis wash is followed by three dilute caustic washes to minimize carryover of dissolved metals with the interstitial liquor (Orme, 1994, p.32).

All wash solutions have an initial composition compatible with DST material of construction. The essential materials for in-tank pretreatment are NaOH and

NaNO₂ for leaching and corrosion control, and flocculating agents to accelerate solids settling, if required (Orme, 1994, p.76). The combined volume of decanted supernatant and wash solutions (i.e. Streams 7, 16, 23, 46 and 53 on Sheet 1 of the flowsheet) is 873 M L (250 Mgal) (Orme, 1994, p.32). Decanted supernatant and wash waters are evaporated to a nominal 7 M Na solution to prepare as feed for ion exchange (Orme, 1994, p.33). (Note that the concentrates are designated to be received by MWTF Tank 241-HN-104 as described in Section 3.4).

3.5.3 Projected MWTF Feed Solution Compatibility with MWTF Tanks

One of the primary boundaries imposed on selection of carbon steel for the MWTF tank material of construction was that the composition of the waste in the tank must meet Hanford specifications for corrosion control identified in Operating Specification ODS-T-151-00007 (Fritz, 1994; Carlos, 1994a). Testing has shown that if the chemistry of the tanks is maintained within the limits of these specifications, uniform corrosion rates of the carbon steel tank material is generally less than 0.4 mils/year, and both stress corrosion cracking and pitting do not occur (Divine, 1985; Ondrejcin, 1979). The chemistry limits from the Operating Specification are listed in Table 2.

The initial mission of the new MWTF tanks will be to store waste from the flammable watch list tank 101-SY. The composition of this tank, as listed in Table 11, meets the chemistry specification, and should continue to meet the specification even after dilution for transfer to the MWTF tanks. If, for some reason, the chemistry is not within Hanford specifications, the MWTF facility will have the capability to add and mix chemicals to restore the specification. The current retrieval sequence, in Figures 2-7, show a dilution ratio of 3:1, which utilizes three MWTF tanks. Should it later be determined that a smaller dilution ratio can be used, the tanks would still be utilized for storing watch list tank wastes and other lower-priority watchlist tanks would be selected. Since these are also DSTs, the waste would be expected to meet current DST chemistry requirements.

Following the initial period of storing watchlist tank contents, five of the six MWTF tanks will be utilized for retrieval of SST tank wastes, mainly from TX, U, SX, and BY tank farms, as discussed above in Sections 3.3.2 and 3.4. The other MWTF tank will be utilized for receiving evaporator bottoms waste. While the tank sequencing curves in Figures 2-7 show that dilution water will be added to the MWTF tanks for simplicity, the actual details of the retrieval operation as discussed in Section 3.5.1 indicate that the dilute sluicing water will enter the accumulation tanks built for the retrieval operation (Orme, 1994). The recirculation of the sludge solution continues until the prescribed solids concentration and/or a 5 M sodium solution is reached. When the accumulation tank reaches a limit condition, the slurry returning from the tank being sluiced is diverted to a newly prepared accumulation tank and feed to the sluice nozzle is switched to originate from the same tank. The "full" accumulation tank is agitated, sampled, and may be conditioned further to

satisfy transfer requirements (Orme, 1994). Thus, the waste that would enter the MWTF tanks would be fully within the TWRS chemistry specification.

The role of the MWTF tanks in sludge washing is not as clear as for the storage of watch list tank contents and SST retrieval. As discussed above for sludge washing in Section 3.5.2, the solids in the retrieved waste will be settled from the waste and the supernate decanted. The solids will be leached with concentrated NaOH, and then washed with a dilute caustic solution (Orme, 1994, p.13). This process is planned to be performed in tanks other than the MWTF tanks, but since the MWTF tanks will receive retrieved waste, there is bound to be sludge present. The initial selection of SST tanks for retrieval into the MWTF tanks selects tanks with high salt cake content and small sludge content so that the amount of sludge entering the MWTF tanks would be minimal. The current flowsheet (Sheets 0 and 1) show the SST retrieved waste going to a DST storage tank (Stream 28) which presumably includes the MWTF tanks, and then going to another DST (Stream 1) to initiate the sludge washing sequence (Orme, 1994). The retrieval sequences in Figures 2-7 show the MWTF waste going directly to the Pretreatment Plant without going to intermediate sludge washing tanks, but in accordance with the TWRS flowsheet this would really be to the sludge washing tanks. This step is not in the current retrieval sequencing scheme, however. With this scenario, the chemistry in the MWTF tanks is the same as described in the above paragraph and would meet TWRS chemistry specifications. Thus, the uniform corrosion, pitting corrosion, and stress corrosion cracking would be controlled. There is one corrosion consideration that has not been previously mentioned, that of erosion-corrosion, that will occur in tanks with mixer pumps due to the sludge impinging on the tank surfaces and causing accelerated corrosion. The MWTF tanks have an erosion-corrosion allowance designed into the tank wall thickness whereas the other DST tanks selected for sludge washing do not; this could make the MWTF tanks a more desirable location for sludge washing than the existing tanks. Further, the MWTF tank material specification provides that the steel shall be within the upper portion of the allowable chromium concentration in order to further enhance erosion-corrosion resistance. Should the MWTF tanks ever be selected for sludge washing in the future based on their erosion-corrosion allowance and chromium content, the following discussion on dilute solutions would be applicable.

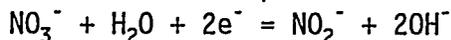
For the less likely mode of operation of sending the retrieved waste directly to the Pretreatment Plant from the MWTF tanks, and accumulating the solids in the MWTF tanks for later pumping to the sludge washing tanks, there is a possibility that dilute solutions would be used for the transfer. While the dilute solutions are proposed to be adjusted in chemistry to meet the current minimum TWRS chemistry requirements (0.01 M Hydroxide, 0.011 M Nitrite for Nitrate < 1 M), there are data available to indicate that accelerated pitting and stress corrosion cracking could occur in this chemistry. These data would also be of concern for the tanks where dedicated sludge washing is planned.

Recent corrosion testing to support the Hanford sludge washing program showed that pitting did not occur on the exposed surfaces of steel in a statistically

designed waste composition study but crevice corrosion did occur in the following two solution compositions (Danielson, 1994):

0.025 M nitrite, 0.393 M nitrate, 0.026 M hydroxide
0.10 M nitrite, 1.00 M nitrate, 0.10 M hydroxide

While pitting did not occur, the presence of crevice corrosion indicates that pitting may occur. Even more significant, slow strain rate testing showed that the carbon steel was subject to stress corrosion cracking in each of these solutions. It should be noted that the nitrite and hydroxide are within the TWRS chemistry specification where immunity from SCC is predicted; therefore the specification does not correctly protect the tanks from SCC in this chemistry regime. Danielson and Bunnell make the point that the nitrate to nitrite ratios are greater than 10 in these two solutions and that if the nitrite was increased SCC immunity may be achieved. However, the author of this report notes that in two other solutions in the Danielson report the ratios also exceed 10, but in these other solutions the hydroxide was also much higher. It is suggested that the proper ratio be the ratio of nitrate to the sum of the hydroxide (or hydroxide squared) and nitrite and that the TWRS chemistry specification be changed to reflect this ratio. The basis for this recommendations is the supposition that the stress corrosion cracking cathodic reaction is controlled by the following chemical reaction



and that the presence of sufficient reactants (nitrite and hydroxide) will stop the cathodic reaction.

Danielson and Bunnell also reported that pitting occurred in the vapor phase of 14 of the 16 test solutions (Danielson, 1994). Most of the pitting was incipient, but a few cases of deep pitting were found. The worst pit penetrated the metal to 20 mils after six months exposure, or a rate of 40 mils/year. Methods of controlling the vapor phase pitting in the MWTF tanks are described by Larrick (Larrick, 1994). The preferred methods included installation of a drip ring and providing for ammonia inhibitor additions.

While the above susceptibility to pitting and stress corrosion cracking information is presented in this report in support of the MWTF tanks, the problem could occur in any Hanford carbon steel tank selected to operate with dilute solutions and the proper precautions must be taken. Currently, work is underway to further define the regimes where these corrosion mechanisms can occur in dilute solutions.

Savannah River personnel have studied pitting in dilute In-Tank Precipitation (ITP) solutions, solutions similar to those that would be found during sludge washing (Zapp, 1994). In uninhibited solutions, A537 carbon steel pitted according to the following equation, with the deepest pit being 18.4 mils in 29 days:

Penetration in mm = $8.35T^{0.46}$ with T in years.

With this equation, penetration of a 0.5-in thick steel plate would occur in about 2.5 years. Pitting, in contrast to SCC, was found to be inhibited by only nitrite (hydroxide had no influence as in SCC) with the amount of nitrite required to be according to the equation:

Required Nitrite $\geq 0.038 \cdot \text{NO}_3^- \cdot 10^{0.041T}$ with T in °C

Other work at Savannah River determined the amount of nitrite to inhibit pitting corrosion in ITP solutions in the presence of chlorides and sulfates according to the following equations (Wiersma, 1994):

For $\text{NO}_3 < 1.0 \text{ M}$ and $\text{OH} < 1.0 \text{ M}$

$$\text{NO}_2 = 0.11 \cdot \text{NO}_3^{0.72} \cdot 10^{0.02T}$$

For $\text{NO}_3 < 1.0 \text{ M}$ and $\text{OH} < 1.0 \text{ M}$ and $\text{Cl} > 0.04\text{NO}_3$

$$\text{NO}_2 = 1.5 \cdot 10^{(1.35 + 1.03 \log(\text{Cl}))} \cdot 10^{0.02(T-40)}$$

For $\text{NO}_3 < 1.0 \text{ M}$ and $\text{OH} < 1.0 \text{ M}$ and $\text{SO}_4 > 0.4\text{NO}_3$

$$\text{NO}_2 = 1.5 \cdot 10^{(-0.22 + 0.61 \log(\text{SO}_4))} \cdot 10^{(0.02(T-40))}$$

During sludge washing, the concentrations of all the important chemical constituents in corrosion control varies with the washing time and volumes. Thus it is important to have good sampling and chemical analysis capability in order to control the compositions on a real-time basis within the acceptable corrosion control ranges discussed above.

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5.0 TABLES

Table 1
FDC Chemical Compositions (Groth, 1994)

Chemical Compositional Range (1)							
Retrieved Waste							
Species	DST		SST.		HWVP		IPM
	Anion/Cation		Anion/Cation		Anion/Cation		
	min mol/L	max mol/L	min mol/L	max mol/L	min mol/L	max mol/L	
Ag	0	0.0013					
Al	0.05	1.1	0.029	0.5	0.01	0.51	
As	0	0.0066					
B	0	0.013					
Ba	0	0.0004	0	0.0014	0	0.13	
Bi			0	0.076			
Ca	0.0014	0.1	0	0.17	0	0.35	
Cd	0	0.0074	0	0.0007	0	0.077	
Cr	0.0067	0.28	0.0001	0.091	0	0.026	
Cu	0	0.02					
Fe	0.0004	0.26	0.0057	0.89	0.025	0.75	
Hg	0	2.80E-05	0	0.0001			
K	0.044	0.55	0.0002	0.0095			
La,Nd	0	0.0066	0	0.001	0	0.049	
Mg	0.0004	0.046					
Mn	0.0003	0.16	0.0009	0.41	0	0.23	
Mo	0	0.0029			0	0.055	
Na	1.6	10.7	1.6	7.1	0.037	0.71	
Ni	0.0002	0.008	0	0.042	0	0.11	
Pb	0	0.004	0	0.12			
Pd,Rh	0	0.0063			0	0.005	
Si (SiO2)	0.0024	0.028	0.0004	0.46	0	0.29	
Ti	0	0.002			0	0.05	
U	0	0.0092			0	0.11	
Zr (ZrO2)	0	0.3	0	0.065	0	0.32	
Acetate			0	0.0055			
Citrate	0	0.03	0.0042	0.06			
Oxalate							0.34
Formate							0.34
EDTA	0	0.016	0	0.011			
HEDTA	0	0.021					
Fe(CN)6			0	0.025			
Cl	0.003	0.17	0	0.022	0	0.008	
CO3	0.03	0.69	0.014	0.38	0.01	0.5	2.7
F	0.014	1	0.001	0.71	0	0.36	
Fission Prod.	0	0.0001			0	0.037	
NO2	0.1	1.8	0.0086	0.83			1
NOx (NO3)	0.15	3.6	0.64	5.1	0	0.58	4.7
OH	0.24	4.4	0.25	6.9			6.9
PO4	0	0.4	0.0007	3.8	0	0.056	
SO4	0.003	0.16	0.01	0.22	0	0.025	
TOC	0	2			0	0.912	2.1

(1) Chemical Concentrations based on Internal Memo #22170-93-012

Table 2
TWRS Tank Chemistry Specifications

Normal Operating Temperatures (T < 212 °F)

<u>Variable</u>	<u>Specification Limit</u>
For $\text{NO}_3^- \leq 1.0\text{M}$:	
OH^-	$0.010\text{M} \leq \text{OH}^- \leq 5.0\text{M}$
NO^-	$0.011\text{M} \leq \text{NO}^- \leq 5.5\text{M}$
(for solutions below 167 °F, the OH^- limit is 8.0M)	
For $1.0\text{M} \leq \text{NO}_3^- \leq 3.0\text{M}$:	
OH^-	$0.1(\text{NO}_3^- \text{ Concentration}) \leq \text{OH}^- \leq 10\text{M}$
$\text{OH}^- + \text{NO}^-$	$\geq 0.4(\text{NO}_3^- \text{ Concentration})$
For $\text{NO}_3^- > 3.0\text{M}$:	
OH^-	$0.3\text{M} \leq \text{OH}^- \leq 10\text{M}$
$\text{OH}^- + \text{NO}^-$	$\geq 1.2\text{M}$
NO_3^-	$\leq 5.5\text{M}$

For High Operating Temperatures (T > 212 °F)

Normal operating temperature limits apply with the exception that OH^- concentration must be < 4M.

Special limits may apply for Tanks 102-AP, 104-AP and 106-AP.

Table 3
Waste Type in Double Shell Tanks (Shaver, 1990)

(Page 1 of 6)

<u>TANK</u>	<u>WASTE SOURCE</u>	<u>VOLUME and WASTE TYPE</u>
Tank 101-AY: (dilute)	B Plant complexed waste:	451 Kgal DC
	Water:	390 Kgal DN
	Salt Well Liquid (SWL):	30 Kgal DN
	Pre 1980 Complexed Concentrate:	<u>26 Kgal CC</u>
	Total Tank Volume:	897 Kgal DC
Tank 102-AY (dilute)	Water:	257 Kgal DN
	B Plant Non-Complexed waste:	471 Kgal DN
	T Plant Waste:	69 Kgal DN
	100 N Sulfate Waste:	28 Kgal DN
	300-400 Area Waste:	64 Kgal DN
	Plutonium Finishing Plant (PFP):	14 Kgal DN
	S Plant:	<u>35 Kgal DN</u>
Total Tank Volume:	938 Kgal DN	
Tank 101-AZ (concentrated)	Aging Waste:	791 Kgal AW
	Water:	<u>191 Kgal DN</u>
	Total Tank Volume:	982 Kgal AW
Tank 102-AZ (dilute)	Water:	544 Kgal DN
	Aging Waste:	<u>411 Kgal AW</u>
	Total Tank Volume:	955 Kgal AW
Tank 101-SY (concentrated)	Nov '77 Complexed (Concentrate):	365 Kgal CC
	DSS made in 4-77:	275 Kgal DSS
	DSS made in 11-80:	231 Kgal DSS
	Slurry Growth:	74 Kgal
	Single-Shell Tank 106-SX:	132 Kgal CC
	Single-Shell Tank 111-U:	<u>59 Kgal CC</u>
Total Tank Volume:	1136 Kgal CC	
Tank 102-SY (dilute)	T Plant:	238 Kgal DN
	PFP Supernate:	122 Kgal DN
	S Plant:	70 Kgal DN
	Water:	109 Kgal DN
	TRU Solids from PFP, T, S Plants:	<u>102 Kgal PT</u>
	Total Tank Volume:	641 Kgal DN/PT
Tank 103-SY (concentrated)	Pre 1980 Complexed Waste:	126 Kgal CC
	DSS made in 11-80:	361 Kgal DSS
	Uranium sludge:	55 Kgal CC
	Complexed Salt-well liquid:	<u>206 Kgal CC</u>
	Total Tank Volume:	748 Kgal CC

Table 3 (Cont.)
Waste Type in Double Shell Tanks (Shaver, 1990)

(Page 2 of 6)

