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RCRA PART B PERMIT APPLICATION

FOR THE

IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY

Volume 14
INTEC Liquid Waste Management System

Section D
Process Information

October 2003

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ACRONYMS

AE	Architectural Engineer
API	American Petroleum Industry
APS	Atmospheric Protection System
ASME	American Society of Mechanical Engineers
CFR	Code of Federal Regulations
COPC	compounds of potential concern
CPP	Chemical Processing Plant
DCS	Distributed Control System
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
ETS	Evaporator Tank System
HEPA	high efficiency particulate air
HLLWE	High Level Liquid Waste Evaporator
IDAPA	Idaho Administrative Procedures Act
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
ILWMS	INTEC Liquid Waste Management System
LET&D	Liquid Effluent Treatment and Disposal (facility)
LRA	level recorder alarm
NWCF	New Waste Calcining Facility
PE	professional engineer
PEWE	Process Equipment Waste Evaporator
P&ID	piping and instrumentation diagram
PIC	Products of Incomplete Combustion
ppm	parts per million

POG	process offgas
PWL	process waste liquid
RCRA	Resource Conservation and Recovery Act
SLRA	Screening Level Risk Assessment
TFF	Tank Farm Facility
TFT	Tank Farm Tank
TOC	Total Organic Carbon
VOG	vessel offgas
WAC	waste acceptance criteria
WC	water column
WWH	Westside Waste Holdup

SECTION D. PROCESS INFORMATION

D-1. PROCESS INFORMATION

As defined under the Resource Conservation and Recovery Act (RCRA), the Idaho Hazardous Waste Management Act, the Code of Federal Regulations (CFR), and the Idaho Administrative Procedures Act (IDAPA), there are three process codes associated with the regulated hazardous waste management units in the Idaho Nuclear Technology and Engineering Center (INTEC) Liquid Waste Management System (ILWMS). The process codes are S02, tank storage; T01, tank treatment; and X99, other miscellaneous treatment.

The system consists of the Process Equipment Waste Evaporator (PEWE) system, the Liquid Effluent Treatment and Disposal (LET&D) facility, and the Evaporator Tank System (ETS). The ETS will be addressed in a modification to the final partial permit, when issued. The system includes tanks and ancillary equipment in Buildings CPP-604, CPP-641, CPP-649, CPP-659 Annex, CPP-601, CPP-1618, CPP-1619 and associated valve boxes at the INTEC. The equipment associated with the PEWE system is addressed separately from the LET&D facility. The LET&D facility regulated tanks and ancillary equipment are described after the PEWE system. The regulated tanks and ancillary equipment specific to the PEWE system are listed below:

- VES-WL-132, CPP-604 Evaporator Feed Sediment Tank (regulated under IDAPA as a storage/treatment tank)
- VES-WL-133, CPP-604 Evaporator Feed Collection Tank (regulated under IDAPA as a storage/treatment tank)
- VES-WL-102, CPP-604 Surge Tank for VES-WL-133 (regulated under IDAPA as a storage/treatment tank)
- VES-WL-109, CPP-604 Evaporator Head Tank (regulated under IDAPA as a storage tank)
- EVAP-WL-129, CPP-604 Evaporator Unit, including VES-WL-129, VES-WL-130, HE-WL-307, and HE-WL-308 (regulated under IDAPA as a miscellaneous unit with treatment/storage tanks)
- VES-WL-134, CPP-604 Process Condensate Surge Tank (regulated under IDAPA as a storage tank)
- EVAP-WL-161, CPP-604 Evaporator Unit, including VES-WL-161, VES-WL-162, HE-WL-300, and HE-WL-301 (regulated under IDAPA as a miscellaneous unit with treatment/storage tanks)

- VES-WL-131, CPP-604 Process Condensate Surge Tank (regulated under IDAPA as a storage tank)
- VES-WL-108, CPP-604 Process Offgas Condensate Knock-Out Pot (regulated under IDAPA as a storage tank)
- VES-WL-111, CPP-604 Bottoms Collection Tank (regulated under IDAPA as a storage/treatment tank)
- VES-WL-101, CPP-604 Bottoms Collection Tank (regulated under IDAPA as a storage/treatment tank)
- VES-WL-103, VES-WL-104, and VES-WL-105, CPP-641 Westside Waste Holdup Tanks (regulated under IDAPA as storage/treatment tanks)
- VES-WM-100, VES-WM-101, and VES-WM-102, CPP-604 Tank Farm Tanks (regulated under IDAPA as storage/treatment tanks)
- VES-WG-100, VES-WG-101, VES-WH-100, and VES-WH-101, CPP-601 Deep Tanks (regulated under IDAPA as storage/treatment tanks)
- VES-WL-135 (DVB-OGF-D5), VES-WL-136 (DVB-OGF-D8) VES-WL-137 (CPP-649), VES-WL-138, VES-WL-139, VES-WL-142, VES-WL-144 and VES-WL-150 (CPP-604), Process Waste Liquid System (regulated under IDAPA as storage tanks)
- VES-WL-106, VES-WL-107, and VES-WL-163, CPP-604 Process Condensate Collection Tanks (regulated under IDAPA as treatment/storage tanks).

Functional descriptions of the regulated tanks and ancillary equipment specific to the PEWE system are listed below:

VES-WL-132, Evaporator Feed Sediment Tank

VES-WL-132 functions as a settling basin for solids that would otherwise settle out in the Evaporator Feed Collection Tank, VES-WL-133. When the waste stream enters VES-WL-132, it encounters a baffle-and-weir system. The solids settle out of the solution as it flows under the baffle and over the weir.

VES-WL-133, Evaporator Feed Collection Tank

VES-WL-133 serves both evaporators, EVAP-WL-129 and EVAP-WL-161, and receives wastes from various sources. Wastes are transferred from VES-WL-133 to either the Evaporator Head Tank, VES-WL-109, or directly to EVAP-WL-129.

VES-WL-102, Surge Tank for VES-WL-133

The original function of this tank was as a feed collection tank for the PEWE system. The PEWE system was upgraded, and VES-WL-133 now serves as the evaporator feed collection tank. The current function of this tank is to provide surge capacity for VES-WL-133. It is also possible to feed the evaporators from this tank.

VES-WL-109, Evaporator Head Tank

The function of this tank is to provide a constant head for feed solution for EVAP-WL-161. Feed is pumped to this tank from the Evaporator Feed Collection Tanks, VES-WL-102 or VES-WL-133. The Evaporator Head Tank has an overflow that returns to VES-WL-102 or VES-WL-133.

EVAP-WL-129, Evaporator Unit (includes VES-WL-129, VES-WL-130, HE-WL-307 and HE-WL-308)

The function of the evaporator is to reduce the volume of waste sent to the INTEC Tank Farm Facility (TFF). The evaporator is composed of a flash column, VES-WL-129, a mist eliminator, VES-WL-130, a reboiler, HE-WL-307, and a condenser, HE-WL-308. The feed pumps draw waste from the Evaporator Feed Collection Tank, VES-WL-133, and transfer the waste to the evaporator. The evaporator uses steam to heat the solution in reboiler HE-WL-307. The solution is circulated from the reboiler through the flash column, where the liquid flashes and vapor is separated from the liquid. Liquid drops to the bottom of the flash column and is recycled back to HE-WL-307. Constituents of the waste that have a lower boiling point than the system temperature flash and produce vapor. The constituents with a higher boiling point remain liquid and are re-circulated through the evaporator.

The vapor rises in the flash column, passes a baffle and then passes through a coarse wire mesh to remove entrained liquid droplets from the vapor. The vapor then enters the mist eliminator, VES-WL-130, which contains a fine wire mesh to remove additional entrained liquid droplets (light constituents and water). The remaining vapors from the evaporator flow to condenser HE-WL-308. The condensates from HE-WL-308 are normally drained to VES-WL-131, the Process Condensate Surge

Tank. The condensates can alternately be drained to VES-WL-134, the Process Condensate Surge Tank. The remaining non-condensable vapor is routed to the Vessel Offgas (VOG) system.

When the level in the Process Condensate Surge Tank, VES-WL-131, reaches a preset level, the liquid is transferred to one of the Process Condensate Collection Tanks (VES-WL-106, VES-WL-107, or VES-WL-163).

VES-WL-134, Process Condensate Surge Tank

VES-WL-134 collects condensate from the evaporator. VES-WL-134 provides the capability for the evaporators to be operated in series. For series operation, EVAP-WL-129 is operated until VES-WL-134 is full. The tank provides feed for EVAP-WL-161.

Future plans for this tank are to store nitric acid recovered from the LET&D process via VES-WLL-195 to allow more efficient operation of the process.

EVAP-WL-161, Evaporator Unit (includesVES-WL-161, VES-WL-162, HE-WL-300 and HE-WL-301)

The EVAP-WL-161 is similar to EVAP-WL-129 in both design and operation. A difference is that EVAP-WL-161 is fed from an Evaporator Head Tank, VES-WL-109, rather than receiving feed directly from the feed pumps. The feed pumps draw waste from the Evaporator Feed Collection Tank, VES-WL-133, and transfer the waste to VES-WL-109. The evaporator is fed by gravity from VES-WL-109. The evaporator is composed of a flash column, VES-WL-161, a separator, VES-WL-162, a reboiler, HE-WL-300, and a condenser, HE-WL-301.