<u>TANK</u>	<u>WASTE SOURCE</u>	<u>VOLUME and WASTE TYPE</u>
Tank 101-AW (concentrate)	PUREX Miscellaneous Waste:	298 Kgal DN
	Water:	73 Kgal DN
	PUREX NCRW Supernate:	146 Kgal DN
	B Plant Waste:	102 Kgal DN
	Salt Well Liquid:	66 Kgal DN
	Pre 1980 DN:	64 Kgal DN
	T Plant:	46 Kgal DN
	100 N Area Sulfate Waste:	47 Kgal DN
	PFM Supernate:	28 Kgal DN
	300-400 Area Waste:	15 Kgal DN
	Fuels Fabrication Waste:	16 Kgal DN
	DP and pre 1980 CP Waste:	15 Kgal DP
	S Plant:	6 Kgal DN
	Pre 1980 CP:	3 Kgal CP
	Total Tank Volume:	1125 Kgal DSSF
Tank 102-AW* (concentrated)	Water:	428 Kgal DN
	PUREX Miscellaneous Waste:	218 Kgal DN
	PUREX NCRW Supernate:	92 Kgal DN
	PUREX ASF:	85 Kgal DN
	B Plant Waste:	84 Kgal DN
	T Plant:	27 Kgal DN
	100 N Area Sulfate Waste:	26 Kgal DN
	PFM Supernate:	16 Kgal DN
	Salt Well Liquid:	16 Kgal DN
	300-400 Area Waste:	12 Kgal DN
	Fuels Fabrication Waste:	10 Kgal DN
	Pre 1980 DN:	9 Kgal DN
	DP Waste:	2 Kgal DP
	S Plant:	3 Kgal DN
	Pre 1980 CC:	1 Kgal CC
Total Tank Volume:	1029 Kgal DN	
Tank 103-AW (dilute)	PUREX NCRW Supernate:	128 Kgal DN
	Water:	34 Kgal DN
	NCRW Solids:	487 Kgal PD
	Total Tank Volume:	649 Kgal DN/PD
Tank 104-AW (dilute)	PUREX Miscellaneous Waste:	821 Kgal DN
	Water:	40 Kgal DN
	Pre 1980 Miscellaneous Solids:	267 Kgal DN
	Total Tank Volume:	1128 Kgal DN
Tank 105-AW (dilute)	PUREX NCRW Supernate:	514 Kgal DN
	NCRW Solids:	388 Kgal PD
	Total Tank Volume:	902 Kgal DN/PD

*Evaporated to DSSF, 4-15-94 to 6-15-94

Table 3 (Cont.)
Waste Type in Double Shell Tanks (Shaver, 1990)

(Page 3 of 6)

<u>TANK</u>	<u>WASTE SOURCE</u>	<u>VOLUME and WASTE TYPE</u>
Tank 106-AW* (concentrated)	Water:	160 Kgal DN
	PUREX Miscellaneous Waste:	70 Kgal DN
	B Plant Waste:	42 Kgal DN
	PUREX NCRW Supernate:	29 Kgal DN
	Ammonia Scrubber Feed (ASF) Waste:	27 Kgal DN
	T Plant:	9 Kgal DN
	100 N Area Sulfate Waste:	9 Kgal DN
	300-400 Area Waste:	5 Kgal DN
	Salt Well Liquid:	5 Kgal DN
	PFP Supernate:	2 Kgal DN
	Miscellaneous Solids:	<u>173 Kgal DN</u>
	Total Tank Volume:	531 Kgal DN
	Tank 101-AN (dilute)	Water:
Salt Well Liquid:		306 Kgal DN
PUREX Miscellaneous:		32 Kgal DN
PUREX NCRW Supernate:		17 Kgal DN
100 N Area Sulfate Waste:		18 Kgal DN
300/400 Area		<u>20 Kgal DN</u>
Total Tank Volume:	547 Kgal DN	
Tank 102-AN (concentrated)	Pre 1980 DN:	406 Kgal DN
	Water:	144 Kgal DN
	Pre 1980 CC:	157 Kgal CC
	B Plant Complexed Waste:	149 Kgal DC
	B Plant Non-Complexed Waste:	59 Kgal DN
	Salt Well Liquid:	81 Kgal DN
	PUREX Miscellaneous Waste:	56 Kgal DN
	T Plant:	25 Kgal DN
	300-400 Area Waste:	17 Kgal DN
	Pre 1980 CP:	<u>1 Kgal CP</u>
Total Tank Volume:	1095 Kgal CC	
Tank 103 AN (concentrated)	Water:	246 Kgal DN
	PUREX Miscellaneous Waste:	175 Kgal DN
	Salt Well Liquid:	118 Kgal DN
	B Plant Waste:	109 Kgal DN
	PUREX NCRW upernate:	87 Kgal DN
	Pre 1980 DN:	76 Kgal DN
	T Plant:	45 Kgal DN
	100 N Area Sulfate Waste:	27 Kgal DN
	300-400 Area Waste:	23 Kgal DN
	PFP Supernate:	15 Kgal DN
	DP and pre 1980 CP:	16 Kgal DP
	Pre 1980 CC:	8 Kgal CC
	S Plant:	5 Kgal DN
Fuels Fabrication Waste:	<u>2 Kgal DN</u>	
Total Tank Volume:	952 Kgal DN	

*Evaporated to DSSF, 4-15-94 to 6-15-94

Table 3 (Cont.)
Waste Type in Double Shell Tanks (Shaver, 1990)

(Page 4 of 6)

<u>TANK</u>	<u>WASTE SOURCE</u>	<u>VOLUME and WASTE TYPE</u>
Tank 104-AN (concentrated)	Water:	236 Kgal DN
	PUREX Miscellaneous Waste:	228 Kgal DN
	Pre 1980 DN:	181 Kgal DN
	B Plant Waste:	119 Kgal DN
	Salt Well Liquid:	104 Kgal DN
	PUREX NCRW Supernate:	72 Kgal DN
	T Plant:	52 Kgal DN
	100 N Area Sulfate Waste:	32 Kgal DN
	PFP Supernate:	10 Kgal DN
	300-400 Area Waste:	7 Kgal DN
	DP and pre 1980 CP:	6 Kgal DP
	S Plant:	6 Kgal DN
	Pre 1980 CC:	8 Kgal CC
	Fuels Fabrication Waste:	<u>1 Kgal DN</u>
Total Tank Volume:	1062 Kgal DSSF	
Tank 105-AN (concentrated)	Water:	302 Kgal DN
	Salt Well Liquid:	156 Kgal DN
	PUREX Miscellaneous Waste:	139 Kgal DN
	Pre 1980 DN:	138 Kgal DN
	B Plant Waste:	137 Kgal DN
	T Plant:	110 Kgal DN
	Pre 1980 CC:	44 Kgal CC
	PFP Supernate:	38 Kgal DN
	100 N Area Sulfate Waste:	27 Kgal DN
	300-400 Area Waste:	15 Kgal DN
	S Plant:	10 Kgal DN
	DP and pre 1980 CP:	7 Kgal DP
	PUREX NCRW Supernate:	6 Kgal DN
	Fuels Fabrication Waste:	<u>1 Kgal DN</u>
Total Tank Volume:	1130 Kgal DSSF	
Tank 106-AN (concentrated)	DP and pre 1980 CP:	647 Kgal CP
	Pre 1980 DN:	248 Kgal DN
	Water:	<u>123 Kgal DN</u>
Total Tank Volume:	1018 Kgal CP	
Tank 107-AN (concentrated)	Pre 1980 CC:	516 Kgal CC
	Water:	152 Kgal DN
	Pre 1980 DN :	128 Kgal DN
	B Plant Non-Complexed Waste:	73 Kgal DN
	T Plant:	72 Kgal DN
	Salt Well Liquid:	70 Kgal DN
	PUREX Miscellaneous Waste:	42 Kgal DN
	PFP Supernate:	20 Kgal DN
S Plant:	<u>5 Kgal DN</u>	
Total Tank Volume:	1078 Kgal CC	

Table 3 (Cont.)
Waste Type in Double Shell Tanks (Shaver, 1990)

(Page 5 of 6)

<u>TANK</u>	<u>WASTE SOURCE</u>	<u>VOLUME and WASTE TYPE</u>
Tank 101-AP (dilute)	PUREX ASF Waste:	988 Kgal DN
	Water:	<u>76 Kgal DN</u>
	Total Tank Volume:	1064 Kgal DN
Tank 102-AP (dilute)	Water:	66 Kgal DN
	100 N Area Phosphate Waste:	52 Kgal DN
	100 N Area Sulfate Waste:	10 Kgal DN
	PUREX ASF Waste:	<u>5 Kgal DN</u>
	Total Tank Volume:	132 Kgal DP
Tank 103-AP* (dilute)	Water:	355 Kgal DN
	PUREX Miscellaneous Waste:	1 Kgal DN
	PUREX ASF Waste:	20 Kgal DN
	B Plant Waste:	344 Kgal DN
	T Plant:	205 Kgal DN
	100 N Area Sulfate Waste:	40 Kgal DN
	FFP Supernate:	96 Kgal DN
	300-400 Area Waste:	35 Kgal DN
	S Plant:	<u>40 Kgal DN</u>
	Total Tank Volume:	1136 Kgal DN
Tank 104-AP (dilute)	100 N Area Phosphate Waste:	13 Kgal DP
	100 N Area Sulfate Waste:	2 Kgal DN
	Water:	<u>7 Kgal DN</u>
	Total Tank Volume:	22 Kgal DN
Tank 105-AP (concentrated)	Water:	321 Kgal DN
	PUREX Miscellaneous Waste:	162 Kgal DN
	PUREX NCRW Supernate:	74 Kgal DN
	PUREX ASF Waste:	77 Kgal DN
	B Plant Waste:	74 Kgal DN
	T Plant:	25 Kgal DN
	100 N Area Sulfate Waste:	24 Kgal DN
	FFP Supernate:	14 Kgal DN
	Salt Well Liquid:	15 Kgal DN
	300-400 Area Waste:	11 Kgal DN
	Fuels Fabrication Waste:	9 Kgal DN
	Pre 1980 DN:	8 Kgal DN
	100 N Area Phosphate Waste:	2 Kgal DP
	S Plant:	3 Kgal DN
Pre 1980 CC:	<u>5 Kgal CC</u>	
Total Tank Volume:	825 Kgal DSSF	

*Evaporated to DSSF, 4-15-94 to 6-15-94

Table 3 (Cont.)
 Waste Type in Double Shell Tanks (Shaver, 1990)
 (Page 6 of 6)

<u>TANK</u>	<u>WASTE SOURCE</u>	<u>VOLUME and WASTE TYPE</u>
Tank 106-AP (concentrated)	Water:	493 Kgal DN
	PUREX Miscellaneous Waste:	169 Kgal DN
	B Plant Waste:	155 Kgal DN
	PUREX NCRW Supernate:	76 Kgal DN
	PUREX ASF Waste:	78 Kgal DN
	T Plant:	46 Kgal DN
	100 N Area Sulfate Waste:	27 Kgal DN
	PFP Supernate:	25 Kgal DN
	Salt Well Liquid:	15 Kgal DN
	300-400 Area Waste:	17 Kgal DN
	Pre 1980 DN:	12 Kgal DN
	Fuels Fabrication Waste:	9 Kgal DN
	100 N Area Phosphate Waste:	2 Kgal DP
	S Plant:	7 Kgal DN
Pre 1980 CC:	<u>1 Kgal CC</u>	
	Total Tank Volume:	1133 Kgal DN
Tank 107-AP (dilute)	PUREX PDD:	1115 Kgal DN
	Water:	<u>13 Kgal DN</u>
	Total Tank Volume:	1128 Kgal DN
Tank 108-AP (dilute)	PUREX Waste:	154 Kgal DN
	Water:	<u>22 Kgal DN</u>
	Total Tank Volume:	176 Kgal DN

Table 4
GLOSSARY OF TERMS

ABBREVIATION	DEFINITION
DST	Double-Shell Tank
SST	Single-Shell Tank
D, DN	DILUTE, NON-COMPLEXED WASTE; LOW-ACTIVITY WASTE FROM A VARIETY OF SOURCES
DSSF	DOUBLE-SHELL SLURRY FEED; THIS IS THE PRODUCT FORMED BY EVAPORATION OF DN TO JUST BEFORE SODIUM ALUMINATE PRECIPITATES
DSS	DOUBLE-SHELL SLURRY; THIS IS THE PRODUCT FORMED BY EVAPORATION OF DSSF BEYOND ALUMINATE PRECIPITATION
DC	DILUTE COMPLEXED WASTE; WASTE CONTAINING ORGANICS
CC	CONCENTRATED COMPLEXANT; CONCENTRATED DC WASTE
NCRW, PD	PUREX NEUTRALIZED CLADDING REMOVAL WASTE
NCAW, AW	NEUTRALIZED CURRENT ACID WASTE, AGING WASTE; FROM PUREX FIRST CYCLE SOLVENT EXTRACTION
ASF	PUREX AMMONIA SCRUBBER FEED
PDD	PUREX PROCESS DISTILLATE DISCHARGE
PFP	PLUTONIUM FINISHING PLANT WASTE
PT	TRU SOLIDS FROM WEST AREA OPERATIONS INCLUDING PFP
DP	DILUTE PHOSPHATE DECONTAMINATION WASTE FROM N REACTOR
CP	CONCENTRATED DP WASTE
100 N SULFATE B PLANT	N REACTOR ION EXCHANGE REGENERATION WASTE 1945-1952 BISMUTH PHOSPHATE PROCESS WASTES. 1967-1991 CS/SR RECOVERY WASTES
T PLANT	DECONTAMINATION WASTES. PRIOR TO 1956, BISMUTH PHOSPHATE WASTES
S PLANT	REDOX PROCESS WASTES
300-400 AREA	MISCELLANEOUS LABORATORY WASTES
FFW	FUEL FABRICATION WASTE; NEUTRALIZED NITRATES AND FLUORIDES
SWL	SALT WELL LIQUID FROM SST's

Table 5

Double Shell Tank Inventory

Input Chemical	NCAW		DSS/DSSF	NCRW		PFP		CC		Total (Kgs)*
	Solid (Kgs)	Liquid (Kgs)	Liquid (Kgs)	Solid (Kgs)	Liquid (Kgs)	Solid (Kgs)	Liquid (Kgs)	Solid (Kgs)	Liquid (Kgs)	
Ag +	3.22E+02	2.93E+01				8.98E+01				4.41E+02
Al+3	3.67E+04			1.53E+04		1.69E+04		2.78E+04		9.66E+04
As +5	3.48E+02	1.82E+02				3.12E+02				8.41E+02
B+3	2.38E+02	8.13E+01	1.29E+01	1.40E+03	1.25E+00	9.00E+01		3.69E+01	7.00E+02	2.56E+03
Ba +2	3.80E+02	9.82E+00	2.98E+02	5.33E+02	4.95E-02			5.40E+01	4.86E+02	1.76E+03
Be +2	9.23E+00	7.17E-01								9.95E+00
Ca+2	1.62E+03	4.21E+01	3.34E+03	1.43E+03	2.90E+01	2.50E+03		7.71E+02	6.94E+03	1.67E+04
Cd+2	6.07E+03	1.80E+01	2.79E+02			3.74E+02				6.74E+03
Co+3	7.81E+02	3.28E+01	1.09E-03	7.93E-04	7.02E-07	7.37E-05				8.14E+02
Cr+3	1.28E+03	4.97E+03	2.30E+04	4.10E+03	9.33E+01	9.31E+03		1.28E+03	2.43E+04	6.83E+04
Cu+2	2.33E+02	1.04E+01	2.09E+02			5.29E+02				9.82E+02
Fe+3	5.94E+04	8.53E+01	1.13E+03	2.89E+03	2.25E+00	9.30E+03		1.44E+03	2.74E+04	1.02E+05
Hg+2			2.80E+02							2.80E+02
K+	2.88E+03	1.92E+04	1.31E+06	5.13E+04	1.93E+04	1.30E+03	3.42E+02	3.13E+02	3.10E+04	1.43E+06
Mg+2	4.63E+02	1.12E+01	5.23E+02	4.11E+02	1.20E+00	7.08E+02		3.28E+02	2.95E+03	5.40E+03
Mo+6	7.16E+01	4.59E+02	2.77E+03	3.60E+01	4.32E-02	3.99E+01		2.52E+02	4.79E+03	8.42E+03
Na+	5.78E+04	5.31E+05	1.13E+07	4.43E+05	1.18E+04	5.74E+04	2.44E+03	4.51E+04	4.46E+06	1.69E+07
Ni+3	3.43E+03	1.39E+01	5.61E+02	4.16E+02	3.58E-01	2.44E+02		2.95E+02	5.60E+03	1.06E+04
Pb+4	4.83E+02	3.42E+01	2.65E+03			5.18E+02				3.68E+03
Rare Earths +3	4.55E+03	6.09E+01	5.16E-01	2.00E+03	5.03E-02	5.82E+02		4.43E+02	3.99E+03	1.16E+04
Rh+3	7.53E+01	1.07E+01	1.28E+00	1.41E+02	1.50E-01	2.14E+02				4.43E+02
Ru+3	2.66E+02	2.43E+01	6.17E-01	5.22E+01	3.30E-02	2.10E+02				5.54E+02
Si+4	3.19E+03	2.14E+03	8.12E+03	1.46E+04	1.07E+02	9.36E+02	1.40E+01	3.09E+04		5.99E+04
Th+4	5.16E+02	1.98E+01				2.90E+02				8.26E+02
Ti+4	2.21E+02	4.59E+00	1.46E+00	1.60E+02	1.49E-01	5.98E+01				4.47E+02
UO2+2	3.41E+03	5.28E+03	7.88E+03	2.65E+04	3.49E+00	1.12E+03		3.20E+00	6.08E+01	4.43E+04
Zn+2	1.63E+02	4.33E+01	8.38E+02	6.38E+01	1.25E-01	1.91E+02		1.05E+02	9.42E+02	2.35E+03
AlO2-		6.72E+04	3.38E+06		1.28E+03		3.68E+02		1.15E+06	4.60E+06
Cl-	9.77E+01	7.41E+02	3.29E+05	2.50E+03	2.21E+03	2.21E+03	8.86E+01	1.10E+02	1.10E+05	4.46E+05
CO3-2	7.57E+03	3.44E+04	2.85E+05	2.07E+04	1.05E+03	1.50E+04	3.75E+02	7.57E+02	7.56E+05	1.12E+06
F-	1.42E+03	7.64E+03	9.47E+04	2.29E+05	7.46E+03	2.37E+03	9.49E+01	3.89E+01	3.88E+04	3.81E+05
Fe(CN)6-3			1.36E+03							1.36E+03
NO2-	1.63E+04	1.27E+05	4.77E+06	3.70E+04		1.53E+04	2.87E+02	8.27E+02	8.27E+05	5.80E+06
NO3-	1.81E+04	3.76E+05	9.26E+06	1.02E+05	3.66E+04	7.75E+04	3.10E+03	4.15E+03	4.14E+06	1.40E+07
OH-	1.66E+05	1.76E+05	4.22E+06	1.74E+05	-1.11E+03	4.76E+04	6.27E+02	1.63E+05	1.33E+06	6.28E+06
PO4-3	4.50E+03	4.54E+04	3.55E+04			2.37E+04	5.93E+01	1.08E+02	1.08E+05	2.18E+05
SO4-2	1.00E+04	1.04E+05	1.27E+05	2.37E+03	6.62E+02	4.00E+03	9.60E+01	1.32E+02	1.32E+05	3.79E+05
Organic Carbon	4.39E+03	8.24E+03	1.52E+05					9.00E+03	4.41E+05	6.14E+05
H2O		6.54E+06	4.41E+07		2.00E+06		4.84E+05		1.26E+07	6.58E+07
MnO2	2.77E+03	8.67E+00	7.95E+02	1.61E+03		5.43E+03		5.83E+02	1.11E+04	2.23E+04
ZrO2·2H2O	2.76E+04	6.39E+01		5.16E+05		2.65E+02		1.83E+02	1.65E+03	5.46E+05
Total, Kg	4.49E+05	8.05E+06	7.95E+07	1.65E+06	2.08E+06	2.99E+05	4.91E+05	2.89E+05	2.62E+07	1.19E+08

Table 6
 Source Documents for Provisional Double Shell Tank Inventories (Shelton, 1994)

TANK	WASTE TYPE	SOURCE
101AN	DN	WHC-SD-TI-528
102AN	CC	WHC-SD-WM-TI-492
103AN	DSS	WHC-SD-WM-TI-543
104AN	DSSF	WHC-SD-WM-TI-528
105AN	DSSF	WHC-SD-WM-TI-528
106AN	DSSF	WHC-SD-WM-TI-528
107AN	CC	RHO-65453-85-053
101AP	DN	WHC-SD-WM-TI-528
102AP	DN	WHC-SD-WM-TI-528
103AP	DN	WHC-SD-WM-TI-528
104AP	DN	WHC-SD-WM-TI-528
105AP	DSSF	WHC-SD-WM-TI-528
106AP	DN	WHC-SD-WM-TI-528
107AP	DN	WHC-SD-WM-TI-528
108AP	DN	WHC-SD-WM-TI-528
101AW	DSSF	WHC-SD-WM-TI-528
102AW	DN	WHC-SD-WM-TI-528
103AW	NCRW	85440-91-018
104AW	DN	WHC-SD-WM-TI-528
105AW	NCRW	85440-91-018
106AW	DN	WHC-SD-WM-TI-528
101AY	CC	WHC-SD-WM-TI-543
102AY	DN	WHC-SD-WM-TI-528
101AZ	NCAW	D.E. PLACE
102AZ	NCAW	D.E. PLACE
101SY	CC	WHC-SD-WM-TI-543
102SY	PPF	WHC-SD-WM-TI-492
103SY	CC	WHC-SD-WM-TI-492

Table 7
 Provisional Double Shell Tank Inventories by Tank, Tanks 101-107AN, 101-103AP,
 Liquid Components (Shelton, 1994)

SIREM NAME	101AN	102AN	103AN	104AN	105AN	106AN	107AN	101AP	102AP	103AP
LIQUID COMPONENTS										
Total Kilograms	2.47E+06	4.78E+06	5.26E+06	4.18E+06	6.04E+06	2.50E+04	4.34E+06	4.11E+06	4.28E+06	4.31E+06
Volume, Liters	2.41E+06	3.70E+06	3.36E+06	3.00E+06	4.28E+06	2.27E+04	3.39E+06	4.02E+06	4.19E+06	4.29E+06
Specific Gravity	1.02E+00	1.25E+00	1.57E+00	1.39E+00	1.41E+00	1.10E+00	1.28E+00	1.02E+00	1.02E+00	1.01E+00
Ag+	4.29E+00	5.68E+01	5.68E+01	5.68E+01	5.68E+01	8.25E+02	5.68E+01	7.10E+00	7.41E+00	1.42E+01
Al(OH) ₃	1.07E+04	2.13E+05	7.16E+05	4.01E+05	7.07E+05	7.42E+02	5.52E+04	1.82E+04	1.89E+04	3.55E+03
Am+3	8.23E-05	9.99E-02	2.39E-03	9.88E+00	1.39E+01	4.00E-06		1.36E-04	1.42E-04	1.43E-05
Am+5	1.61E+00		5.68E+02			1.64E-03		2.67E+00	2.78E+00	2.01E-01
Er+3										
Er+2	2.04E+00	7.18E+01	5.68E+01			2.52E-01		3.39E+00	3.53E+00	2.70E-01
Er+2			5.68E+01							
El+3	2.99E+01		1.70E+03			3.29E+00		4.96E+01	5.17E+01	
Ca+2	8.23E+00	2.06E+03	3.06E+02			2.05E+00		1.36E+01	1.42E+01	
Ca+2	1.07E+00	2.37E+02	5.68E+01			1.13E+00		1.77E+00	1.85E+00	4.61E-01
Ca+3										5.77E-05
Ca+3	2.20E-07	4.68E-05	2.04E-05					3.69E-07		
Co+3	1.99E-05	7.76E-05	1.74E-04			1.49E-07		3.30E-05	3.44E-05	5.63E-05
Co(OH) ₂	6.37E+01	3.99E+03	6.95E+03	4.71E+03	6.67E+03	2.95E+01		1.05E+02	1.10E+02	3.55E+01
Cr+3	6.64E-01	1.72E+01	3.25E+01	2.64E+01	2.48E+01	5.18E-02		1.10E+00	1.15E+00	3.45E-01
Cr+2	5.99E+00	1.44E+02	4.26E+01			8.51E-02		9.93E+00	1.03E+01	
Fe+3	4.13E+01	4.23E+02		3.36E+01	4.77E+01	1.57E-01	7.65E+03	6.84E+01	7.13E+01	
H+										2.26E-06
Rb+2	2.00E-02		5.68E+01			1.13E-03		3.31E-02	3.45E-02	8.59E-03
K+	1.05E+04	8.65E-03	5.39E+04	2.16E+04	2.62E+04	2.45E+01		1.74E+04	1.82E+04	
La+3		6.42E-02								
Li+										
Mg+2	1.61E+01	3.63E-01	1.02E-02			6.29E-02		2.66E+01	2.78E+01	3.00E+00
Mn+2	4.17E+00							6.91E+00	7.20E+00	
Mn+6	1.42E+01	3.59E-03	3.12E-02			1.51E+00		2.36E+01	2.46E+01	
Na+	4.30E+04	1.01E+06	1.19E+06	8.15E+05	1.18E+06	2.05E+03	8.73E+05	7.13E+04	7.43E+04	2.21E+04
Ni+3	2.49E+01	1.56E-03	8.81E-01					4.12E+01	4.33E+01	
Np+4	1.07E-03		1.01E-01			6.80E-02		1.77E-03	1.84E-03	
Rb+4	3.89E+01	9.86E-02	2.55E+02			1.04E+01		6.45E+01	6.72E+01	1.66E+00
Ru+4	5.74E-03	4.33E-00	1.09E-01			1.38E-05		9.52E-03	9.13E-03	4.82E-04
Rb+										
Ra+7										
Rn+3										
Ru+3										
Sm+5			5.68E-02							
Se+6	1.40E-02		7.38E-02			3.05E-03		2.32E-02	2.42E-02	
Si+4	2.99E+01	6.59E+02	9.65E+02					4.96E+01	5.17E+01	
Sr+2	2.42E-02	3.19E-00	3.50E-01	2.14E-01	9.92E-02	3.46E-04		4.17E-02	4.15E-02	8.52E-05
Ta+6										
Tb+4										
Ti+4	1.17E+00		5.68E+01			7.97E-02		1.94E+00	2.02E+00	
Ti+3										
UO ₂ +2	3.83E+00		8.16E+02					6.31E+00	6.57E+00	4.90E+00
V+5			5.68E+01							
V+6			7.38E+02							
Zn+2	5.39E+01	1.15E+02	1.70E+02			2.14E-01		8.93E+01	9.31E+01	1.14E+00
Zn+4								2.07E+01		
Cl-	8.85E+02	1.41E+04	1.41E+04	2.27E+04	3.63E+04	5.59E+01		1.47E+03	1.53E+03	2.06E+02
ClO ₂ -2	9.62E+02	2.11E+05	3.18E+04	8.57E+04	9.33E+04	4.46E+02	2.76E+05	1.60E+03	1.66E+03	8.04E+03
F-	4.21E+03	9.38E+03	2.81E+03			1.40E+00	2.45E+03	6.97E+03	7.27E+03	5.38E+02
Fe(OH) ₃			9.78E+02			1.11E+00				2.02E+01
I-	4.49E-01		1.05E+01			9.62E-01		7.44E-01	7.76E-01	7.72E-01
NO ₂ -	8.74E+03	2.54E+05	4.88E+05	2.67E+05	5.12E+05	6.73E+02	1.58E+05	1.45E+04	1.51E+04	5.40E+03
NO ₃ -	2.75E+04	9.36E+05	5.68E+05	5.81E+05	8.26E+05	1.53E+03	6.95E+05	4.56E+04	4.75E+04	1.65E+04
OH-	1.82E+04	2.03E+05	4.05E+05	2.26E+05	2.64E+05	1.83E+02	2.22E+05	2.97E+04	3.10E+04	3.22E+03
PO ₄ -3	5.43E-01	1.88E+04	1.88E+04	8.44E+03	8.11E+03	4.18E+02	1.18E+04	9.00E+02	9.38E+02	5.73E+02
SO ₄ -2	2.65E+03	4.58E+04	5.68E+03	1.98E+04	2.80E+04	4.89E+01	2.39E+04	4.40E+03	4.58E+03	1.46E+03
TiO ₂ -	1.86E+00	3.72E-07	5.92E+01			1.54E-01		3.09E+00	3.22E+00	4.52E-01
Cl ₄	1.22E-05	1.29E-03	1.59E-03			1.71E-06		1.98E-05	2.07E-05	4.30E-06
ED	2.33E+06	1.70E+06	1.56E+06	1.54E+06	2.15E+06	1.85E+04	1.85E+06	3.88E+06	4.04E+06	4.25E+06
H ₂ O ₂		1.54E+04	3.22E+05			3.96E+00				3.42E-01
Organic Carbon	1.24E+04	1.41E+05	2.61E+04	1.67E+05	1.99E+05	7.40E+01	1.62E+05	2.06E+04	2.15E+04	4.66E+02
ZrO ₂ /ZrO	2.79E+04	1.15E+03	1.44E+02			1.10E+00		4.63E+01	4.83E+01	
Ca and Ba, (Cl)	5.75E+04	1.49E+06	2.84E+06	2.29E+06	2.15E+06	4.49E+03		9.53E+04	9.96E+04	2.99E+04
Sr and Y, (Cl)	3.55E+03	4.78E+05	4.94E+04	3.02E+04	1.40E+04	4.88E+01		5.88E+03	6.13E+03	1.20E+01
Te, (Cl)	1.93E+01	3.86E-06	6.12E+02			1.60E+00		3.21E+01	3.34E+01	4.69E+00
Am, (Cl)	2.82E-01	3.43E+02	8.22E+00	3.39E+04	4.77E+04	1.37E-02		4.67E-01	4.87E-01	4.91E-02
Np, (Cl)	7.55E-04		7.13E-02			4.80E-02		1.25E-03	1.30E-03	
Ru, (Cl)	3.56E-01	2.69E+02	6.76E+00			8.56E-04		5.90E-01	5.79E-01	2.99E-02
TRU, (Cl)	6.39E-01	6.11E+02	1.50E+01	3.39E+04	4.77E+04	6.26E-02		1.06E+00	1.07E+00	7.89E-02

Table 9
Provisional Double Shell Tank Inventories by Tank, Tanks 104-108AP, 101-105AW,
Liquid Components (Shelton, 1994)