The evaporator uses steam to heat the solution in reboiler HE-WL-300. The solution is circulated from the reboiler through the flash column, where the liquid flashes and vapor is separated from the liquid. Liquid drops to the bottom of the flash column and is recycled back to HE-WL-300. Constituents of the waste that have a lower boiling point than the system temperature flash and produce vapor. The constituents with a higher boiling point remain liquid and are re-circulated through the evaporator.

The vapor rises in the flash column, passes a baffle and then passes through a coarse wire mesh to remove entrained liquid droplets from the vapor. The vapor then enters the separator (mist eliminator), VES-WL-162, which contains a fine wire mesh to remove additional entrained liquid droplets (light constituents and water). The remaining vapors from the evaporator flow to condenser, HE-WL-301. The condensates are normally drained to VES-WL-131, the Process Condensate Surge Tank. The remaining non-condensable vapor is routed to the VOG system.

When the level in VES-WL-131 reaches a preset level, the liquid is transferred to one of the Process Condensate Collection Tanks (VES-WL-106, VES-WL-107, or VES-WL-163).

VES-WL-131, Process Condensate Surge Tank

VES-WL-131 collects condensate from the evaporator. When the tank reaches a preset level, the contents are transferred to one of the Process Condensate Collection Tanks (VES-WL-106, VES-WL-107, or VES-WL-163). A heel of approximately 20 percent is maintained in the tank to protect the pumps.

VES-WL-108, Process Condensate Knock-Out Pot

The function of the Process Condensate Knock-Out Pot is to remove and collect condensed liquid from the evaporator VOG before the offgas is released to the plant VOG.

VES-WL-101 and VES-WL-111, Bottoms Collection Tanks

VES-WL-101 and VES-WL-111 are collection points for waste to be transferred from the PEWE system, TFF, or other facilities. These tanks collect, store, and/or treat the PEWE system concentrated bottoms.

VES-WL-103, -104, and -105, CPP-641 Westside Waste Holdup Tanks (WWH)

Historically, VES-WL-103, VES-WL-104, and VES-WL-105 collected aqueous wastes generated from CPP-620, CPP-627, and CPP-637 laboratory research and development and acted as a diversion point for service waste such as steam condensate. These tanks have been emptied to the maximum extent allowed by the transfer pumps, without causing damage to the pump bearings, and no transfers of waste to this system are taking place.

VES-WM-100, VES-WM-101, and VES-WM-102, CPP-604 Tank Farm Tanks (TFT)

VES-WM-100, VES-WM-101, and VES-WM-102 are collection points for waste to be transferred to the PEWE system. These tanks can be used as surge capacity for the PEWE feed storage/treatment or for the storage/treatment of PEWE bottoms.

VES-WG-100, VES-WG-101, VES-WH-100 and VES-WH-101, CPP-601 Deep Tanks

The Deep Tanks are collection points for waste to be transferred to the PEWE system. These tanks collect, store and/or treat the waste prior to transfer to the PEWE system.

VES-WL-135, VES-WL-136, VES-WL-137, VES-WL-138, VES-WL-139, VES-WL-142, VES-WL-144, and VES-WL-150, Process Waste Liquid (PWL) Tanks and Sumps

The PWL system collects hazardous waste liquid from CPP-604, CPP-649, and associated valve boxes and transfers the waste to the PEWE system.

The PWL tanks and sumps are located in CPP-604, CPP-649, and associated valve boxes. The purpose of the system is to collect offgas condensate and liquid from floor drains and transfer the waste to the PEWE Evaporator Feed Collection Tank, VES-WL-133. The system is comprised of tanks VES-WL-135, -136, -137, -138, -139, -142, -144, -150, and various cell sumps. VES-WL-150 collects liquids from the floor drains and the other tanks collect offgas condensate. A sump or vault secondarily contains each of the tanks.

Sumps SU-WL-140, -143, -145, -146, -147 and -148 do not contain PWL tanks. Sumps SU-WL-140 and SU-WL-143 are located in the Rare Gas Plant in CPP-604. Since the Rare Gas Plant is no longer active there are no sources of waste that would be collected in either sump. Sump SU-WL-148 is located at the INTEC main stack. In the event of equipment failure, condensate from the main stack could collect in this sump. These sumps are emergency equipment and do not routinely collect waste; therefore, the sumps are exempt from requiring secondary containment. Sumps SU-WL-145, SU-WL-146, and SU-WL-147 are part of the secondary containment and leak detection system for the PEWE Condensate Collection Cell and PEWE EVAP-WL-161 Cell. As such, these sumps do not require the emergency structure exemption set forth in IDAPA 58.01.05.008 [40 CFR §264.1(g)(8)(i)].

The tanks and sumps are jetted upon high level detection. All are transferred into a common header and then transferred into VES-WL-133, except VES-WL-150, which is transferred into the Evaporator Feed Sediment Tank, VES-WL-132, which is a settling tank. The settling tank drains directly into VES-WL-133.

VES-WL-106, VES-WL-107, and VES-WL-163, CPP-604 Process Condensate Collection Tanks

The Process Condensate Collection Tanks (VES-WL-106, VES-WL-107, and VES-WL-163) collect the evaporator vapor condensate (overheads) from the PEWE process.

PEWE System Operation

The PEWE system to be permitted includes the PEWE and associated input/feed tanks. The PEWE system reduces the volume of hazardous wastes sent to the TFF. The PEWE system evaporates the wastes, producing concentrated wastes (bottoms) and vapor condensates (overheads). The overheads are transferred to the LET&D facility for further processing. Bottoms generated from the PEWE go to VES-WL-101 or VES-WL-111 or are recycled back to VES-WL-133 for further processing. Solutions may be transferred back to VES-WL-133 and blended with other wastes for further evaporation when appropriate concentration of the waste has not been achieved (i.e., all available feed solutions have been processed, loss of utilities, etc.). Returning the waste to VES-WL-133 reduces the volume of waste being transferred to the TFF.

The evaporator is operated on a semi-continuous basis. While the evaporator is operating, feed is added to the evaporator to keep the liquid in the operating evaporator at a preset level. Feed is continuously added to make up for the liquid that is boiled off. The evaporator operates as a thermal siphon. As waste is boiled in the reboiler, bubbles form and rise in the tubes. This produces a motive force that pulls liquid from the evaporator into the reboiler tubes. The rising bubbles flow to the flash column from the reboiler. At a predetermined level, based on density or temperature, the evaporator is shut down and the evaporator contents (bottoms) are transferred to either VES-WL-101 or VES-WL-111 or are recycled back to VES-WL-133 for further processing. From VES-WL-101 or VES-WL-111, the bottoms can be sent to the CPP-604 TFTs, (VES-WM-100, VES-WM-101, and VES-WM-102), to the TFF, or back to the ETS. The overheads are sent to the LET&D for further processing. All of these tanks were designed and constructed to contain the types of solutions stored. The P.E. certifications for these units attest that the tank systems are adequately designed and are compatible with the waste(s) to be stored or treated in accordance with IDAPA 58.01.05.008 [40 CFR § 264.192(a)].

As described above, there may be instances where complete concentration of the waste feed does not occur. When this happens, the remaining feed may be blended with other wastes and reintroduced to the ILWMS. Depending on the characteristics of the new feed solution (e.g., high chlorides, fluorides, or radionuclide concentration), it may be appropriate to route the mixture back to the ETS for processing, rather than the PEWE, to ensure optimum treatment and protection of equipment.

With the addition of the C-40 valve box, the PEWE bottoms (from both VES-WL-101 and VES-WL-111) can be transferred to the ETS, TFF, and the CPP-604 TFT. From the CPP-604 TFT, waste can be transferred to the TFF, the ETS, or the PEWE. The transfer lines are encased in stainless steel and equipped with leak detection. Drawings showing transfer routes are included in the Section D Plant Drawing package for the Part B Permit Application, Appendix D-1.

Occasionally, PEWE process condensate does not meet the feed limits or operational constraints (e.g., fluorides, TOC, radionuclide concentration) established for the LET&D facility, as identified in

Section D-8b(5) of the Part B Permit Application. In these instances, the condensate is routed back to the evaporator feed tank and blended with other solutions for further processing.

The temperature of the evaporator liquid is controlled below 110° C. At much higher temperatures unstable chemical compounds can form. The temperature limit is further discussed in Section D-2d of this permit application.