SHELL NAME	104AP	105AP	106AP	107AP	108AP	101AW	102AW	103AW	104AW	105AW
LIQUID COMPONENTS										
Total Kilograms	7.36E+04	3.58E+06	4.42E+06	4.32E+06	3.49E+06	5.33E+06	3.61E+06	1.28E+06	3.44E+06	2.89E+06
Volume, Liters	7.19E+04	3.19E+06	4.23E+06	4.22E+06	3.41E+06	4.09E+06	3.55E+06	1.21E+06	3.34E+06	2.75E+06
Specific Gravity	1.02E+00	1.12E+00	1.05E+00	1.02E+00	1.02E+00	1.30E+00	1.02E+00	1.05E+00	1.03E+00	1.05E+00
Age	1.27E-01	6.79E+01	1.46E+01	7.46E-00	6.04E+00	6.04E+00	3.35E+00	7.53E+00	7.53E+00	7.53E+00
Al(OH) ₃	3.25E+02	4.79E+04	4.36E+04	1.91E+04	1.54E+04	4.22E+05	6.44E+03	5.81E+02	1.97E+04	7.92E+03
Am-3	1.64E-08	1.21E-03	1.45E-04	1.43E-04	1.16E-04	4.05E-02	2.65E-04		1.07E-04	
Am-5	4.78E-02	2.02E-02	4.40E-03	2.81E-00	2.27E+00	4.29E-02	5.65E+00		2.82E+00	
Ba-3										
Ba-2	6.06E-02	1.88E+01	4.11E-00	3.56E-00	2.88E+00	4.02E+01	4.88E+00	6.83E-01	3.59E+00	4.00E-01
Ba-2										1.39E-01
Ca-3	8.88E-01	2.42E+02	5.33E-01	5.21E-01	4.22E+01	5.21E+02			5.25E+01	
Ca-2	2.44E-01	1.56E+02	1.46E-01	1.43E+01	1.16E+01	1.42E+02		7.50E+00	1.45E+01	1.39E+02
Ca-2	3.16E-02	2.45E+00	5.33E-01	1.66E-00	1.51E+00	5.23E+00	1.50E+00		1.88E+00	
Ca-3							6.04E-05			
Ca-3	1.07E-09	3.48E-04	3.85E-07			3.48E-04	3.48E-04	1.77E-07		
Ca-3	3.05E-07	4.16E-05	3.11E-05	3.47E-05	2.81E-05	2.05E-04	1.33E-05		2.59E-05	
Ca(OH) ₂	1.89E+00	1.25E-03	1.63E-02	1.11E-02	8.98E+01	1.60E+03	9.23E+01	2.04E+02	1.12E+02	3.55E+02
Ca+	4.56E-07	9.82E+00	1.15E-03	1.15E+00	9.34E-01	2.26E+01	5.90E-01	1.61E+00	8.64E-01	5.70E+00
Ca-2	1.78E-01	4.84E+01		1.04E-01	8.44E+00	1.04E+02			1.05E+01	
Fe-3	1.22E+00		1.22E-01	7.18E-01	5.82E+01		1.05E+02	1.54E+01	7.25E+01	5.20E+00
H+										
H-2	5.93E-04	3.15E-01	7.07E-02	3.46E-02	2.81E-02	6.75E-01	1.67E-02		3.51E-02	
H+	3.12E+02	1.05E-05	1.63E-04	1.83E-04	1.48E+04			2.48E+04	1.85E+04	4.32E+04
H-3										
H+										
H-2	4.77E-01	3.78E-01	2.25E-01	2.62E-01	2.27E-01	2.26E-02	5.04E+01	8.33E-01	2.82E-01	1.70E+02
H-2	1.24E-01			7.25E-00	5.67E-00				7.32E+00	
H-6	4.22E-01	1.16E-02	2.52E-01	2.46E-01	2.00E-01	2.46E-02		3.15E+00	2.50E-01	7.53E+01
Na+	1.28E+03	4.45E+05	1.67E-05	7.49E-04	6.06E+04	9.91E+05	6.33E+04	4.22E+04	7.55E+04	8.02E+04
Na-3	7.29E-01	3.97E-02	4.42E-01	4.39E-01	3.91E-01	7.85E-01	3.60E-00		4.37E-01	
Np-4	3.91E-05	6.13E-00	1.68E-03	1.85E-03	1.50E-03	1.22E-01			1.39E-03	
Rn-4	1.15E+00	6.08E-02	1.32E-02	6.77E-01	5.48E-01	1.43E-03	3.00E+01		6.83E-01	
Rn-4	3.70E-06	2.17E-03		1.00E-02	8.10E-03	7.51E-02	2.06E-02		7.49E-03	
Rn+										
Rn-7										
Rn-3							2.45E-06			
Rn-3										
Sn-5										
Se-6	4.16E-04	6.78E-02		2.44E-02	1.98E-02		1.67E-02		2.46E-02	
Si-4	8.89E-01	3.17E-02	5.33E-01	5.21E-01	4.22E+01	9.46E-00		3.00E+02	5.23E-01	
Sn-2	1.57E-08	4.49E-04	4.44E-02	4.38E-02	3.55E-02	3.09E-02	1.08E-03		3.25E-02	
Te-6										
Th-4										
TI-4	3.48E-02	9.61E-00	2.07E-00	2.04E-00	1.65E+00	2.04E+01			2.06E+00	
TI-3										
UC-2	1.85E-01		6.70E-00	6.63E+00	5.15E+00	1.09E-03	6.56E-05	1.36E-01	7.26E+00	2.69E+01
VH-5										
WH-6										
Zn-2	1.60E+00	2.39E+02	1.41E-02	9.37E-01	7.59E+01	1.36E-03	3.43E+01	5.60E+00	9.46E+01	
Zn-4										
Cl-	2.63E+01	8.12E+03	1.41E-04	1.54E-03	1.25E+03	1.41E+04	1.74E+03	5.40E+02	1.45E+03	5.40E+02
Cl-2	2.86E+01	4.78E+04	5.30E-03	1.66E+03	1.36E+03	5.30E+04	8.04E+03	9.75E+02	1.69E+03	9.00E+03
F-	1.25E+02	7.77E+03	3.36E+01	7.22E+03	5.93E+03	3.25E+02	1.51E+04	3.25E+04	7.39E+03	3.97E+04
Fe(OH) ₃		4.43E+02	9.70E-01			9.37E+02	3.94E+01			
I-	1.37E-02	7.35E-01	7.92E-01	7.61E-01	6.33E-01	6.91E+00			5.85E-01	
NO ₂ -	2.59E+02	1.58E+05		1.52E-04	1.23E+04	4.35E+05	9.64E+03	1.62E+03	1.53E+04	2.85E+03
NO ₃ -	8.16E+02	5.19E+05	7.80E+00	4.78E-04	3.67E+04	9.22E+05	5.30E+04	1.02E+04	4.82E+04	9.35E+03
OH-	5.34E+02	1.22E+05	6.87E-04	3.13E-04	2.53E+04	2.79E+05	5.10E+03	9.15E+03	3.15E+04	3.16E+04
PO ₄ -3	1.61E+01	9.10E+03	1.85E-03	9.45E+02	7.65E+02	9.07E+03	6.55E+02	5.73E+01	9.54E+02	4.00E+02
SO ₄ -2	7.88E+01	7.49E+03	4.74E+02	4.62E-03	3.74E+03	4.44E+03	8.75E+03		4.66E+03	2.24E+03
TiO ₂ -	3.39E-03	5.45E-01	3.29E-00	3.24E+00	2.63E+00	3.61E+01		2.53E+00	2.43E+00	4.01E+00
Cl ₄	1.84E-08	1.65E-03	2.66E-05	2.08E-05	1.68E-05	3.36E-04			1.56E-05	
EZO	6.94E+04	2.06E+06	4.16E+06	4.07E+06	3.29E+06	2.00E+06	3.44E+06	1.15E+06	3.19E+06	2.66E+06
H ₂ C		1.67E+02	3.64E+01			3.54E+02	1.16E+01			
Organic Carbon	1.22E+04	2.19E-03	2.16E-04	1.75E+04		1.06E+04	1.84E+03	1.60E+03	2.18E+04	4.60E+03
ZrO ₂ :ZrO	8.30E-01	1.74E+02	3.74E+01	4.85E+01	3.94E+01	3.69E+02			4.90E+01	
Cs and Ba, (Cl)	3.95E-02	8.50E+05	9.96E+01	9.96E+04	8.09E+04	1.96E+06	5.11E+04	1.57E+05	7.45E+04	4.94E+05
Sr and Y, (Cl)	2.21E-03	6.33E+01	6.28E+03	6.18E+03	5.01E+03	4.36E+03	1.52E+02		4.63E+03	
Te, (Cl)	3.52E-02	5.65E+00	3.41E+01	3.36E+01	2.73E+01	3.75E+02		2.63E+01	2.52E+01	4.16E+01
Am, (Cl)	5.63E-05	4.15E+00	4.97E-01	4.91E-01	3.98E-01	1.39E+02	9.09E-01		3.67E-01	
Hg, (Cl)	2.76E-05	4.32E+00	1.32E-03	1.31E-03	1.06E-03	8.61E+00			9.81E-04	
Pb, (Cl)	2.29E-04	1.31E-01	6.22E-01	5.02E-01	4.66E+00		1.28E+00		4.64E-01	
BRJ, (Cl)	3.13E-04	8.61E+00	4.99E-01	1.11E+00	9.01E-01	1.52E+02	2.19E+00		8.32E-01	

Table 10
 Provisional Double Shell Tank Inventories by Tank, Tanks 104-108AP, 101-105AW,
 Solid Components (Shelton, 1994)

STREAM NAME	104AP	105AP	106AP	107AP	108AP	101AW	102AW	103AW	104AW	105AW
SOLID COMPONENTS										
Total Kilograms								7.90E+05		4.37E+05
Ag+										
Al+3								1.08E+04		7.50E+02
As+3								9.97E-02		
As+5										
B+3										
Ba+2								6.79E+02		4.00E+02
Ba+2										
Ca+2								1.49E+03		1.91E+02
Ca+2										
Ca+3										
Ca+3										
Ca+3										
Ca+3								5.92E+02		1.96E+02
Ca+								2.01E-01		3.00E-01
Ca+2										
Fe+3								1.38E+03		5.15E+02
K+								9.16E+03		4.80E+03
La+3								9.00E+02		4.50E+02
Li+										
Hg+2								8.29E+02		
Mn+6								4.47E+02		
Na+								2.38E+05		1.26E+05
Ni+3								3.56E+02		7.00E+01
Ni+4								5.00E-02		5.00E-02
Rb+4										
Rb+4								1.50E+01		7.90E+00
Rb+										
Ra+7										
Ra+3										
Ra+3										
Sb+5										
Se+6										
Si+4								2.70E+03		1.30E+03
Si+2								5.65E-01		4.00E-01
Ta+6										
Tb+4										
Ti+4										
Ti+3										
UO2+2								1.70E+04		8.94E+03
V+5										
Zn+2								2.74E+02		
Zn+4										
Cl-								6.00E+01		6.00E+01
Cl-2										6.00E+03
F-								9.75E+04		8.83E+04
I-										
NO2-								8.50E+01		1.50E+02
NO3-								1.80E+03		1.65E+03
OH-								1.27E+05		1.92E+04
PO4-3										
SO4-2										
TeO4-								1.33E-01		6.52E-01
Cl4										
HCO2								9.50E+02		3.16E+01
Organic Carbon										
ZrO2.2H2O								2.78E+05		4.60E+03
Cs and Ba, (Cl)								1.74E+04		1.73E+05
Sr and Y, (Cl)								7.97E+04		2.60E+04
Te, (Cl)								1.38E+00		5.64E+04
Am, (Cl)								3.42E+02		6.76E+00
Np, (Cl)								3.53E-02		3.53E-02
Pu, (Cl)								9.30E+02		4.90E+02
TRU, (Cl)								1.27E+03		4.90E+02

Table 12
 Provisional Double Shell Tank Inventories by Tank, Tanks 106AW, 101-102AY, 101-102AZ, 101-103SY Solid Components (Shelton, 1994)

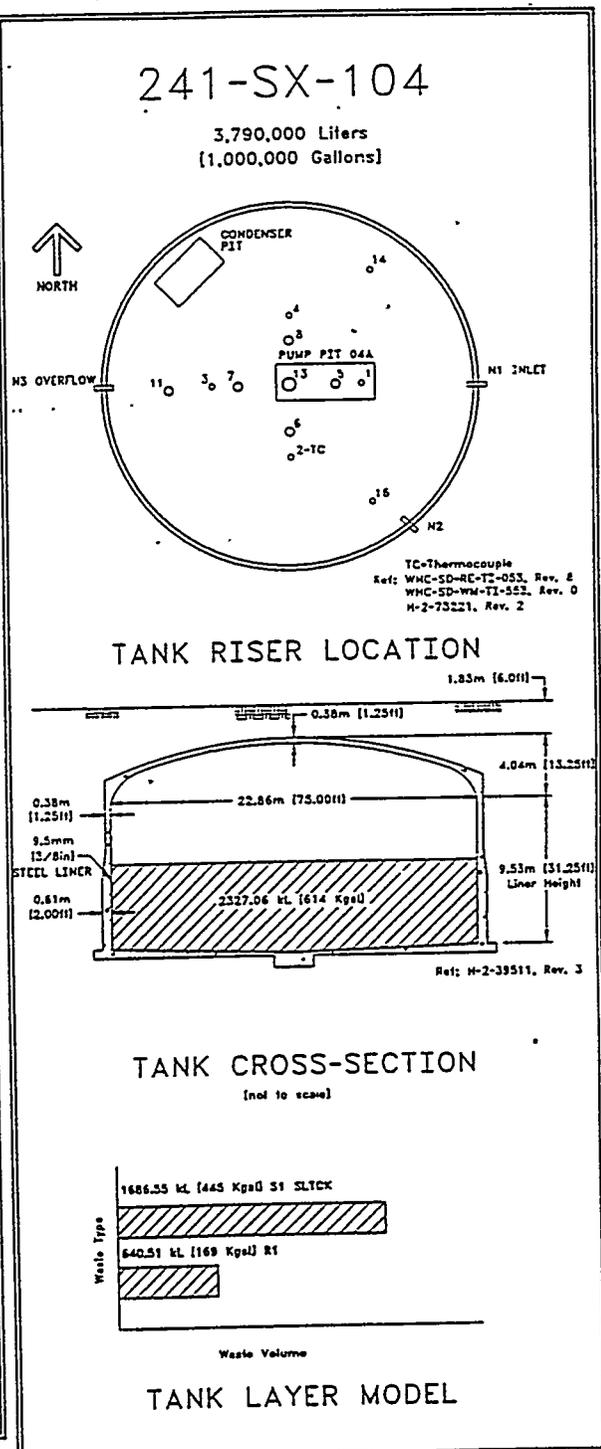
SUREM NAME	106AW	101AY	102AY	101AZ	102AZ	101SY	102SY	103SY	TOTAL DW
ST ID CO-FORMS				2.25E+05	2.36E+05	2.76E+06	1.95E+05	3.31E+06	
Total Kilograms				1.23E+02	1.99E+02		5.86E+01		
As+				1.29E+04	2.37E+04	1.41E+05	1.09E+04	1.77E+05	
Al+3				1.31E+01	7.85E+00	9.60E-01	2.42E+00	6.25E-01	
Am+3				1.73E+02	1.74E+02		2.01E+02		
As+5							5.83E+01	4.35E+02	
B+3				9.07E+01	1.47E+02			3.85E+01	
Ba+2				2.18E+02	1.62E+02				
Be+2				5.24E+00	3.96E+00				
Ca+2				7.31E+02	8.67E+02	2.43E+03	1.62E+03	7.44E+02	
Ca+2				1.69E+03	4.35E+03		2.42E+02		
Ca+3				2.41E+02	1.18E+02		2.64E+02		
Ca+3				1.90E-01	8.89E-03		2.69E-04		
Ca+3				3.47E+02	4.34E+02		4.76E-05	7.76E-04	
Ca+3				1.52E+03	7.48E+02	2.23E+04	6.01E+03		
Ca+4				5.74E+00	7.12E+00	1.39E+02	6.21E-01	2.02E+01	
Ca+2				1.30E+02	1.03E+02		3.41E+02		
Fe+3				2.76E+04	3.19E+04	2.18E+03	6.00E+03	5.05E+03	
K+				2.01E+03	8.73E+02	1.35E+04	8.40E+02	1.29E+04	
La+3				1.14E+03	1.32E+03			1.17E-02	
Li+				2.20E-01	8.56E+00		5.60E+00		
Mg+2				1.84E+02	2.79E+02		4.57E+02	6.15E-01	
Mg+6				4.17E+01	2.99E+01	2.46E+02	2.55E+01	4.86E+02	
Ni+				2.85E+04	2.93E+04	8.91E+05	3.71E+04	1.04E+06	
Ni+3				1.47E+03	1.96E+03	1.04E+03	1.55E+02	4.79E-02	
Np+4				2.70E-01	4.26E+00		5.37E-01		
Pb+4				1.60E-02	3.22E+02		3.34E+02		
Pb+4				1.54E+01	1.24E+01	5.67E+00	2.96E+01	3.27E+00	
Pb+				5.05E+00	3.89E+00				
Pb+7				1.75E-01	2.14E+01				
Pb+3				5.17E-01	2.36E+01		1.35E+02		
Pb+3				-1.83E+02	8.25E+01		1.56E+02		
Sr+5				8.15E+02	1.00E+03		9.82E+01		
Sr+6				5.47E+02	3.03E+02		6.37E+02		
Si+4				1.77E+03	1.42E+03		6.04E+02	1.62E+03	
Si+2				1.50E+02	9.59E+01		2.35E+01	2.55E+01	
Ta+6				4.09E+01	2.27E+01		1.03E+02		
Ta+4				7.46E+02	2.85E+02		1.25E+03		
Ti+4				1.98E+02	2.28E+01		3.66E+01		
Ti+3				2.03E+03	2.46E+03		5.49E+02		
UO2+2				7.98E+02	2.61E+03	3.95E+03	7.26E+02		
V+5				7.82E+00	9.93E+00		1.37E+01		
Zn+2				1.22E+02	4.13E+01	2.34E+02	1.23E+02	1.03E+03	
Zn+4								1.03E+02	
Zn+								2.74E+04	
Cl-				4.21E+01	5.57E+01	7.94E+04	1.43E+03	8.35E-04	
ClO-2				7.60E-03			9.67E+03		
F-				1.09E+03	3.28E+02	7.02E+02	1.53E+03	5.83E+03	
I-							6.07E-01		
NO2-				1.12E+04	5.11E+03	4.25E+05	9.89E+03	3.38E+05	
NO3-				1.62E+04	1.54E+03	4.22E+05	5.00E+04	7.84E+05	
OH-				6.85E+04	1.04E+05	6.27E+05	3.21E+04	7.02E+05	
FO4-3				2.35E+02	1.49E+02	2.25E+04	1.53E+04	1.88E+04	
SO4-2				5.16E+03	4.85E+03	2.41E+04	2.58E+03	1.38E+04	
TcO4-				2.17E+01	2.86E+01	3.45E+02	7.88E+00		
Cl4				2.24E-04	7.48E-02		1.81E-04		
MnO2				2.88E+03	2.68E+03		7.00E+03	1.34E+04	
Organic Carbon				3.18E+03	1.21E+03	7.95E+04		9.15E+04	
ZrO2:ZrO				2.35E+04	1.19E+04		1.71E+02	1.15E+03	
Cs and Ba, (Cl)				4.97E+05	6.17E+05	1.2E+07	5.38E+04	1.75E+06	
Sr and Y, (Cl)				2.12E+07	1.35E+07		3.31E+06	3.57E+06	
Tc, (Cl)				2.25E+02	2.97E+02	3.58E+03	8.18E+01		
Am, (Cl)				4.49E+04	2.70E+04	3.29E+03	8.30E+03	2.15E+03	
Np, (Cl)				1.91E+01	3.01E+00		3.79E-01		
Pu, (Cl)				9.55E+02	7.69E+02	3.52E+02	1.84E+03	2.03E+02	
TRU, (Cl)				4.59E+04	2.77E+04	3.64E+03	1.01E+04	2.36E+03	

Table 13
 Estimates of the Maximum Concentrations of Chemicals Expected in the SST's
 (Walter, 1993)

Species	SST												
	MO/L												
	A	AX	B	BX	BY	C	S	SX	T	TX	TY	U	
Ag	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Al	0.0753	0.4966	0.0287	0.2194	0.3380	0.4416	0.3399	0.1942	0.0641	0.1951	0.1480	0.2230	
As													
B													
Ba	0.0001	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Bi	0.0000	0.0000	0.0259	0.0001	0.0000	0.0001	0.0000	0.0000	0.0760	0.0001	0.0015	0.0001	0.0001
Ca	0.0002	0.1672	0.0005	0.0005	0.0299	0.0560	0.0000	0.0020	0.0000	0.0001	0.0000	0.0000	0.0000
Cd	0.0001	0.0002	0.0003	0.0001	0.0000	0.0002	0.0001	0.0001	0.0005	0.0000	0.0007	0.0002	0.0002
Cr	0.0001	0.0908	0.0007	0.0001	0.0001	0.0001	0.0001	0.0090	0.0200	0.0020	0.0002	0.0017	0.0069
Cu													
Fe	0.2860	0.8916	0.0665	0.0158	0.0123	0.0334	0.0057	0.0126	0.1576	0.0205	0.1448	0.0148	0.0148
Hg	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000	0.0000
Hr	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
K	0.0010	0.0064	0.0091	0.0095	0.0018	0.0002	0.0000	0.0000	0.0010	0.0000	0.0000	0.0000	0.0000
La,Nd	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000	0.0000	0.0000	0.0000
Mg													
Mn	0.0322	0.4098	0.0038	0.0022	0.0013	0.0313	0.0009	0.0018	0.0179	0.0037	0.0009	0.0013	0.0013
Mo													
Na	6.8743	2.5798	5.2930	6.4581	5.6672	6.3503	5.7031	6.5171	1.6393	6.8703	7.0692	6.2034	6.2034
Ni	0.0010	0.0294	0.0021	0.0039	0.0418	0.0251	0.0004	0.0004	0.0005	0.0015	0.0000	0.0000	0.0000
Nr	0.0000	0.0021	0.1161	0.0007	0.0000	0.0011	0.0000	0.0002	0.0000	0.0002	0.0000	0.0000	0.0000
Pb													
Pd,Rh													
SI (SiO2)	0.0026	0.0366	0.0108	0.0952	0.0331	0.0004	0.0077	0.0166	0.0145	0.1531	0.4627	0.2063	0.2063
Ti													
U													
Zr (ZrO2)	0.0001	0.0011	0.0010	0.0005	0.0004	0.0649	0.0034	0.0000	0.0041	0.0012	0.0129	0.0011	0.0011
Acetate	0.0037	0.0055	0.0000	0.0001	0.0000	0.0001	0.0001	0.0003	0.0000	0.0013	0.0000	0.0006	0.0006
Chlorate	0.0116	0.0303	0.0412	0.0595	0.0580	0.0195	0.0206	0.0285	0.0042	0.0525	0.0329	0.0077	0.0077
Oxalate													
Formate													
EDTA	0.0072	0.0109	0.0000	0.0001	0.0000	0.0001	0.0003	0.0006	0.0000	0.0026	0.0000	0.0011	0.0011
HEDTA	0.0137	0.0209	0.0001	0.0003	0.0000	0.0002	0.0005	0.0012	0.0000	0.0050	0.0000	0.0021	0.0021
Fe(CN)6	0.0000	0.0011	0.0003	0.0004	0.0253	0.0111	0.0000	0.0001	0.0000	0.0002	0.0000	0.0000	0.0000
Cl	0.0001	0.0009	0.0040	0.0022	0.0038	0.0000	0.0010	0.0010	0.0014	0.0104	0.0219	0.0009	0.0009
CO3	0.0590	0.0805	0.1099	0.0926	0.0860	0.0347	0.0221	0.0144	0.0187	0.2034	0.3753	0.0227	0.0227
F	0.0010	0.0280	0.2435	0.0140	0.1108	0.7063	0.0172	0.0028	0.1180	0.1620	0.0220	0.0296	0.0296
Fission Prod.													
NO2	0.0340	0.1986	0.2463	0.4003	0.8265	0.0086	0.1485	0.0923	0.0535	0.4147	0.2560	0.1799	0.1799
NOx (NO3)	4.4784	2.5655	2.2172	4.4829	4.2883	3.4539	5.1108	4.8008	0.6405	3.7769	2.8331	4.8868	4.8868
CH	1.6058	8.5891	0.3403	0.7986	1.1335	4.9864	1.4673	1.8553	1.3003	0.2452	2.0360	0.9936	0.9936
P04	0.0007	0.0063	1.7214	0.0488	0.0431	0.0105	0.0084	0.0036	3.8207	0.3139	0.2310	0.0341	0.0341
SO4	0.0823	0.0307	0.0567	0.0633	0.0316	0.0467	0.0264	0.0103	0.0155	0.1121	0.2231	0.0180	0.0180

Table 14
Inventory Estimate of Tank 241-SX-104 (Gaddis, 1994b, p. 117)

Single-Shell Tank 241-SX-104 Solids Composite Inventory Estimate			
Physical Properties:			
Total Solid Waste	3.80E+06 kg (614 kgal)		
Heat load	6.74 kW (2.30E+04 BTU/hr)		
Bulk Density	1.64 (g/cc)		
Void Fraction	0.55		
Water wt%	30.32		
TOC wt% C (wet)	0.03		
Chemical Constituents:			
	moles/l	ppm	kg
Na ⁺	10.54	1.48E+05	5.63E+05
Al ³⁺	1.53	2.52E+04	9.60E+04
Fe ³⁺ (total Fe)	2.32E-02	7.91E+02	3.01E+03
Cr ³⁺	0.13	4.02E+03	1.53E+04
Bi ³⁺	0	0	0
La ³⁺	0	0	0
Ce ³⁺	0	0	0
Zr (as ZrO(OH) ₂)	0	0	0
Pb ²⁺	0	0	0
Ni ²⁺	4.23E-03	1.52E+02	5.77E+02
Sr ²⁺	0	0	0
Mn ⁴⁺	0.11	3.84E+03	1.46E+04
Ca ²⁺	0	0	0
K ⁺	6.63E-03	1.58E+02	6.02E+02
OH ⁻	5.71	5.93E+04	2.26E+05
NO ₃ ⁻	7.55	2.86E+05	1.09E+06
NO ₂ ⁻	8.89E-02	2.50E+03	9.50E+03
CO ₃ ²⁻	0.51	1.86E+04	7.09E+04
PO ₄ ³⁻	0.42	2.41E+04	9.17E+04
SO ₄ ²⁻	0.24	1.42E+04	5.38E+04
Si (as SiO ₂) ²⁻	0	0	0
F ⁻	7.69E-02	8.92E+02	3.39E+03
Cl ⁻	5.65E-03	1.22E+02	4.66E+02
C ₄ H ₇ O ₇ ³⁻	3.24E-03	3.75E+02	1.42E+03
EDTA ⁴⁻	0	0	0
HEDTA ³⁻	3.77E-06	0.63	2.40
NTA ³⁻	0	0	0
glycolate ⁻	5.72E-03	2.62E+02	9.97E+02
acetate ⁻	3.63E-03	1.31E+02	4.97E+02
oxalate ²⁻	0	0	0
DBP	0	0	0
NPH	0	0	0
CCl ₄	0	0	0
hexone	0	0	0
Fe(CN) ₆ ⁴⁻	0	0 (g-mol)	0
Radiochemical Constituents:			
Pu		2.99E-02 (μCi/g)	1.89 (kg)
U	2.31E-02 (M)	3.36E+03 (μg/g)	1.28E+04 (kg)
Cs	0.28 (Ci/L)	1.74E+02 (μCi/g)	6.62E+05 (Ci)
Sr	0.23 (Ci/L)	1.42E+02 (μCi/g)	5.40E+05 (Ci)



* Composite inventory excludes supernatant, diatomaceous earth, and cement. Unknowns in tank inventory are assigned by Tank Layering Model (TLM).

Table 15
Inventory Estimate of Tank 241-SX-105 (Gaddis, 1994b, p. 122)

Single-Shell Tank 241-SX-105			
Solids Composite Inventory Estimate			
Physical Properties			
Total Solid Waste	4.31E+06 kg (683 kgal)		
Heat load	7.29 kW (2.49E+04 BTU/hr)		
Bulk Density	1.67 (g/cc)		
Void Fraction	0.51		
Water wt%	23.87		
TOC wt% C (wet)	0.03		
Chemical Constituents	moles/l	ppm	kg
Na ⁺	12.79	1.76E+05	7.60E+05
Al ³⁺	0.71	1.14E+04	4.93E+04
Fe ³⁺ (total Fe)	1.52E-02	5.11E+02	2.20E+03
Cr ³⁺	9.77E-02	3.05E+03	1.31E+04
Bi ³⁺	0	0	0
La ³⁺	0	0	0
Ce ³⁺	0	0	0
Zr (as ZrO(OH) ₂)	0	0	0
Pb ²⁺	0	0	0
Ni ²⁺	5.21E-03	1.84E+02	7.91E+02
Sr ²⁺	0	0	0
Mn ²⁺	0.14	4.64E+03	2.00E+04
Ca ²⁺	0	0	0
K ⁺	8.17E-03	1.92E+02	8.26E+02
OH ⁻	3.25	3.32E+04	1.43E+05
NO ₃ ⁻	9.14	3.40E+05	1.46E+06
NO ₂ ⁻	0.11	3.10E+03	1.34E+04
CO ₃ ²⁻	0.62	2.22E+04	9.56E+04
PO ₄ ³⁻	0.51	2.93E+04	1.26E+05
SO ₄ ²⁻	0.30	1.73E+04	7.47E+04
Si (as SiO ₂) ²⁻	0	0	0
F ⁻	9.57E-02	1.09E+03	4.70E+03
Cl ⁻	7.16E-03	1.52E+02	6.56E+02
C ₂ H ₃ O ₂ ⁻	4.11E-03	4.66E+02	2.01E+03
EDTA ⁴⁻	0	0	0
HEDTA ³⁻	4.82E-06	0.79	3.42
NTA ³⁻	0	0	0
glycolate ⁻	7.05E-03	3.17E+02	1.37E+03
acetate ⁻	4.47E-03	1.58E+02	6.82E+02
oxalate ²⁻	0	0	0
DBP	0	0	0
NPH	0	0	0
CCL	0	0	0
hexone	0	0	0
Fe(CN) ₆ ⁴⁻	0	0 (g-mol)	0
Radiological Constituents			
Pu		1.98E-02 (μCi/g)	1.42 (kg)
U	2.81E-02 (M)	4.02E+03 (μg/g)	1.73E+04 (kg)
Cs	0.34 (Ci/L)	2.06E+02 (μCi/g)	8.88E+05 (Ci)
Sr	0.18 (Ci/L)	1.08E+02 (μCi/g)	4.64E+05 (Ci)

* Composite inventory excludes supernatant, diatomaceous earth, and cement. Unknowns in tank inventory are assigned by Tank Layering Model (TLM).

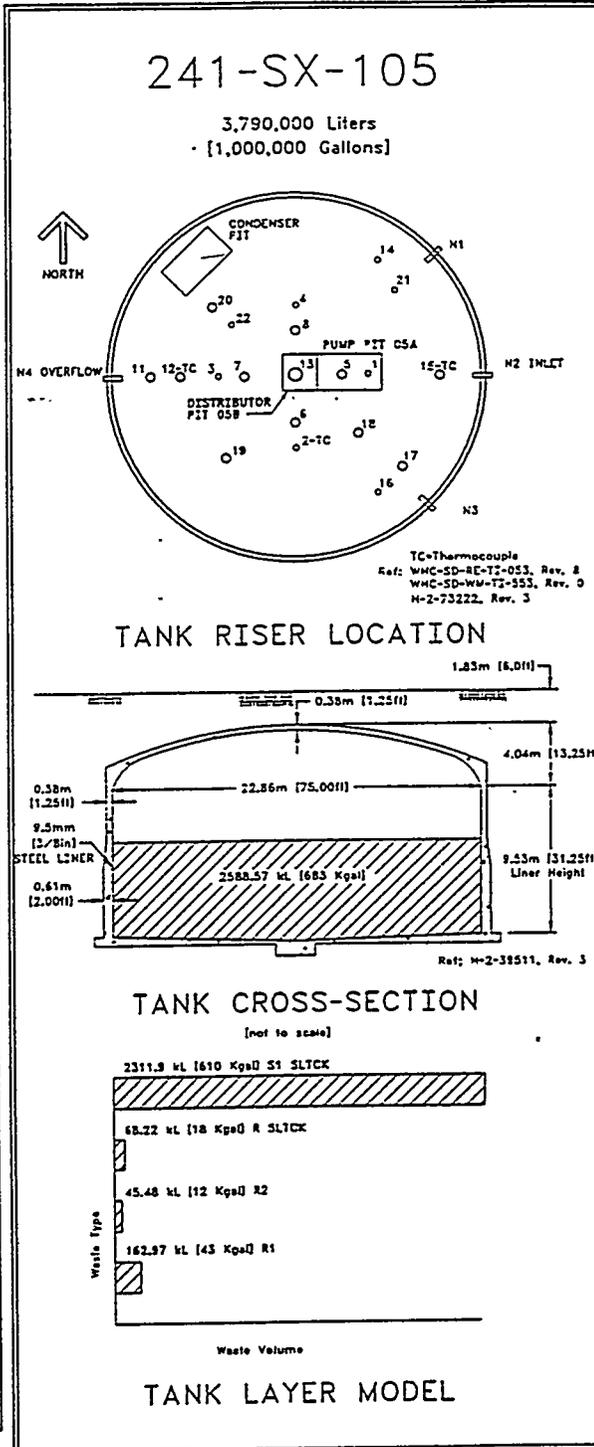
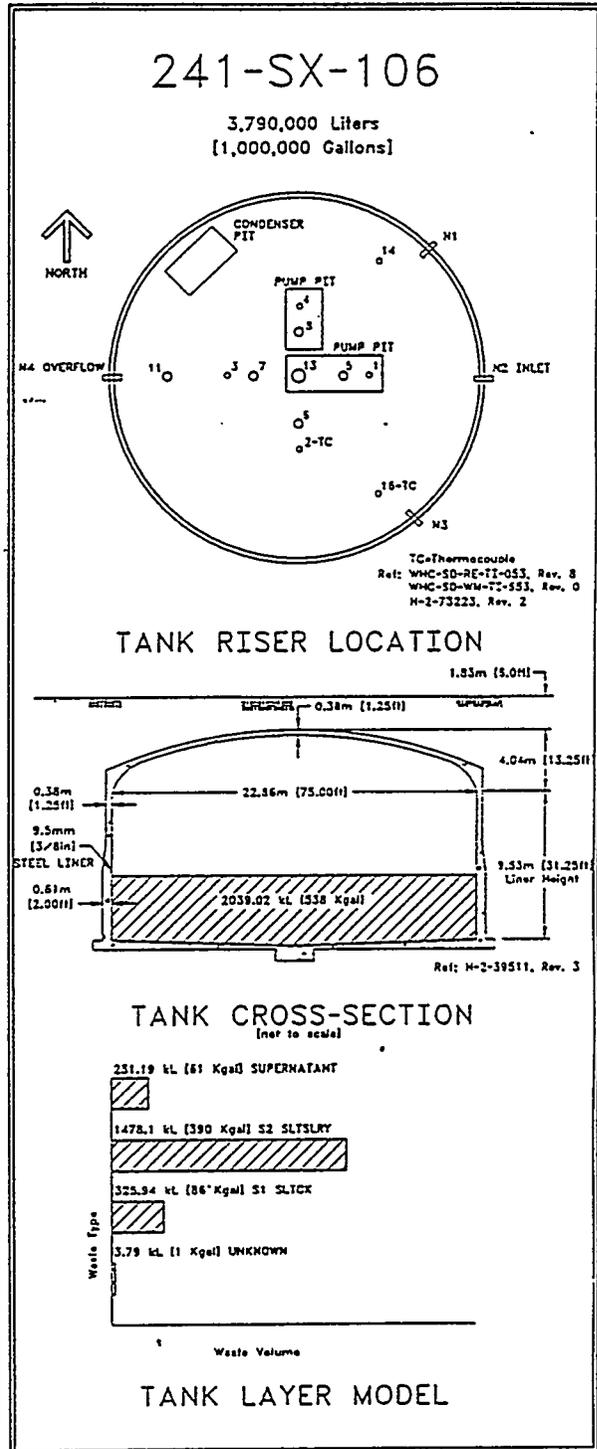