The density of the waste in the evaporator is controlled to reduce the possibility that the heat exchanger tubes will scale up and eventually plug and to maintain heat transfer efficiencies. A solution density > 1.3 indicates the possibility of large quantities of dissolved solids. At very high densities, the amount of dissolved solids could exceed the solubility of certain species in the solution. Dissolved solids (especially silicates, carbonates, and phosphates) form solid precipitates if the solution has too many dissolved solids. The precipitates can form in the heat exchanger tubes, where the waste is most concentrated, and coat the tubes with a thin layer of solids (scale). Over time, the scale will increase in thickness as more precipitates form. Eventually the scale can become so thick that it reduces heat transfer and evaporator efficiency and may even plug the heat exchanger tubes. One method to help prevent formation of scale is to control (limit) the solution density (specific gravity). When the solution in the evaporator approaches a specific gravity of approximately 1.2 to 1.3, the feed is shut off. The waste is further concentrated to a specific gravity of approximately 1.3 and drained to the Bottoms Collection Tanks, VES-WL-101 and VES-WL-111. From the Bottoms Collection Tanks, the waste can be transferred for storage or further treatment.

Feed flowing to the Evaporator Feed Collection Tank, VES-WL-133, may first pass through the Feed Sediment Tank, VES-WL-132, to allow potential solids to settle out of the stream. When the waste stream enters VES-WL-132, it encounters a baffle and weir system, which allows time for solids to settle out of the solution as the fluid flows under the baffle and over the weir. The waste is accumulated in the Evaporator Feed Collection Tank, VES-WL-133, before being fed to one of two evaporator units, EVAP-WL-129 or EVAP-WL-161. EVAP-WL-161 receives feed from the Evaporator Head Tank, VES-WL-109, and EVAP-WL-129 receives feed directly from the Evaporator Feed Collection Tank, VES-WL-133.

Normally, one evaporator is operated at a time. However, the system was designed so that the evaporators could be operated simultaneously (in series or parallel). The liquid waste is fed to the operating evaporator continuously, until the concentrated liquid reaches a procedurally designated specific gravity or temperature in the PEWE as previously discussed. The evaporators are shut down upon reaching one of the set points.

Other factors that could result in the PEWE being shut down are a lack of feed to the evaporators or a lack of available storage space in the Process Condensate Collection Tanks (VES-WL-106, VES-WL-107, and VES-WL-163). The remaining material in the flash column (bottoms) is concentrated and drained to one of the Bottoms Collection Tanks, VES-WL-101 or VES-WL-111, for temporary storage/treatment or recycled back through VES-WL-133. Sample analysis determines if the total organic carbon (TOC) limit may exceed LET&D processing parameters and therefore would be routed back to the Evaporator Feed Tank, VES-WL-133, and blended with other solutions for further treatment. From VES-WL-101 or VES-WL-111 the waste may be transferred to the TFF. The liquid may be left in the evaporators until more feed is made available to continue evaporator operation.

When an evaporator is operating, liquid waste enters the flash column of the evaporator and circulates through the reboiler, where it is boiled in the operating reboiler, HE-WL-307 or HE-WL-300. The boiling waste (liquid/vapor phase) then flows into the flash column, where the liquid phase separates from the vapor phase and drops into the flash column. The liquid phase mixes with liquid waste in the flash column and is re-circulated through the reboiler.

The vapor rises in the flash column, passes a baffle, and then passes through a coarse wire mesh to remove entrained liquid droplets before exiting the flash column. The vapor then enters the mist eliminator, VES-WL-130 or VES-WL-162, which contains a fine wire mesh to further remove entrained liquid droplets. The vapors from the evaporator flow from the wire mesh to a condenser, HE-WL-308 or HE-WL-301, and the condensates drain to the Condensate Surge Tank, VES-WL-131.

When the liquid level in the surge tank reaches a preset level, the liquid is transferred by one of two pumps, to the Process Condensate Collection Tanks (VES-WL-106, VES-WL-107 and VES-WL-163). From the Process Condensate Collection Tanks, the waste is pumped to the Acid Fractionator Waste Feed Head Tank, VES-WLK-197. The waste in VES-WLK-197 is fed by gravity to the LET&D fractionators. Aluminum nitrate may be added in the condensate collection tanks to complex the fluorides to reduce corrosion in the downstream LET&D equipment. When one of the Process Condensate Collection Tanks becomes full, process samples are taken as described in Section C of this permit application. Depending on the results of this analysis, the contents are either routed to the LET&D facility for further processing or are returned to the Evaporator Feed Tank for re-evaporation.

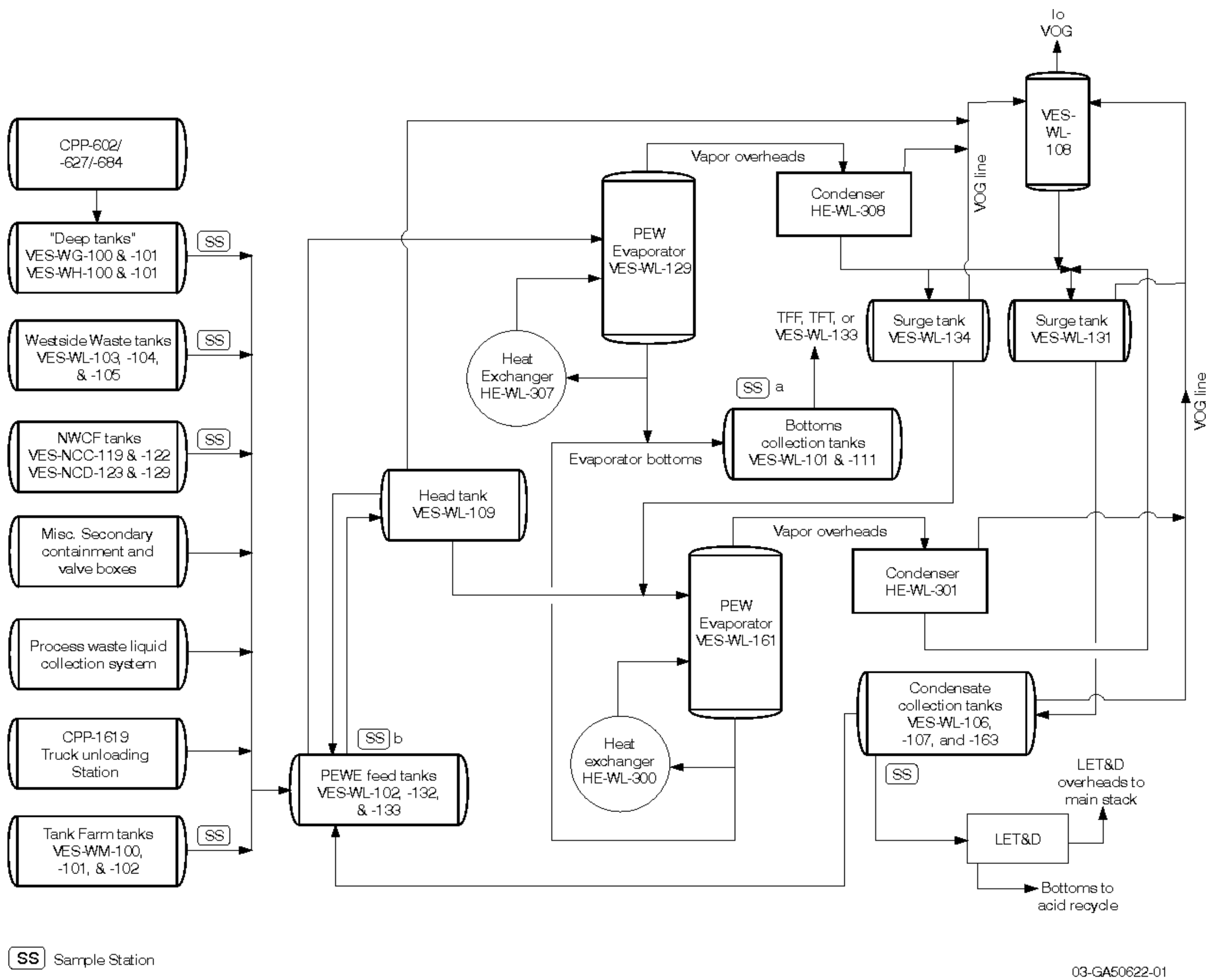
When the evaporators are operated in series, waste is first concentrated in EVAP-WL-129. Condensate from this evaporator is collected in the Condensate Surge Tank, VES-WL-134, which is used for series operation. The condensate in VES-WL-134 is then used as feed for EVAP-WL-161. The condensate from evaporator VES-WL-161 is transferred to the Process Condensate Collection Tanks, via Condensate Surge Tank VES-WL-131.

The evaporators are equipped to allow demineralized water to be injected into the system during a run. The demineralized water is injected while the system is operated. This allows the system to strip acid into the condensate (overheads) more efficiently.

A process flow diagram for the PEWE system is presented in Exhibit D-1. The direct primary hazardous waste sources to the PEWE system are also shown in Exhibit D-1. In addition, the process flow for the PEWE system is represented on Piping and Instrumentation Diagram (P&ID) No. 096156 and 094276 (Sheets 1 – 4) in the diagram package (Appendix D-1) included with this application. Exhibit D-2 schematically shows the boundary of tanks and equipment that are included in the ILWMS. The boxes with dashed lines are inputs to the PEWE system. The boxes inside the bold border are tanks and equipment used in the ILWMS and described in this permit application.

CPP-604 Tank Farm Tanks (TFT)

The CPP-604 TFT system can receive wastes for temporary storage before they are transferred to PEWE feed tanks, the TFF, or the ETS, also known as the High Level Liquid Waste Evaporator (HLLWE), located in the New Waste Calcining Facility (NWCF). The CPP-604 TFT system includes VES-WM-100, VES-WM-101, and VES-WM-102. The process flow for the CPP-604 TFT system is represented on P&ID No. 057498 in Appendix D-1. VES-WM-100 receives the incoming waste. Then the waste may overflow from VES-WM-100 to VES-WM-101, which in turn overflows to VES-WM-102.



a - Not routinely sampled. Solution is sent directly to Tank Farm Facility or to Evaporator Tank System where sampling can occur.

b - VES-WL-102 and VES-EL-133 sample lines are plugged and not serviceable. VES-WL132 is not equipped with samplers.

Exhibit D-1. PEWE System flow diagram and inputs.

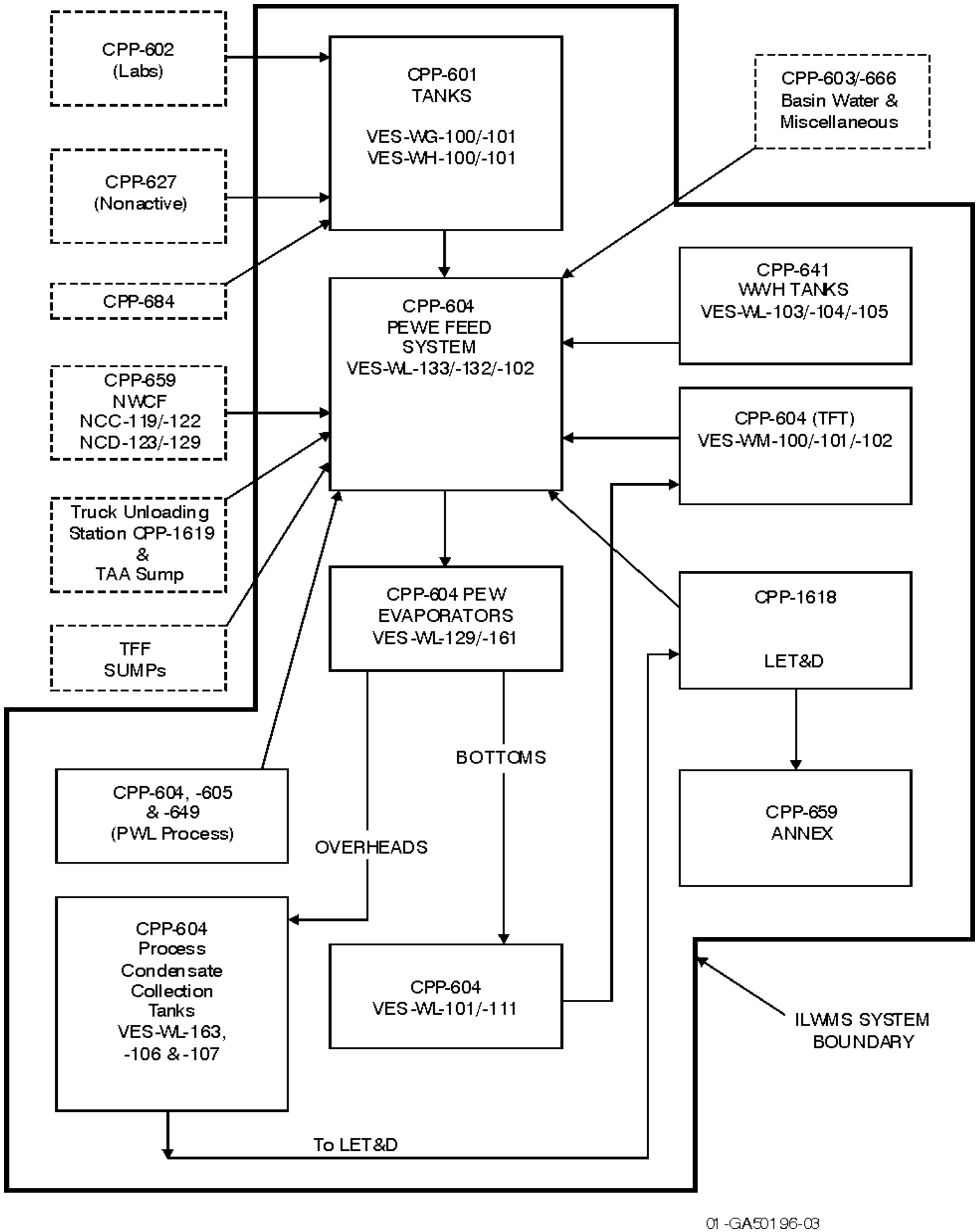


Exhibit D-2. ILWMS system boundary and inputs.

A jet in VES-WM-100 transfers solution to VES-WM-102, a jet in VES-WM-102 transfers solution to VES-WM-101, and a jet in VES-WM-101 transfers solution to VES-WM-100.

VES-WM-100, VES-WM-101, and VES-WM-102 are also each equipped with a transfer jet that transfers waste from the CPP-604 TFT system to the PEWE, the ETS, and the TFF, or back to the TFTs.

CPP-641 Storage Tanks

The Westside Waste Holdup (WWH) tanks system stores/treats waste temporarily before it is transferred to the PEWE or TFF. The WWH tank system includes three storage tanks (VES-WL-103, VES-WL-104, and VES-WL-105), along with the associated transfer pumps, valves, and piping. The process flow diagram for the WWH tanks is represented on P&ID No. 111804, in Appendix D-1.

Solution can be transferred from VES-WL-103 to VES-WL-104, from VES-WL-104 to VES-WL-105, and from either VES-WL-104 or VES-WL-105 to the PEWE or the TFTs. Once the solution in a tank reaches a specified volume, the tank is sampled and the sample analyzed to determine if it can meet the waste acceptance criteria (WAC) for the PEWE. If the sample analysis indicates the solution cannot be transferred to the PEWE, the waste is sent to the TFTs or the TFF for storage.

Transfers from the WWH tanks are made using a pump. Steam jets are used to transfer wastes between the WWH tanks. All jets and pumps are contained in the same vault as the respective tank.

CPP-601 Storage Tanks (Deep Tanks)

The CPP-601 storage and treatment (WG/WH Deep Tanks) tank system includes four tanks (VES-WG-100, VES-WG-101, VES-WH-100, VES-WH-101) and the associated transfer pumps, valves, and piping. The process flow for the CPP-601 storage tanks is represented on P&ID No. 092711 and 092712, in Appendix D-1.

Wastes are received in the WG/WH tanks from floor and lab drains or transfers from processes in CPP-601, -602, -627, -640, -666, and -684. These tanks are sampled, analysis is completed, and depending on the results of the analysis, the waste is transferred to the PEWE Feed Tank, VES-WL-133, via VES-WL-132, or to the TFF for storage.

CPP-1618 Liquid Effluent Treatment and Disposal Facility

The LET&D is part of the liquid waste treatment system at the INTEC. The LET&D system equipment functions very similarly to the PEWE system equipment. The LET&D processes the PEWE overhead condensate waste stream to recover nitric acid. Exhibit D-3 schematically shows the tanks and equipment that are included in the LET&D system. The regulated tanks and ancillary equipment specific to the LET&D system are listed below:

- VES-WLK-197, CPP-1618 Acid Fractionator Waste Feed Head Tank (regulated under IDAPA as a storage tank)
- FRAC-WLL-170, CPP-1618 Acid Fractionator, including FRAC-WLL-170, HE-WLL-391, HE-WLL-396, HE-WLL-398, and VES-WLL-198 (regulated under IDAPA as a miscellaneous unit with treatment/storage tanks)
- FRAC-WLK-171, CPP-1618 Acid Fractionator, including FRAC-WLK-171, HE-WLK-392, HE-WLK-397, HE-WLK-399, and VES-WLK-199 (regulated under IDAPA as a miscellaneous unit with treatment/storage tanks)
- VES-WLL-195, CPP-1618 Acid Fractionator Bottoms Tank (regulated under IDAPA as a storage tank)
- VES-NCR-171, CPP-659 Annex LET&D Nitric Acid Recycle Tank (regulated under IDAPA as a storage tank)
- VES-NCR-173, CPP-659 Annex Nitric Acid Head Tank (regulated under IDAPA as a storage tank).

Acid Fractionators System and Process

The LET&D treatment process reduces the volume of liquid waste by fractionating PEWE overhead condensates into saturated steam/offgas and acid fractions. The fractionators separate the waste solution into water (overheads) and nitric acid (bottoms). Normally, only one fractionator operates at a time.

The feed is transferred from the Process Condensate Collection Tanks to the Acid Fractionator Waste Feed Head Tank (VES-WLK-197) in Cell 1 of the LET&D. The waste is gravity fed to the fractionators, FRAC-WLL-170 or FRAC-WLK-171, via the Acid Fractionator Waste Feed Head Tank.