Table 16
Inventory Estimate of Tank 241-SX-106 (Gaddis, 1994b, p. 127)

Single-Shell Tank 241-SX-106			
Solids Composite Inventory Estimate			
Physical Properties			
Total Solid Waste	3.38E+06 kg (477 kgal)		
Heat load	3.42 kW (1.17E+04 BTU/hr)		
Bulk Density	1.87 (g/cc)		
Void Fraction	0.26		
Water wt%	5.85		
TOC wt% C (wet)	0.16		
Chemical Constituents			
	moles/L	ppm	kg
Na ⁺	18.04	2.22E+05	7.49E+05
Al ³⁺	2.61	3.77E+04	1.27E+05
Fe ³⁺ (total Fe)	1.18E-03	35.39	1.19E+02
Ca ²⁺	8.10E-03	2.25E+02	7.60E+02
Bi ³⁺	0	0	0
La ³⁺	0	0	0
Ce ³⁺	0	0	0
Zr (as ZrO(OH) ₂)	0	0	0
Pb ²⁺	0	0	0
Ni ²⁺	1.05E-03	33.03	1.12E+02
Sr ²⁺	0	0	0
Mn ²⁺	2.84E-02	8.35E+02	2.82E+03
Ca ²⁺	0	0	0
K ⁺	4.28E-02	8.95E+02	3.02E+03
OH ⁻	9.42	8.57E+04	2.89E+05
NO ₃ ⁻	11.01	3.65E+05	1.23E+06
NO ₂ ⁻	0.65	1.60E+04	5.41E+04
CO ₃ ²⁻	1.03	3.32E+04	1.12E+05
PO ₄ ³⁻	0.33	1.66E+04	5.60E+04
SO ₄ ²⁻	0.83	4.27E+04	1.44E+05
Si (as SiO ₂)	0	0	0
F ⁻	0.51	5.14E+03	1.74E+04
Cl ⁻	3.84E-02	7.28E+02	2.46E+03
C ₂ H ₂ O ₇ ⁻	2.18E-02	2.20E+03	7.44E+03
EDTA ⁴⁻	0	0	0
HEDTA ³⁻	2.57E-05	3.77	12.72
NTA ³⁻	0	0	0
glycolate ⁻	3.69E-02	1.48E+03	5.00E+03
acetate ⁻	2.34E-02	7.39E+02	2.49E+03
oxalate ²⁻	0	0	0
DBP	0	0	0
NPH	0	0	0
CCL	0	0	0
hexone	0	0	0
Fe(CN) ₆ ⁴⁻	0	0 (g-mol)	0
Radiological Constituents			
Pu	1.39E-03 (μCi/g)	7.83E-02 (kg)	
U	4.30E-02 (M)	5.47E+03 (μg/g)	1.85E+04 (kg)
Cs	0.38 (Ci/L)	2.04E+02 (μCi/g)	6.90E+05 (Ci)
Sr	1.51E-02 (Ci/L)	8.06 (μCi/g)	2.72E+04 (Ci)



* Composite inventory excludes supernatant, diatomaceous earth, and cement. Unknowns in tank inventory are assigned by Tank Layering Model (TLM).

Table 17
Inventory Estimate of Tank 241-U-102 (Gaddis, 1994b, p. 187)

Single-Shell Tank 241-U-102 Solids Composite Inventory Estimate			
Physical Properties			
Total Solid Waste	2.21E+06 kg (356 kgal)		
Heat load	1.07 kW (3.64E+03 BTU/hr)		
Bulk Den	1.64 (g/cc)		
Void Fraction	0.42		
Water wt%	24.44		
TOC wt% C (wet)	0.05		
Chemical Constituents			
	mole/L	ppm	kg
Na ⁺	12.68	1.77E+05	3.93E+05
Al ³⁺	0.90	1.48E+04	3.28E+04
Fe ³⁺ (total Fe)	0	0	0
Cr ³⁺	0	0	0
Bi ³⁺	0	0	0
La ³⁺	0	0	0
Ce ³⁺	0	0	0
Zr (as ZrO(OH) ₂)	0	0	0
Pb ²⁺	0	0	0
Ni ²⁺	0	0	0
Sr ²⁺	0	0	0
Mn ²⁺	0	0	0
Ca ²⁺	0	0	0
K ⁺	1.40E-02	3.33E+02	7.37E+02
OH ⁻	3.58	3.70E+04	8.20E+05
NO ₃ ⁻	5.16	1.95E+05	4.31E+05
NO ₂ ⁻	0.25	6.89E+03	1.53E+04
CO ₃ ²⁻	0.99	3.60E+04	7.98E+04
PO ₄ ³⁻	1.11	6.43E+04	1.42E+05
SO ₄ ²⁻	0.80	4.70E+04	1.04E+05
Si (as SiO ₂)	0	0	0
F ⁻	0.21	2.40E+03	5.32E+03
Cl ⁻	2.03E-02	4.37E+02	9.68E+02
C ₂ H ₃ O ₇ ⁻³	7.14E-03	8.22E+02	1.82E+03
EDTA ⁴⁻	0	0	0
HEDTA ³⁻	8.42E-06	1.41	3.11
NTA ³⁻	0	0	0
glycolate ⁻	1.21E-02	5.51E+02	1.22E+03
acetate ⁻	7.65E-03	2.75E+02	6.09E+02
oxalate ²⁻	0	0	0
DBP	0	0	0
NPH	0	0	0
CCl ₄	0	0	0
hexone	0	0	0
Fe(CN) ₆ ⁴⁻	0	0 (g-mol)	
Radiological Constituents			
Pu		1.55E-02 (μCi/g)	0.57 (kg)
U	0.12 (M)	1.77E+04 (μg/g)	3.92E+04 (kg)
Cs	0.11 (Ci/L)	68.46 (μCi/g)	1.52E+05 (Ci)
Sr	3.92E-02 (Ci/L)	23.85 (μCi/g)	5.28E-04 (Ci)

* Composite inventory excludes supernatant, diatomaceous earth, and cement.
Unknowns in tank inventory are assigned by Tank Layering Model (TLM).

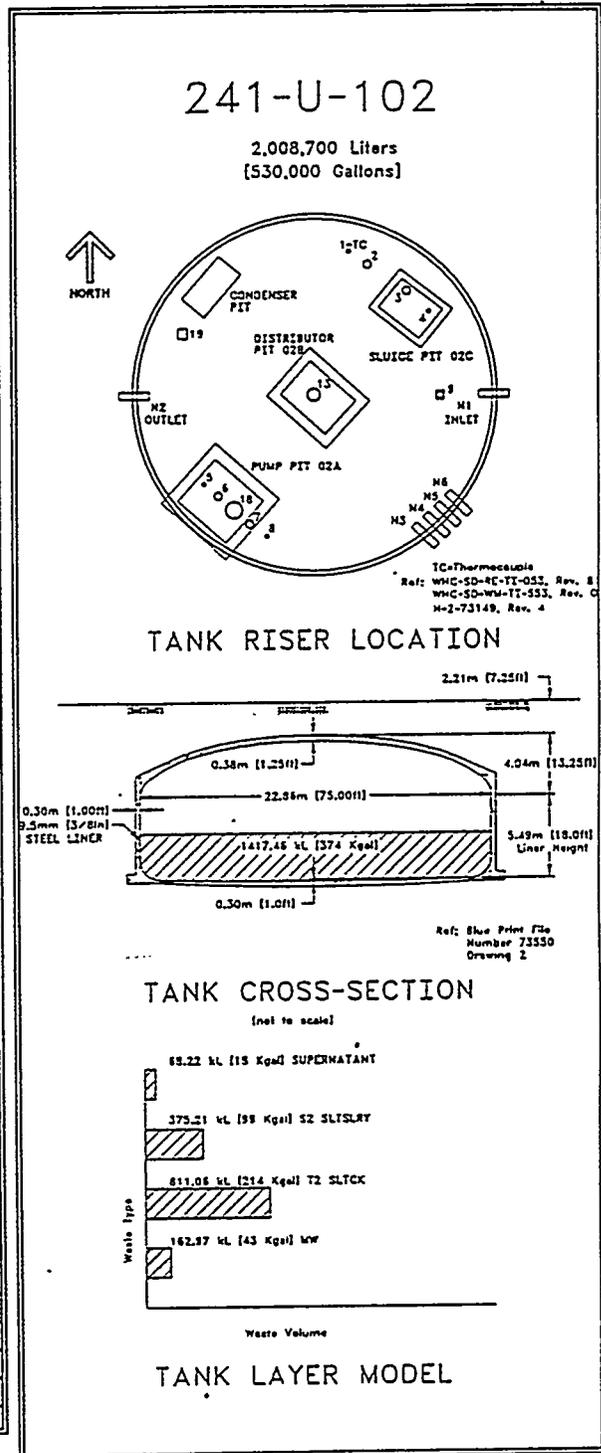


Table 18
Inventory Estimate of Tank 241-U-103 (Gaddis, 1994b, p. 192)

Single-Shell Tank 241-U-103 - Solids Composite Inventory Estimate			
Physical Properties			
Total Solid Waste	3.00E+06 kg (455 kgal)		
Heat load	3.08 kW (1.05E+04 BTU/hr)		
Bulk Density	1.74 (g/cc)		
Void Fraction	0.39		
Water wt%	18.09		
TOC wt% C (wet)	0.07		
Chemical Constituents			
	mole/L	ppm	kg
Na ⁺	15.06	1.99E+05	5.96E+05
Al ³⁺	1.07	1.67E+04	4.99E+04
Fe ³⁺ (total Fe)	0	0	0
Cr ³⁺	1.52E-03	45.38	1.36E+02
Bi ³⁺	0	0	0
La ³⁺	0	0	0
Ce ³⁺	0	0	0
Zr (as ZrO(OH) ₂)	0	0	0
Pb ²⁺	0	0	0
Ni ²⁺	3.87E-03	1.31E+02	3.92E+02
Sr ²⁺	0	0	0
Mn ⁴⁺	0.10	3.31E+03	9.90E+03
Ca ²⁺	0	0	0
K ⁺	1.95E-02	4.37E+02	1.31E+03
OH ⁻	4.47	4.37E+04	1.31E+05
NO ₃ ⁻	9.50	3.39E+05	1.01E+06
NO ₂ ⁻	0.29	7.56E+03	2.27E+04
CO ₃ ²⁻	0.91	3.14E+04	9.40E+04
PO ₄ ³⁻	0.66	3.58E+04	1.07E+05
SO ₄ ²⁻	0.47	2.61E+04	7.81E+04
Si (as SiO ₃ ²⁻)	0	0	0
F ⁻	0.23	2.50E+03	7.48E+03
Cl ⁻	1.72E-02	3.50E+02	1.05E+03
C ₂ H ₃ O ₇ ³⁻	9.80E-03	1.06E+03	3.19E+03
EDTA ⁴⁻	0	0	0
HEDTA ³⁻	1.15E-05	1.81	5.43
NTA ³⁻	0	0	0
glycolate ⁻	1.68E-02	7.23E+02	2.17E+03
acetate ⁻	1.06E-02	3.61E+02	1.08E+03
oxalate ²⁻	0	0	0
DBP	0	0	0
NPH	0	0	0
CCl ₄	0	0	0
hexone	0	0	0
Fe(CN) ₆ ⁴⁻	0	0 (g-mol)	0
Radiological Constituents			
Pu		8.49E-03 (μCi/g)	0.42 (kg)
U	8.54E-02 (M)	1.17E+04 (μg/g)	3.5E+04 (kg)
Cs	0.35 (Ci/L)	2.01E+02 (μCi/g)	6.01E+05 (Ci)
Sr	2.28E-02 (Ci/L)	13.11 (μCi/g)	3.93E+04 (Ci)

* Composite inventory excludes supernatant, diatomaceous earth, and cement.
Unknowns in tank inventory are assigned by Tank Layering Model (TLM).

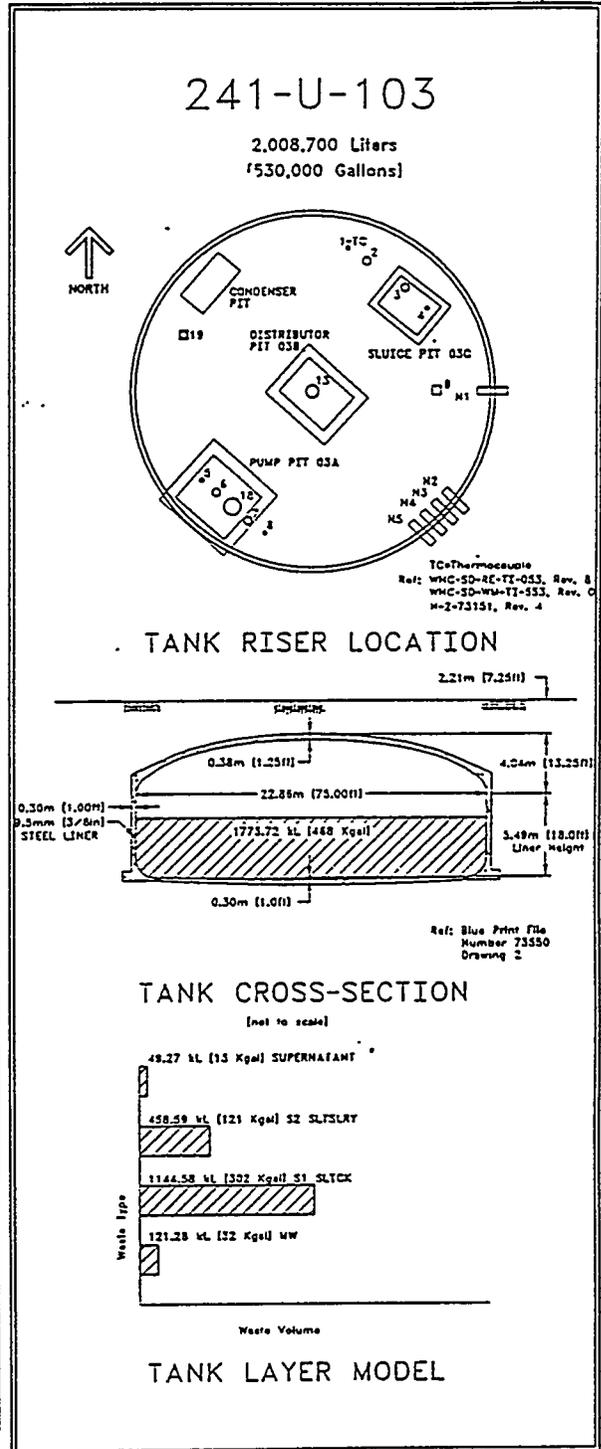
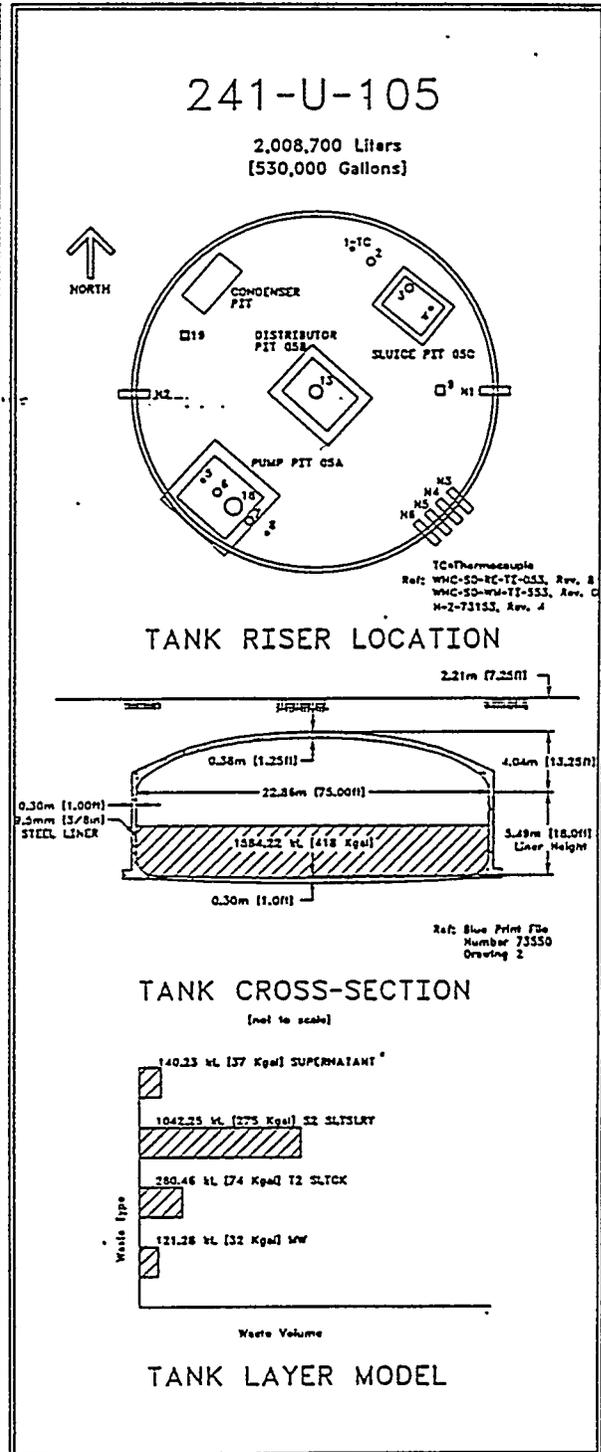


Table 19
Inventory Estimate of Tank 241-U-105 (Gaddis, 1994b, p. 202)

Single-Shell Tank 241-U-105			
Solids Composite Inventory Estimate			
Physical Properties			
Total Solid Waste	2.62E+06 kg (381 kgal)		
Heat load	2.16 kW (7.36E+03 BTU/hr)		
Bulk Density	1.82 (g/cc)		
Void Fraction	0.28		
Water wt%	11.52		
TOC wt% C (wet)	0.13		
Chemical Constituents			
	mol/L	ppm	kg
Na ⁺	16.65	2.11E+05	5.52E+05
Al ³⁺	2.25	3.35E+04	8.76E+04
Fe ³⁺ (total Fe)	0	0	0
Cr ³⁺	0	0	0
Bi ³⁺	0	0	0
La ³⁺	0	0	0
Ce ³⁺	0	0	0
Zr (as ZrO(OH) ₂)	0	0	0
Pb ²⁺	0	0	0
Ni ²⁺	0	0	0
Sr ²⁺	0	0	0
Mn ⁴⁺	0	0	0
Ca ²⁺	0	0	0
K ⁺	3.63E-02	7.82E+02	2.05E+03
OH ⁻	8.26	7.73E+04	2.02E+05
NO ₃ ⁻	8.81	3.01E+05	7.88E+05
NO ₂ ⁻	0.57	1.43E+04	3.75E+04
CO ₃ ²⁻	1.13	3.73E+04	9.77E+04
PO ₄ ³⁻	0.66	3.46E+04	9.05E+04
SO ₄ ²⁻	0.86	4.54E+04	1.19E+05
Si (as SiO ₃ ²⁻)	0	0	0
F ⁻	0.44	4.64E+03	1.21E+04
Cl ⁻	3.51E-02	6.86E+02	1.80E+03
C ₂ H ₃ O ₂ ⁻	1.85E-02	1.93E+03	5.06E+03
EDTA ⁴⁻	0	0	0
HEDTA ³⁻	2.19E-05	3.30	8.64
NTA ³⁻	0	0	0
glycolate ⁻	3.13E-02	1.29E+03	3.39E+03
acetate ⁻	1.99E-02	6.46E+02	1.69E+03
oxalate ²⁻	0	0	0
DBP	0	0	0
NPH	0	0	0
CCl ₄	0	0	0
hexone	0	0	0
Fe(CN) ₆ ⁴⁻	0	0 (g-mol)	
Radiological Constituents			
Pu		9.72E-03 (μCi/g)	0.42 (kg)
U	0.10 (M)	1.34E+04 (μg/g)	3.51E+04 (kg)
Cs	0.28 (Ci/L)	1.54E+02 (μCi/g)	4.04E+05 (Ci)
Sr	2.72E-02 (Ci/L)	15.00 (μCi/g)	3.93E+04 (Ci)



* Composite inventory excludes supernatant, diatomaceous earth, and cement. Unknowns in tank inventory are assigned by Tank Layering Model (TLM).

Table 20
Inventory Estimate of Tank 241-U-107 (Gaddis, 1994b, p. 212)

Single-Shell Tank 241-U-107			
Solids Composite Inventory Estimate			
Physical Properties			
Total Solid Waste	2.61E+06g (375 kgal)		
Heat load	2.33 kW (7.94E+03 BTU/hr)		
Bulk Density	1.84 (g/cc)		
Void Fraction	0.27		
Water wt%	13.47		
TOC wt% C (wet)	0.14		
Chemical Constituents	moles/L	ppm	kg
Na ⁺	16.19	2.03E+05	5.28E+05
Al ³⁺	2.96	4.34E+04	1.13E+05
Fe ³⁺ (total Fe)	0	0	0
Cr ³⁺	3.86E-03	1.09E+02	2.85E-02
Bi ³⁺	0	0	0
La ³⁺	0	0	0
Ce ³⁺	0	0	0
Zr (as ZrO(OH) ₂)	0	0	0
Pb ²⁺	0	0	0
Ni ²⁺	0	0	0
Sr ²⁺	0	0	0
Mn ⁴⁺	0	0	0
Ca ²⁺	0	0	0
K ⁺	3.82E-02	8.13E+02	2.12E+03
OH ⁻	10.54	9.75E+04	2.54E+05
NO ₃ ⁻	8.99	3.03E+05	7.91E+05
NO ₂ ⁻	0.61	1.52E+04	3.97E+04
CO ₃ ²⁻	1.11	3.61E+04	9.42E+04
PO ₄ ³⁻	0.50	2.59E+04	6.75E+04
SO ₄ ²⁻	0.73	3.82E+04	9.96E+04
Si (as SiO ₂)	0	0	0
F ⁻	0.45	4.69E+03	1.22E+04
Cl ⁻	3.47E-02	6.68E+02	1.74E+03
C ₆ H ₅ O ₇ ³⁻	1.97E-02	2.02E+03	5.28E+03
EDTA ⁴⁻	0	0	0
HEDTA ³⁻	2.33E-05	3.47	9.06
NTA ³⁻	0	0	0
glycolate ⁻	3.30E-02	1.35E+03	3.51E+03
acetate ⁻	2.09E-02	6.72E+02	1.75E+03
oxalate ²⁻	0	0	0
DBP	0	0	0
NPH	0	0	0
CCL ₄	0	0	0
hexone	0	0	0
Fe(CN) ₆ ⁴⁻	0	0 (g-mol)	0
Radiological Constituents			
Pu		0.23 (uCi/g)	9.84 (kg)
U	0.11 (M)	1.45E+04 (ug/g)	3.78E+04 (kg)
Cr	0.30 (Ci/L)	1.65E+02 (uCi/g)	4.29E+05 (Ci)
Sr	3.29E-02 (Ci/L)	17.87 (uCi/g)	4.66E+04 (Ci)

* Composite inventory excludes supernatant, diatomaceous earth, and cement. Unknowns in tank inventory are assigned by Tank Layering Model (TLM).

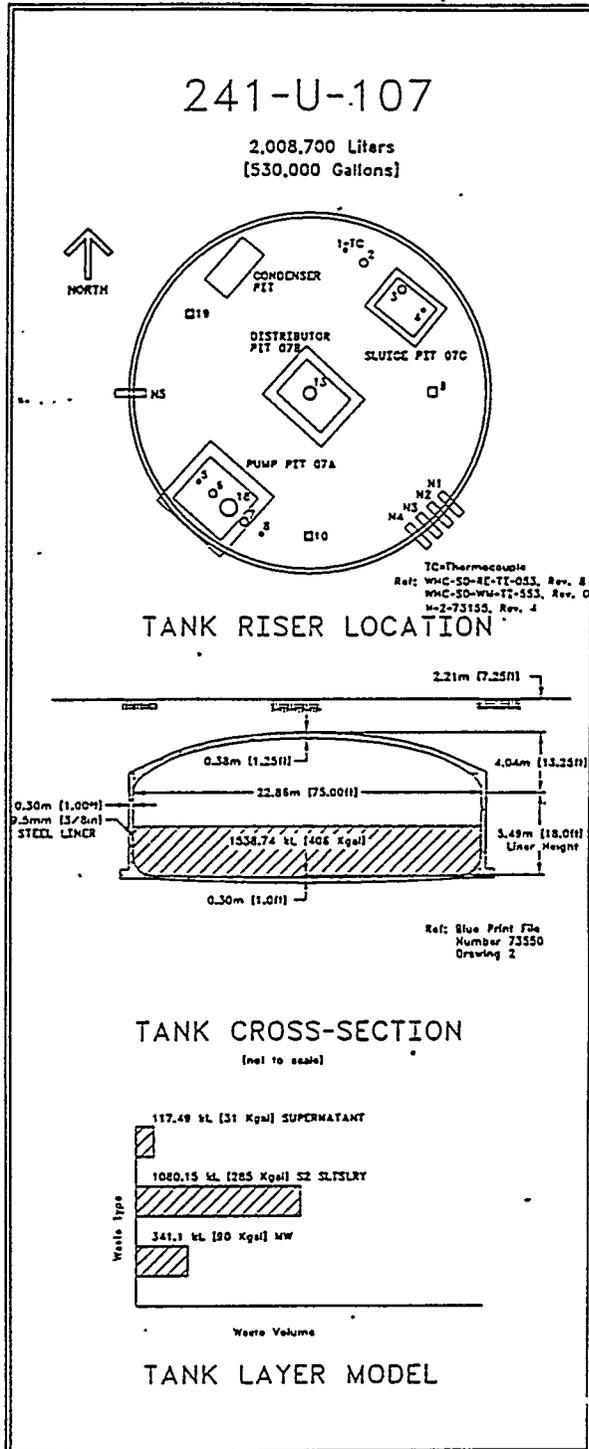


Table 21
Inventory Estimate of Tank 241-U-109 (Gaddis, 1994b, p. 222)

Single-Shell Tank 241-U-109			
Solids Composite Inventory Estimate			
Physical Properties			
Total Solid Waste	2.97E+06 kg (444 kgal)		
Heat load	2.85 kW (9.73E+03 BTU/hr)		
Bulk Density	1.77 (g/cc)		
Void Fraction	0.37		
Water wt%	16.84		
TOC wt% C (wet)	0.09		
Chemical Constituents	moles/L	ppm	kg
Na ⁺	15.15	1.97E+05	5.85E+05
Al ³⁺	1.76	2.69E+04	7.96E+04
Fe ³⁺ (total Fe)	0	0	0
Cr ³⁺	1.11E-03	32.62	96.81
Bi ³⁺	0	0	0
La ³⁺	0	0	0
Ce ³⁺	0	0	0
Zr (as ZrO(OH) ₂)	0	0	0
Pb ²⁺	0	0	0
Ni ²⁺	2.83E-03	93.92	2.79E+02
Sr ²⁺	0	0	0
Mn ²⁺	7.64E-02	2.38E+03	7.05E+03
Ca ²⁺	0	0	0
K ⁺	2.49E-02	5.52E+02	1.64E+03
OH ⁻	6.58	6.34E+04	1.88E+05
NO ₃ ⁻	9.37	3.29E+05	9.77E+05
NO ₂ ⁻	0.38	9.97E+03	2.96E+04
CO ₃ ²⁻	0.91	3.10E+04	9.20E+04
PO ₄ ³⁻	0.54	2.93E+04	8.69E+04
SO ₄ ²⁻	0.55	2.97E+04	8.82E+04
Si (as SiO ₂)	0	0	0
F ⁻	0.29	3.16E+03	9.39E+03
Cl ⁻	2.22E-02	4.46E+02	1.32E+03
C ₆ H ₅ O ₇ ³⁻	1.26E-02	1.35E+03	4.02E+03
EDTA ⁴⁻	0	0	0
HEDTA ³⁻	1.49E-05	2.31	6.85
NTA ³⁻	0	0	0
glycolate ⁻	2.15E-02	9.14E+02	2.71E+03
acetate ⁻	1.36E-02	4.56E+02	1.35E+03
oxalate ²⁻	0	0	0
DBP	0	0	0
NPH	0	0	0
CCl ₄	0	0	0
hexone	0	0	0
Fe(CN) ₆ ⁴⁻	0	0 (g-mol)	0
Radiological Constituents			
Pu		0.13 (μCi/g)	6.22 (kg)
U	7.42E-02 (M)	1.00E+04 (μg/g)	2.97E+04 (kg)
Cs	0.34 (Ci/L)	1.91E+02 (μCi/g)	5.66E+05 (Ci)
Sr	1.75E-02 (Ci/L)	9.92 (μCi/g)	2.95E+04 (Ci)

* Composite inventory excludes supernatant, diatomaceous earth, and cement.
Unknowns in tank inventory are assigned by Tank Layering Model (TLM).

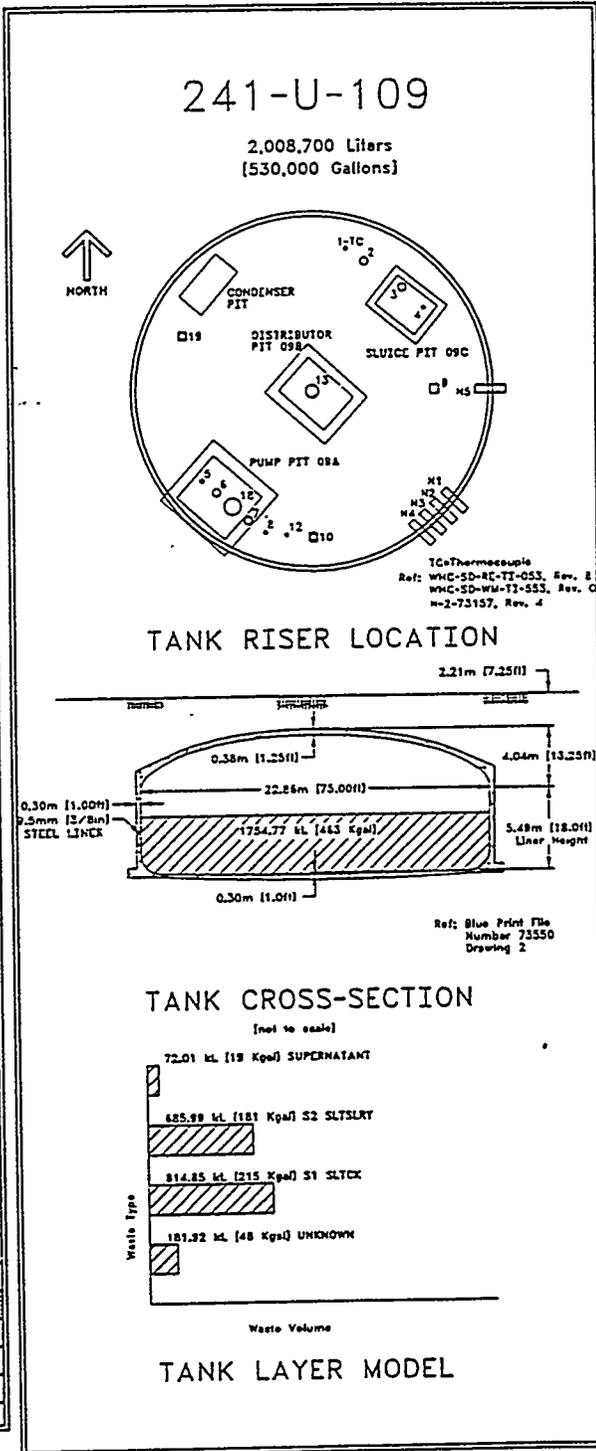
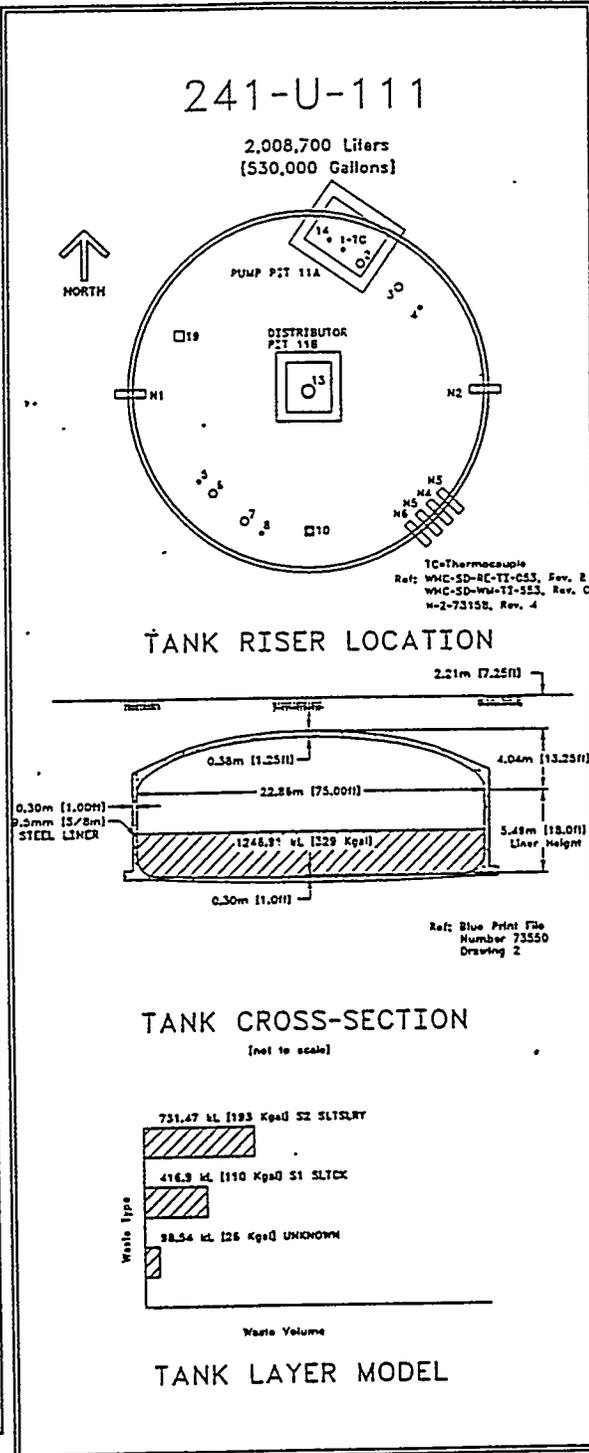