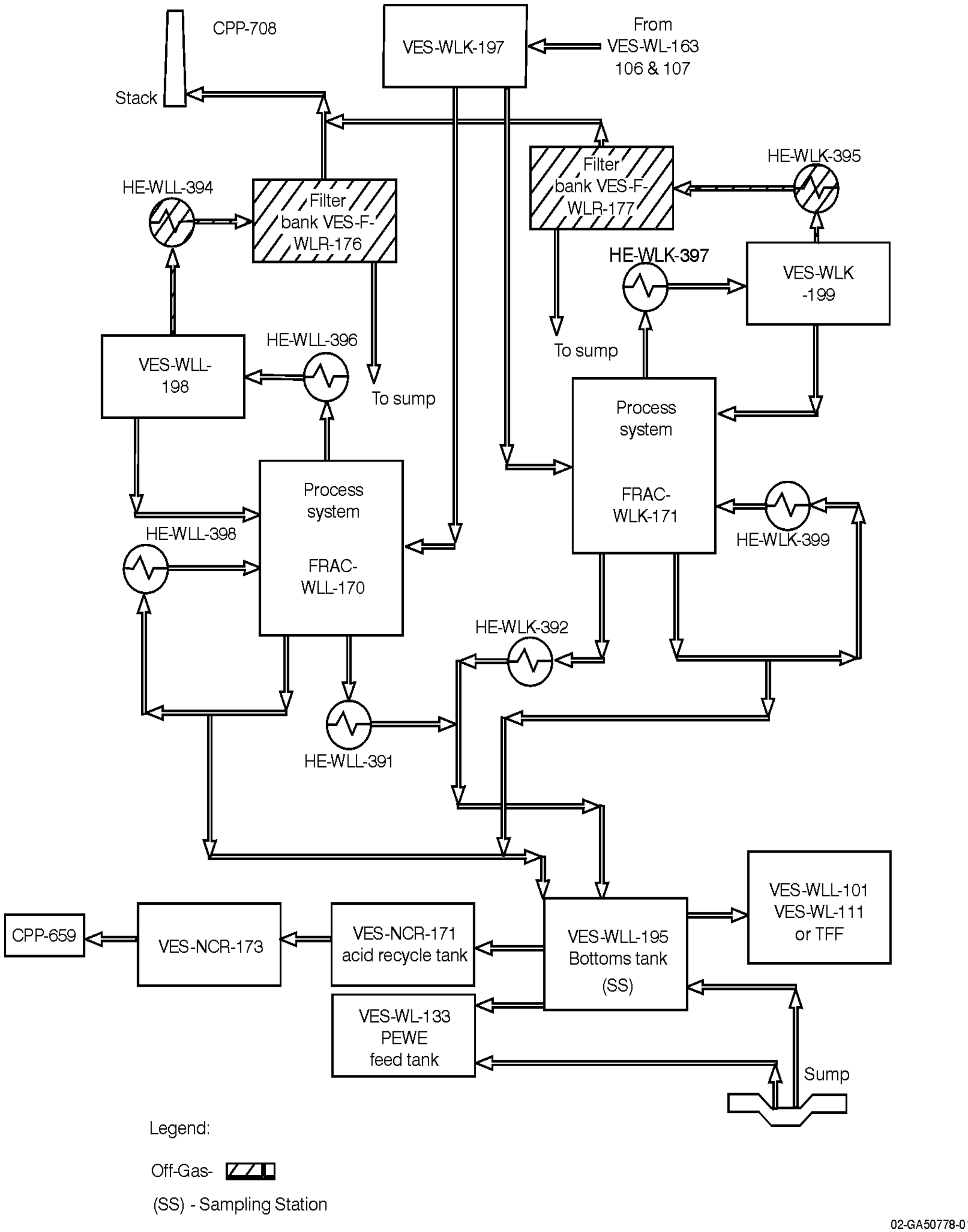


Exhibit D-3. LET&D System flow diagram.

The feed is heated to its boiling point by introducing steam to the reboilers, HE-WLL-398 or HE-WLK-399. The vapors from the boiling liquid rise through several stacked sieve trays in VES-WLL-170 or VES-WLK-171. The sieve trays (perforated plates) installed in the fractionator column mix the vapors and liquid. As the descending liquid cools the rising vapor, the nitric acid condenses and remains in solution on the trays, and flows to the bottom of the fractionator.

The bottoms retain approximately 99% of the acid contained in the feed. The density is controlled to produce approximately 12 Molar nitric acid. When the density setpoint (specific gravity of approximately 1.2 to 1.3) of the nitric acid in the fractionator bottoms is reached, a portion of the solution is drawn off and collected in VES-WLL-195. The nitric acid is used for INTEC waste treatment and decontamination activities. The nitric acid solution stored in VES-WLL-195 is transferred to:

- the PEWE, VES-WL-133, to acidify the PEWE feed,
- VES-WL-101/111 to acidify the PEWE bottoms,
- VES-NCR-171 for reuse at the INTEC, or
- the TFF.

The saturated steam offgas generated from the fractionation process is drawn through a condenser, HE-WLL-396 or HE-WLK-397, where it is partially condensed, producing a reflux stream and steam offgas. The steam and reflux flow through a liquid separator, VES-WLL-198 or VES-WLK-199, where the reflux is removed and returned to the top of the acid fractionator. The reflux flows downward through the upper trays as a final scrub. The remaining steam flows through the separator, and then is heated by a superheater, HE-WLR-394 or HE-WLR-395, is filtered through the High Efficiency Particulate Air (HEPA) filters (F-WLR-176 or F-WLR-177) for radioactive particles, and exhausted to the atmosphere via the INTEC Main Stack.

The Acid Recycle Tank (VES-NCR-171) and Acid Head Tank (VES-NCR-173) are located in the CPP-659 Annex adjacent to the New Waste Calcining Facility (NWCF, CPP-659). VES-NCR-171 has a capacity of approximately 22,500 gallons. The tank is a stainless steel tank that stores acid produced by the LET&D fractionation process. VES-NCR-173 is a stainless steel tank, which stores nitric acid. VES-NCR-173 has capacity of approximately 90 gallons.

Acid from VES-NCR-171 is airlifted into VES-NCR-173 and placed into a common header that can be routed for reuse throughout the INTEC.

PEWE Tank Treatment

Tank treatment (T01) may be conducted in any of the following tanks: VES-WL-133, VES-WL-102, VES-WG-100, VES-WG-101, VES-WH-100, VES-WH-101, VES-WL-101, VES-WL-111, VES-WL-103, VES-WL-104, VES-WL-105, VES-WM-100, VES-WM-101, VES-WM-102, VES-WL-106, VES-WL-107, and VES-WL-163. Tank treatment consists of chemical addition and solids removal. Typical chemical additives used are described in Section C-2f of the permit application. Tank treatment is also performed in the PEWE Feed Sediment Tank, VES-WL-132, which contains a baffle-and-weir system designed to separate solids from the PEWE waste feed stream.

D-2 TANK SYSTEMS

D-2a Existing Tank Systems

ILWMS existing tank systems are equipped with secondary containment and leak detection devices that are compatible with the types of waste managed. See Section D-2f for additional information regarding containment and detection of releases.

D-2a(2) External Corrosion Practices: [IDAPA 58.01.05.008; 40 CFR 264.191]

The tanks are contained within building cells and vaults. The permitted system has RCRA compliant secondary containment. Since the system has RCRA compliant secondary containment and the permitted piping is not directly buried in the soil, cathodic protection is not required.

D-2b New Tank Systems

The PWL Collection System is a new system with several tanks, which collects hazardous waste liquid from CPP-604 and CPP-649, and transfers the waste to the PEWE system.

VES-WL-111 is a new tank system to supplement the existing Bottoms Collection Tank, VES-WL-101.

The LET&D facility is a new system, which includes several tanks. The tanks store and treat hazardous waste.

The INTEC Tank Farm Valve Box C-40, from a regulatory standpoint, is considered ancillary equipment to existing ILWMS tanks. No new tanks were installed as part of this project. This upgrade allows more operational flexibility for transfers between PEWE tank systems.

The Acid Recycle Tank, VES-NCR-171, and Acid Head Tank, VES-NCR-173, are a new tank system. VES-NCR-171 stores acid produced by the LET&D fractionation process. VES-NCR-173 is a stainless steel tank, which stores acid prior to being routed for reuse throughout the INTEC.

The Process Condensate Collection Tank, VES-WL-150, is a new tank system. The tank collects floor drains and offgas condensate, which is transferred to the PEWE feed tanks.

For a detailed description of these new tanks, see Section D-1 of this permit application.

D-2b(1) Assessment of New Tank System's Integrity [IDAPA 58.01.05.008; 40 CFR 264.192 and 270.16(a)]

A written assessment, which has been reviewed and certified by an independent, qualified, registered professional engineer (P.E.), as to the structural integrity and suitability of the PWL Collection System for handling hazardous waste, is included in Appendix D-2.