Table 22
Inventory Estimate of Tank 241-U-111 (Gaddis, 1994b, p. 232)

Single-Shell Tank 241-U-111			
Solids Composite Inventory Estimate			
Physical Properties			
Total Solid Waste	2.24E+06 kg (329 kgal)		
Heat load	2.34 kW (7.99E+03 BTU/hr)		
Bulk Density	1.80 (g/cc)		
Void Fraction	0.33		
Water wt%	13.35		
TOC wt% C (wet)	0.12		
Chemical Constituents			
	moles/L	ppm	kg
Na ⁺	16.08	2.06E+05	4.60E+05
Al ³⁺	2.14	3.21E+04	7.18E+04
Fe ³⁺ (total Fe)	1.20E-02	3.73E+02	8.33E+02
Cl ⁻	1.93E-02	5.58E+02	1.25E+03
Bi ³⁺	4.04E-03	4.70E+02	1.05E+03
La ³⁺	0	0	0
Ce ³⁺	0	0	0
Zr (as ZrO(OH) ₂)	1.15E-03	58.60	1.31E+02
Pb ²⁺	0	0	0
Ni ²⁺	1.95E-03	63.78	1.43E+02
Sr ²⁺	0	0	0
Mn ²⁺	5.27E-02	1.61E+03	3.61E+03
Ca ²⁺	0	0	0
K ⁺	3.26E-02	7.09E+02	1.59E+03
OH ⁻	7.81	7.39E+04	1.65E+05
NO ₃ ⁻	9.97	3.44E+05	7.70E+05
NO ₂ ⁻	0.50	1.27E+04	2.84E+04
CO ₃ ²⁻	0.88	2.95E+04	6.59E+04
PO ₄ ³⁻	0.42	2.23E+04	4.99E+04
SO ₄ ²⁻	0.67	3.56E+04	7.96E+04
Si (as SiO ₂)	1.10E-02	1.71E+02	3.83E+02
F ⁻	0.39	4.13E+03	9.23E+03
Cl ⁻	2.92E-02	5.75E+02	1.29E+03
C ₂ H ₃ O ₇ ⁻	1.66E-02	1.74E+03	3.90E+03
EDTA ⁴⁻	0	0	0
HEDTA ³⁻	1.95E-05	2.98	6.66
NTA ³⁻	0	0	0
glycolate ⁻	2.81E-02	1.17E+03	2.62E+03
acetate ⁻	1.78E-02	5.86E+02	1.31E+03
oxalate ²⁻	0	0	0
DBP	0	0	0
NPH	0	0	0
CCl ₄	0	0	0
hexone	0	0	0
Fe(CN) ₆ ⁴⁻	0	0 (g-mol)	
Radiological Constituents			
Pu		5.22E-03 (μCi/g)	0.19 (kg)
U	3.72E-02 (M)	4.94E+03 (μg/g)	1.10E+04 (kg)
Cs	0.35 (Ci/L)	1.96E+02 (μCi/g)	4.39E+05 (Ci)
Sr	3.37E-02 (Ci/L)	18.77 (μCi/g)	4.20E+04 (Ci)

* Composite inventory excludes supernatant, diatomaceous earth, and cement.
Unknowns in tank inventory are assigned by Tank Layering Model (TLM).



6.0 FIGURES

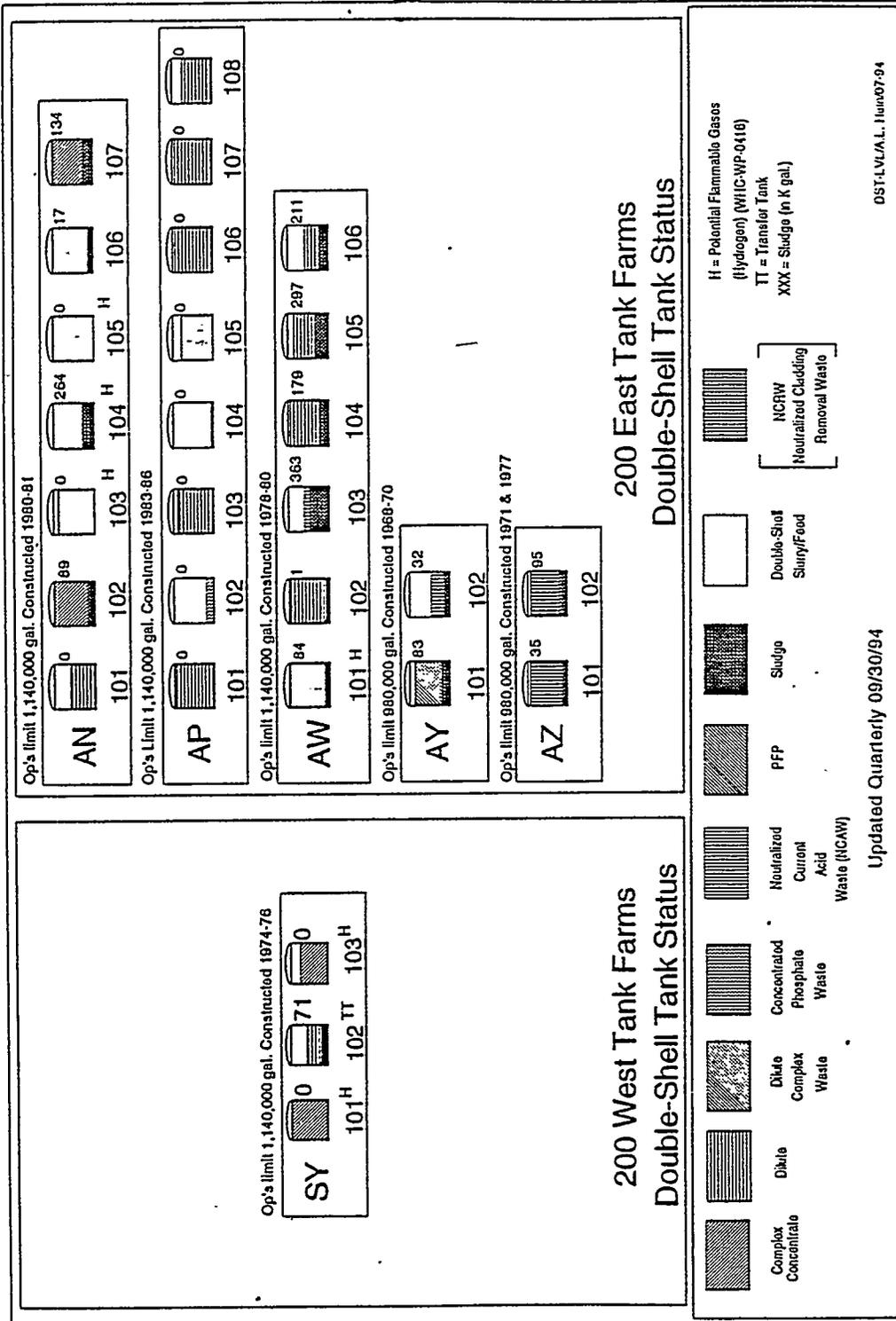
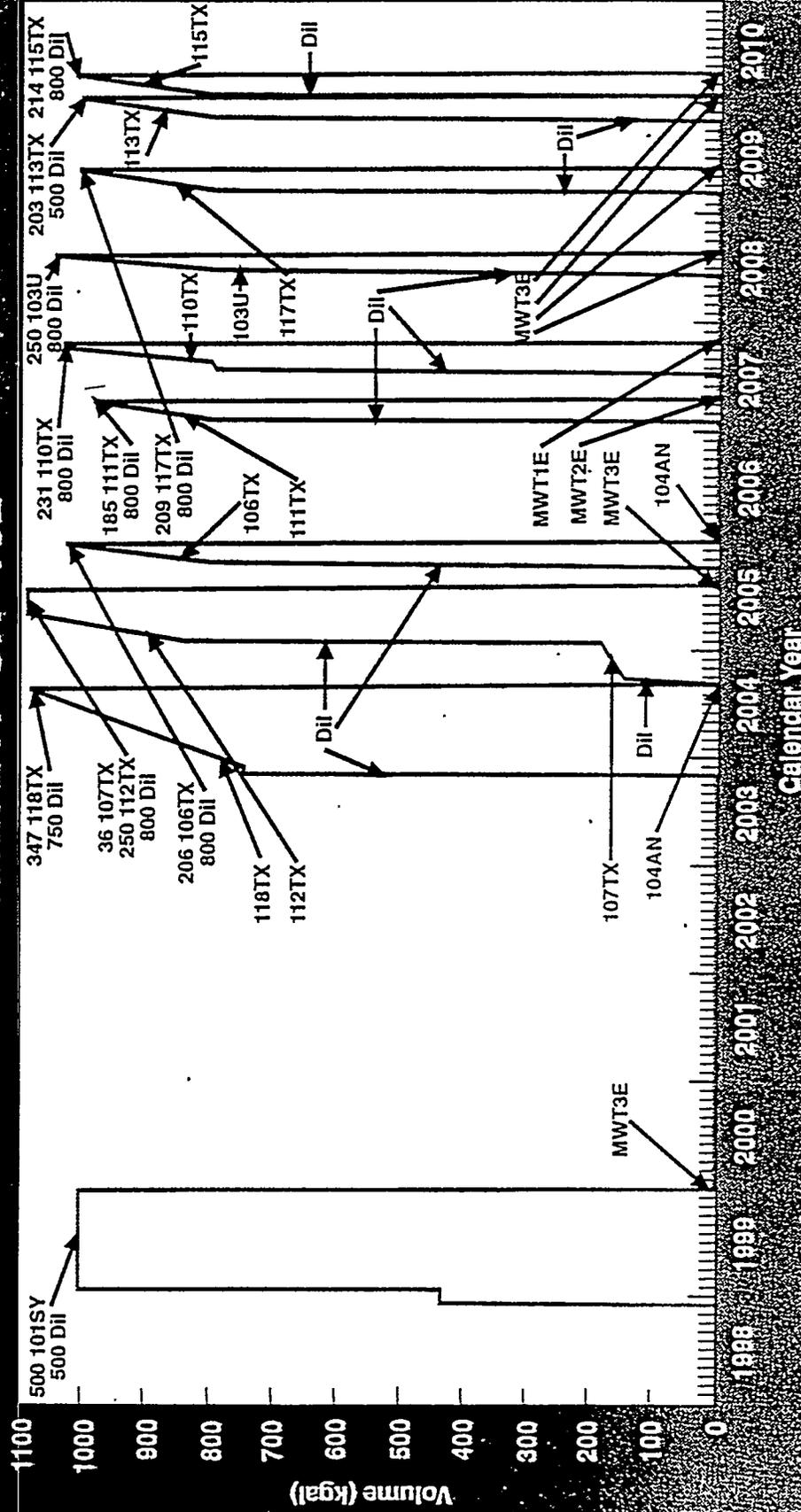


Figure 1
Double-Shell Tank Status (Hanlon, 1994)

Figure 3
MWT Retrieval Sequence

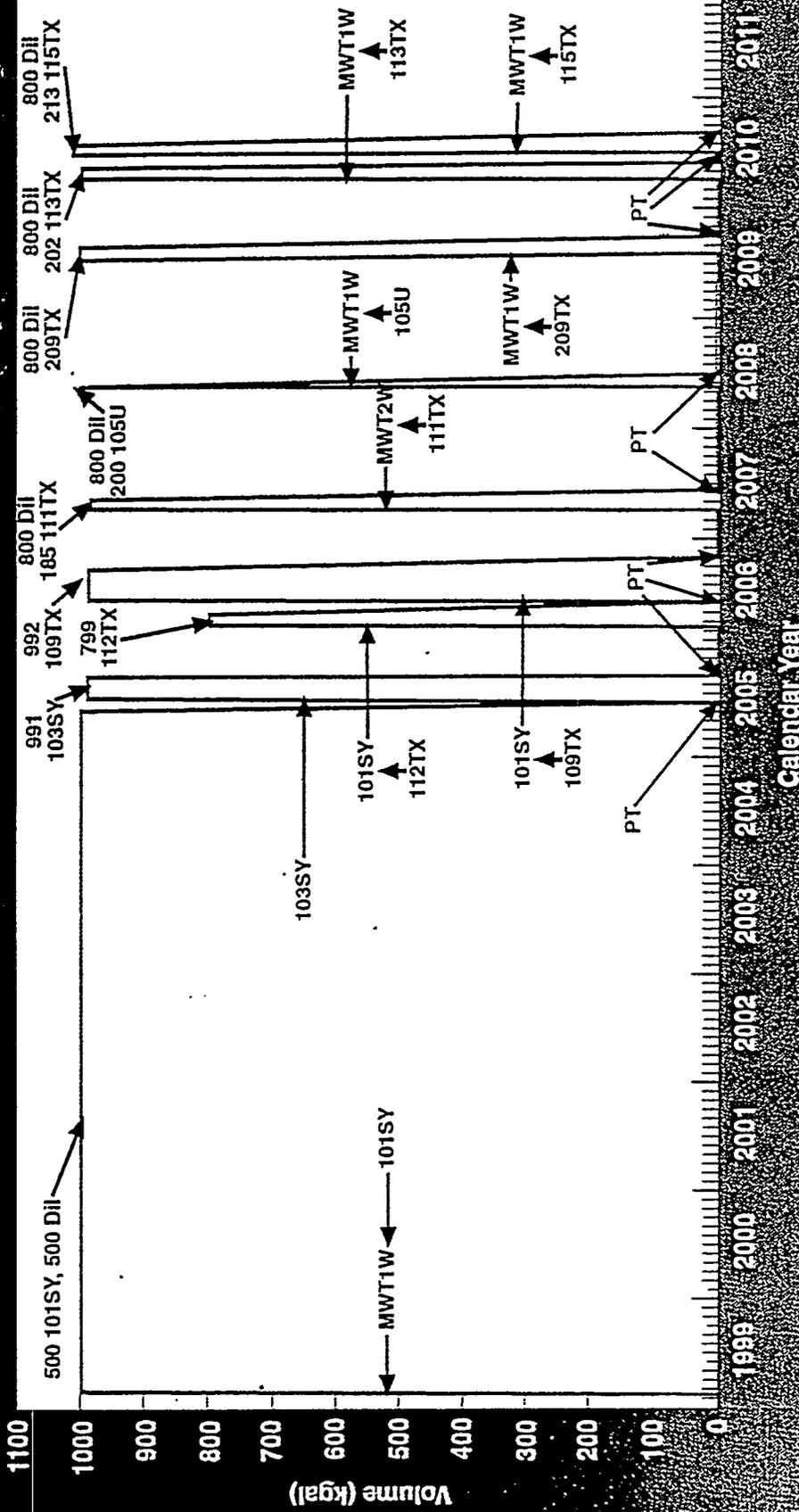
Tank 241-SN-102



Dil = Dilute

Figure 5
MWT Retrieval Sequence

Tank 241-HN-102



PT = To Pretreatment plant
Dil = Dilute

Figure 7
MUTF Retrieval Sequence