A written assessment, which has been reviewed and certified by an independent, qualified, registered P.E., as to the structural integrity and suitability of the bottoms collection tank system, VES-WL-111, for handling hazardous waste, is included in Appendix D-2.

A written assessment, which has been reviewed and certified by an independent, qualified, registered P.E., as to the structural integrity and suitability of the LET&D facility for handling hazardous waste, is included in Appendix D-2.

A written assessment, which has been reviewed and certified by an independent, qualified, registered P.E., as to the structural integrity and suitability of the INTEC Tank Farm Valve Box C-40 for handling hazardous waste, is included in Appendix D-2.

A written assessment, which has been reviewed and certified by an independent, qualified, registered P.E., as to the structural integrity and suitability of the Acid Recycle Tank, VES-NCR-171, and Acid Head Tank, VES-NCR-173, is included in Appendix D-2.

Written assessments, which have been reviewed and certified by an independent, qualified, registered P.E., as to the structural integrity and suitability of VES-WL-101/VES-WL-102 vault secondary containment and the isolation of VES-WL-102 project, which includes the installation of the Process Condensate Collection Tank, VES-WL-150, are included in Appendix D-2.

D-2b(2) External Corrosion Protection: [IDAPA 58.01.05.008; 40 CFR 264.192(f) and 270.16(e)]

The tanks are contained within building cells and vaults. The permitted system has RCRA compliant secondary containment. Since the system has RCRA compliant secondary containment and the permitted piping is not directly buried in the soil, cathodic protection is not required.

D-2b(3) Description of Tank System Installation and Testing Plans and Procedures [IDAPA 58.01.05.008; 40 CFR 264.192(b)-(e) and 270.16(f)]

The P.E. certifications of the Design and Installation of the PWL Collection System, VES-WL-111, the LET&D facility, the INTEC Tank Farm Valve Box C-40, the Acid Recycle Tank (VES-NCR-171), the Acid Head Tank (VES-NCR-173), and the Process Condensate Collection Tank (VES-WL-150) are included in Appendix D-2. These systems were installed and tested per approved construction packages.

D-2c Dimensions and Capacity of Each Tank [IDAPA 58.01.05.012; 40 CFR 270.16(b)]

PEWE Tanks

Table D-1 lists the tank numbers and descriptions, the year operations began, materials of construction, and the design standards used for the tanks in the PEWE system. Many of the tanks were constructed to the current American Petroleum Industry (API) Standard or American Society of Mechanical Engineers (ASME) Section VIII standards of that time period, or qualified later as such, but were not stamped as such. Table D-1 identifies which tanks were certified.

Because the liquid waste solutions processed through the PEWE system are acidic (primarily nitric acid), the tank materials of construction were selected on the basis of their ability to withstand corrosive attack by acidic nitrate solutions in the temperature range from ambient to boiling. Even at boiling temperatures, the stainless steel used is resistant to attack by acidic nitrate solutions.

Additionally, the relatively large quantities of nitric acid in the waste solutions in the PEWE system form a passive layer on the stainless steel in the tanks, thus minimizing the corrosion rates on the tanks.

Evaporator Feed Sediment Tank, VES-WL-132

VES-WL-132 is a flow-through vertical, cylindrical tank with domed ends. It measures 7 ft 9 in. from tangent to tangent, and has a 9-ft outside diameter. The tank has an approximate capacity of 4,700 gal. An internal baffle and weir system forces the water to drop particles before flowing out of the tank. Diagram 096156 in Appendix D-1 depicts VES-WL-132.

Evaporator Feed Collection Tank, VES-WL-133

VES-WL-133 is a horizontal, cylindrical tank with domed ends. It has a 10-ft outside diameter, and measures 30 ft long from tangent to tangent. The tank has an approximate capacity of 19,000 gal. Diagram 096156 in Appendix D-1 depicts VES-WL-133.

VES-WL-102

VES-WL-102 is a surge tank for VES-WL-133. It is a horizontal, cylindrical tank with domed ends. It has a 10-ft outside diameter, and measures 30 ft long from tangent to tangent. The tank has an approximate capacity of 18,400 gal. Diagram 096156 in Appendix D-1 depicts VES-WL-102.

Process Offgas Condensate Knock-Out Pot, VES-WL-108

VES-WL-108 is the Process Offgas Condensate Knock-Out Pot in the offgas system. It is a vertical cylindrical tank with domed ends. It has a 24-in. outside diameter and measures 32 in. from tangent to tangent. The tank has an approximate capacity of 100 gals. Diagram 094276 Sheet 3 in Appendix D-1 depicts this tank.

Table D-1. PEWE Tanks.

Tank Number/ Description	Year of Operation	Materials of Construction	Design Standards
VES-WL-132 Evaporator Feed Sediment	1983	Nitronic 50	ASME Section VIII Stamped
VES-WL-133 Evaporator Feed Collection	1983	Nitronic 50	ASME Section VIII Stamped
VES-WL-102 Surge Tank For VES-WL-133	1951	Type 347 SS	See Note *
VES-WL-109 Evaporator Head	1953	Type 347 SS	See Note *
VES-WL-129 Evaporator	1985	Nitronic 50	ASME Section VIII Stamped
VES-WL-161 Evaporator	1984	Nitronic 50	ASME Section VIII Stamped
VES-WL-131 Condensate Surge	1975	Type 304L SS	Unknown
VES-WL-134 Condensate Surge	1984	Type 304L SS	ASME Section VIII Stamped
VES-WL-111 Bottoms Collection	2001	Type 304L SS	ASME Section VIII Stamped
VES-WL-101 Bottoms Collection	1951	Type 347 SS	See Note *
VES-WH-100, Deep tanks	1953	Type 347 SS	See Note *
VES-WH-101, Deep tanks	1953	Type 347 SS	See Note *
VES-WG-100, Deep tanks	1953	Type 347 SS	See Note *
VES-WG-101, Deep tanks	1953	Type 347 SS	See Note *
VES-WL-103 WWH tank	1961	Type 304L SS	Not Stamped See Note **
VES-WL-104 WWH tank	1961	Type 304L SS	Not Stamped See Note **
VES-WL-105 WWH tank	1961	Type 304L SS	Not Stamped See Note **
VES-WM-100 CPP-604 TFT	1953	Type 347 SS	See Note *
VES-WM-101 CPP-604 TFT	1953	Type 347 SS	See Note *
VES-WM-102 CPP-604 TFT	1953	Type 347 SS	See Note *
VES-WL-106 Process Condensate Collection Tank	1953	Type 347 SS	See Note *

Table D-1. PEWE Tanks. (continued)

Tank Number/ Description	Year of Operation	Materials of Construction	Design Standards
VES-WL-107 Process Condensate Collection Tank	1953	Type 347 SS	See Note *
VES-WL-108 Process Condensate Knock-out Pot	1951	Type 347 SS	See Note *
VES-WL-163 Process Condensate Collection Tank	1984	Type 304L SS	ASME Section VIII Division 1
VES-WL-135	1991	Type 304L SS	ASME Section VIII Division 1
VES-WL-136	1991	Type 304L SS	ASME Section VIII Division 1
VES-WL-137	1991	Type 304L SS	ASME Section VIII Division 1
VES-WL-138	1991	Type 304L SS	ASME Section VIII Division 1
VES-WL-139	1991	Type 304L SS	ASME Section VIII Division 1
VES-WL-142	1991	Type 304L SS	ASME Section VIII Division 1
VES-WL-144	1991	Type 304L SS	ASME Section VIII Division 1
VES-WL-150	1996	Type 304L SS	ASME Section VIII Division 1

Note *: Due to the age of these tanks, no documentation exists to confirm standards. Conversation with the vendor indicates the tanks were built to API or to ASME Standards. It is common practice for the vendor to maintain the documentation for 20 years.
Note **: Not Stamped – Built to ASME Section 8. No code stamp required.

Evaporator Head Tank, VES-WL-109

VES-WL-109 is a vertical, cylindrical tank with domed ends. It has a 3-ft outside diameter, and measures 5 ft from tangent to tangent. The tank has an approximate capacity of 270 gal. Diagram 094276, Sheet 1 in Appendix D-1 depicts VES-WL-109.

Evaporators VES-WL-129 and VES-WL-161

VES-WL-129 and VES-WL-161 are vertical cylindrical tanks with domed ends. The tanks have a 3-ft diameter and are 14 ft 9 in. long, from tangent to tangent. Both evaporators have an approximate capacity of 1,000 gal each. Diagram 094276, Sheet 1 in Appendix D-1 depicts VES-WL-129 and VES-WL-161.

Condensate Surge Tank VES-WL-131

VES-WL-131 is a horizontal, cylindrical tank with domed ends. It has a 2-ft outside diameter and measures 2 ft 9 in. from tangent to tangent. The tank has an approximate capacity of 66 gal. Diagram 094276, Sheet 3 in Appendix D-1 depicts VES-WL-131.

Condensate Surge Tank VES-WL-134

Tank VES-WL-134 is a vertical, cylindrical tank with domed ends. It has a 3 ft 6 in.-outside diameter and is 7 ft long from tangent to tangent. The tank has an approximate capacity of 500 gal. Diagram 094276, Sheet 3 in Appendix D-1 depicts VES-WL-134.

Bottoms Collection Tank, VES-WL-101

VES-WL-101 is a horizontal-oriented, cylindrical tank with domed ends, measuring 10 ft by 30 ft. The tank has an approximate capacity of 18,400 gal. Diagram 096156 in Appendix D-1 depicts VES-WL-101.

Bottoms Collection Tank, VES-WL-111

VES-WL-111 is designed as a rectangular, horizontal-oriented tank. It measures 12 ft long, 4 ft 8 in. wide, and 3 ft 6 in. high. The tank has an approximate capacity of 1,500 gal. Diagram 094276, Sheet 2 in Appendix D-1 depicts VES-WL-111.

CPP-604 Process Condensate Collection Tanks, VES-WL-106, VES-WL-107, and VES-WL-163

Tanks VES-WL-106, VES-WL-107 and VES-WL-163 are vertical-oriented cylindrical tanks with domed ends. The tanks are each approximately 12 ft long and have an 8 ft diameter. The tanks have an approximate capacity of 5,000 gal each. Diagram 094276, sheet 3 in Appendix D-1 depicts the tanks.

CPP-604 TFT, VES-WM-100, VES-WM-101, VES-WM-102

VES-WM-100, VES-WM-101, and VES-WM-102 are horizontal-oriented, cylindrical tanks with domed ends. All three tanks have an outside diameter of 10 ft and 30 ft from tangent to tangent. Each tank has an approximate capacity of 18,400 gal. Diagram 103308 in Appendix D-1 depicts these tanks.

CPP-641 Tanks, VES-WL-103, VES-WL-104, VES-WL-105

VES-WL-103, VES-WL-104, and VES-WL-105 are horizontal-oriented, cylindrical tanks with domed ends. All three tanks have an outside diameter of 8 ft and are approximately 12 ft 6 in. from tangent to tangent. The tanks have an approximate capacity of 5,000 gal each. Diagram 111804 in Appendix D-1 depicts Tanks VES-WL-103, VES-WL-104, and VES-WL-105.

CPP-601 Deep Tanks, VES-WH-100/-101 and VES-WG-100/-101

Tanks VES-WG-100, VES-WG-101, VES-WH-100, and VES-WH-101 are horizontal tanks with domed ends. The tanks have approximately a 9 ft diameter and are approximately 8 ft 6 in. from tangent to tangent. The tanks have an approximate capacity of 4,500 gal. Diagram 092711 in Appendix D-1 depicts the WH tanks and Diagram 092712 depicts the WG tanks.

VES-WL-135, VES-WL-136, VES-WL-137, VES-WL-138, VES-WL-139, VES-WL-142, and VES-WL-144 Process Waste Liquid (PWL) Tanks

Tanks VES-WL-135, VES-WL-136, VES-WL-139, and VES-WL-142 are vertical-oriented cylindrical tanks with domed ends. The tanks have approximately a 1 ft 6 in.-diameter and are approximately 8 in. from tangent to tangent. The tanks have an approximate capacity of 10 gal. Tanks VES-WL-137, VES-WL-138, and VES-WL-144 are vertical-oriented cylindrical tanks with domed ends. The tanks have approximately a 2 ft diameter and are approximately 1 ft from tangent to tangent. The tanks have an approximate capacity of 25 gal. Diagrams 368921, 368922, 368923, 368924, 368925, 368927, 368929, 368930, and 368931 in Appendix D-1 depict the PWL tanks.

VES-WL-150 Tank

Tank VES-WL-150 is a vertical-oriented cylindrical tank with domed ends. The tank has approximately a 2 ft diameter and is approximately 2 ft from tangent to tangent. The tank has an approximate capacity of 50 gal. Diagram 179009 in Appendix D-1 depicts the tank.

LET&D Tanks

This section provides the LET&D tank numbers, the year each tank was placed into service, the materials of construction, and the design standards. Table D-2 summarizes the LET&D tanks.

Fractionator Waste Feed Head Tank VES-WLK-197

The Acid Fractionator Waste Feed Head Tank is a horizontal tank with domed ends. The tank has an approximate 3-ft diameter and is 4 ft from tangent to tangent. The maximum capacity of the tank is 270 gal. The tank is located approximately 16 ft above the highest feed point of Acid Fractionator FRAC-WLL-170 or FRAC-WLK-171. Waste solutions are pumped from the Process Condensate Collection Tanks to this tank. This tank gravity feeds the fractionators. Diagram 356596, Sheet 10 in Appendix D-1 depicts VES-WLK-197.

Table D-2. LET&D Tanks

Tank Number/ Description	Year of Operation	Materials of Construction	Design Standards
VES-WLK-197	1993	Type 304L SS	ASME Section VIII Division 1
VES-WLL-170	1993	Hastelloy G-30	ASME Section VIII Division 1
VES-WLK-171	1993	Hastelloy G-30	ASME Section VIII Division 1
VES-WLL-195	1993	Type 304L SS	ASME Section VIII Division 1
VES-NCR-171	1995	Type 304 SS	ASME Section VIII Division 1
VES-NCR-173	1995	Type 304L SS	Fabricated per Project Drawings

Acid Fractionators FRAC-WLL-170 and FRAC-WLK-171

The two acid fractionators are identical thermal siphon units, with an inside diameter of 42 in. and a height of approximately 24 ft from tangent to tangent. Both units consist of vertical-oriented, cylindrical tanks, with domed ends. The fractionator, associated equipment, and piping have a maximum capacity of 460 gallons. Hastelloy G-30 is used for equipment and piping in contact with the hot acid because of its strength and resistance to the corrosive solution. The fractionators separate the waste solution into water (overheads) and nitric acid (bottoms). Diagram 356596, Sheets 5 and 8 in Appendix D-1 depict FRAC-WLL-170 and FRAC-WLK-171, respectively.

Acid Fractionator Bottoms Tank VES-WLL-195

The Bottoms Tank is a horizontal-oriented, cylindrical tank with domed ends. The tank has an inner diameter of 36 in. and a length of 4 ft from tangent to tangent. The maximum capacity of the tank is 270 gal. This tank stores nitric acid intended for use in the INTEC waste treatment processes. Diagram 356596, Sheet 3 in Appendix D-1 depicts VES-WLL-195.

LET&D Nitric Acid Recycle Tank VES-NCR-171

The Acid Recycle Tank is a horizontal, cylindrical tank, 11 ft in diameter and 33 ft 8 in. long from end to end. The tank has a maximum capacity of 22,500 gal. This tank stores nitric acid intended for use in NWCF debris treatment, the filter leach process, and decontamination activities. Diagram 176274 in Appendix D-1 depicts VES-NCR-171.

Nitric Acid Head Tank VES-NCR-173

The Nitric Acid Head Tank is a vertical cylindrical tank with flat ends. It has a 24-in. outside diameter and measures approximately 56 in. from end to end. It is constructed from 300 series stainless steel. The tank has an approximate capacity of 90 gallons. Diagram 176274 in Appendix D-1 depicts VES-NCR-173.

D-2d Description of Feed Systems, Safety Cutoffs, Bypass Systems, and Pressure Controls [IDAPA 58.01.05.012; 40 CFR 270.16(c)]

Table D-3. Tank Inputs & Outputs

TANK NUMBER/ DESCRIPTION	DRAWING NUMBER	INPUTS	OUTPUTS
VES-NCR-171 Acid Recycle Tank	176274	Pumped	Air-Lifted
VES-NCR-173 Acid Recycle Head Tank	176274	Air-Lifted	Gravity
VES-WG-100 Deep Tanks	092712	Gravity	Jetted, Pumped
VES-WG-101 Deep Tanks	092712	Gravity, Jetted	Jetted, Pumped
VES-WH-100 Deep Tanks	092711	Gravity, Jetted	Jetted, Pumped
VES-WH-101 Deep Tanks	092711	Gravity	Jetted, Pumped
VES-WL-101 Bottoms Collection	096156	Gravity, Jetted, Pumped	Jetted
VES-WL-102 Surge Tank for VES-WL-133	096156	Gravity	Pumped
VES-WL-103 WWH Tank	111804	Jetted	Jetted, Pumped
VES-WL-104 WWH Tank	111804	Pumped	Jetted, Pumped
VES-WL-105 WWH Tank	111804	Jetted, Pumped	Jetted, Pumped
VES-WL-106 Process Condensate Collection Tank	094276-3	Pumped	Gravity/Pumped
VES-WL-107 Process Condensate Collection Tank	094276-3	Pumped	Pumped/Gravity
VES-WL-108 Waste Evaporator Condensate Knock-out Pot	094276-3	Offgas Condensate	Gravity

Table D-3. Tank Inputs & Outputs (continued)

TANK NUMBER/ DESCRIPTION	DRAWING NUMBER	INPUTS	OUTPUTS
VES-WL-109 Evaporator Feed	094276-1	Jetted, Pumped	Gravity
VES-WL-111 Bottoms Collection Tank	094276-2	Gravity, Jetted, Pumped	Jetted
VES-WL-129 Evaporator	094276-1	Pumped	Gravity
VES-WL-131 Condensate Surge Tank	094276-3	Gravity	Pumped
VES-WL-132 Evaporator Feed Sediment Tank	096156	Jetted, Pumped	Gravity, Jetted
VES-WL-133 Evaporator Feed Collection Tank	096156	Gravity	Jetted, Pumped
VES-WL-134 Condensate Surge Tank	094276-3	Gravity	Pumped
VES-WL-135 Sump Tank	368921	Gravity	Jetted
VES-WL-136 Process Condensate Collection Tank	368922	Gravity	Jetted
VES-WL-137 Process Condensate Collection Tank	368923	Gravity	Jetted
VES-WL-138 Process Condensate Collection Tank	368924	Gravity	Jetted
VES-WL-139 Process Condensate Collection Tank	368925	Gravity	Jetted
VES-WL-142 Process Condensate Collection Tank	368927	Gravity	Jetted
VES-WL-144 Process Condensate Collection Tank	368929	Gravity	Jetted
VES-WL-150 Process Condensate Collection Tank	096156	Jetted/Gravity	Jetted
VES-WL-161 Evaporator	094276-1	Gravity	Gravity

Table D-3. Tank Inputs & Outputs (continued)

TANK NUMBER/ DESCRIPTION	DRAWING NUMBER	INPUTS	OUTPUTS
VES-WL-163 Process Condensate Collection Tank	094276-3	Pumped	Gravity
VES-WLK-171 Acid Fractionator	356596-8	Gravity	Gravity
VES-WLK-197 Fractionator Waste Feed Head Tank	356596-10	Pumped	Gravity
VES-WLL-170 Acid Fractionator	356596-5	Gravity	Gravity
VES-WLL-195 Acid Fractionator Bottoms Tank	356596-3	Gravity	Pumped
VES-WM-100 CPP-604 TFT	057498	Gravity, Jetted, Pumped	Jetted
VES-WM-101 CPP-604 TFT	057498	Gravity, Jetted, Pumped	Jetted
VES-WM-102 CPP-604 TFT	057498	Gravity, Jetted, Pumped	Jetted

PEWE Feed Systems

The piping systems that feed to the PEWE system are designed to slope downward to the PEWE Feed Sediment and Feed Collection Tanks. Wastes flow by gravity or are jetted or pumped to VES-WL-132 or VES-WL-133.

Wastes passing through VES-WL-132 encounter a baffle and weir system, which allows time for solids to settle out of the solution, as the fluid flows under the baffle and over the weir. Waste in VES-WL-132 overflows to VES-WL-133.

From VES-WL-133, waste is pumped by one of two feed pumps either directly to EVAP-WL-129 or to Evaporator Head Tank VES-WL-109, which gravity-feeds to EVAP-WL-161. Additionally, a jet is available to transfer waste from VES-WL-133 to VES-WL-109.

The liquid flow to the evaporators is regulated by feed valves, which are controlled by level recorders/controllers in the control room. The feed valve for EVAP-WL-129 is located between the feed pumps and the evaporator. The feed valve for EVAP-WL-161 is located between Evaporator Head Tank, VES-WL-109, and the evaporator. Evaporator Head Tank VES-WL-109 will overflow back to VES-WL-102 or VES-WL-133.

The PWL tanks and sumps are located in CPP-604, CPP-649, and associated valve boxes. The purpose of the system is to collect offgas condensate and floor drains via gravity, and then transfer the waste to the PEWE Evaporator Feed Collection Tank, VES-WL-133. The system is comprised of tanks VES-WL-135, -136, -137, -138, -139, -142, -144, and -150. A sump or vault secondarily contains each of the tanks. The tanks and sumps are jetted upon high level detection. All are transferred into a common header and then transferred into VES-WL-133, except for VES-WL-150, which is transferred into the Evaporator Feed Sediment Tank, VES-WL-132. VES-WL-132 drains directly into VES-WL-133.

PEWE Safety Cutoffs

The instruments for the PEWE system are located on control panels and the Distributed Control System (DCS) in the Waste Processing Control Room. The control panels consist of instruments and alarms to detect system upsets. The DCS operating consoles display data from the instrumentation and transmit control actions, alarms, and shutoffs of the process control unit.

The DCS monitors and controls processes in the ILWMS. These processes include the LET&D, Service Waste, PEWE, Process Offgas (POG), Atmospheric Protection System (APS), PWL, VOG, and Main Stack Monitor processes or systems. The DCS is a microprocessor-based control system that uses a combination of free-standing operator consoles networked to electronic I/O interfaces to field devices.

To ensure a high degree of integrity, redundancy is used where possible. These include redundant controllers, power supplies, communications modules, consoles, and data highway cabling. This redundancy, along with utilization of equipment only from a vendor with documented previous experience of providing successful complex process control systems, and adherence to the vendor's recommended preventive maintenance practices provide the necessary assurance of reliability for meeting the requirements of EPA regulations, Technical Specifications/Standards, and plant mission.

Examples of other instruments that are monitored by the DCS include steam flow, water flow, instrument air pressure, and differential pressure across the HEPA filters.

The PEWE is manually shut down by the operator when the evaporator reaches a temperature of 108° C. This process includes eliminating the feed and isolating the steam supply to the reboiler. A temperature of 186° C is the theoretical threshold PEWE evaporator process temperature, at which under only the most “favorable” conditions, a potentially explosive self-sustaining tributyl phosphate (TBP)-nitric acid reaction could occur. To provide a significant margin of safety, 130° C is established as the safety limit to ensure that an explosion due to the rapid decomposition of organic nitrated complexes cannot occur under any circumstances. A limiting control setting of 120° C is set to ensure that the 130° C temperature is never reached. As an added measure of safety, INTEC Waste Operations has established the operating limit of 110° C, to further minimize the possibility of an organic-nitric acid explosion. Upon reaching the evaporator process temperature of 110° C, the system alarms and undergoes automatic steam shutoff if the process has not already been halted manually, via the DCS for VES-WL-129 & VES-WL-161. Automatic safe shutdown at 110° C not only eliminates the possibility of an organic-nitric acid explosion, but also serves to limit scale formation in the evaporator reboiler.

On high temperature alarm, the steam to the reboiler is automatically shut off. As the boiling action stops, the level controllers shut off the feed. The air system controllers maintain a positive pressure on the shell (steam) side of the reboiler to prevent waste from entering the steam condensate system, in the event there is a leak in the reboiler tube bundle.

The Bottoms Collection Tanks, VES-WL-101 and VES-WL-111, are monitored from the DCS to control liquid volume and leak detection. Each tank has a high level alarm to alert operators before the tank overfills.

The ILWMS is monitored and controlled by the DCS. As part of the DCS, the field instrumentation interfaces to electronic hardware in process control unit cabinets. Operating consoles located in the Waste Processing Control Room display data from the instrumentation and transmit control actions to the process control unit. The consoles interface to the process control units over a system network.

The conditions that require operator response include high and low level in the evaporator, high temperature, high density, lack of feed, and/or loss of utilities.

The PWL tanks and sumps are considered part of the PEWE collection system. The tanks and sumps have high level alarms that, upon activation, are jetted to the appropriate tank. The tanks and sumps are monitored by the DCS located in the Waste Processing Control Room.

VES-WL-132, VES-WL-133, VES-WL-102, VES-WL-106, VES-WL-107, and VES-WL-163 all have high level alarms. VES-WL-109 has an overfill line that drains back to tanks VES-WL-133 or VES-WL-102. Upon high level alarm, the condition is investigated, and appropriate action taken.

PEWE Bypass Systems

Waste can be transferred through the evaporators to VES-WL-101 or VES-WL-111 without operating the evaporators. Such transfers may occur when:

- The evaporators are not operable due to scheduled maintenance activities or are in need of repairs
- The system requires testing following repairs or maintenance (this minimizes waste by not introducing new materials to the system)
- The PEWE Feed Tanks can be emptied to allow additional storage capacity during periods of system maintenance and/or testing.

In the unlikely event that VES-WL-132 was to completely fill, solids would be carried over into VES-WL-133. As VES-WL-132 approached its capacity, solids would be detected as a result of plugging in the vessel's instrument lines. VES-WL-132 would then be immediately bypassed, diverting feed solutions directly to VES-WL-133. Once full of solids, VES-WL-132 is designed to be remotely removed/replaced. The full sediment tank will be managed as a RCRA solid waste and disposed in accordance with all applicable regulations. However, if the solids content in PEWE feed remains low, the INEEL may elect not to install a new feed sediment tank.

There are no bypass systems associated with the PWL tanks and sumps. No safety or waste treatment issues are associated with an inability to bypass these tanks or sumps.

PEWE Pressure Controls

Waste treatment and storage vessels at INTEC are connected to a gaseous waste treatment system called the VOG system. All ILWMS storage and treatment systems discharge gases such as instrument air purges (used in level, density, and pressure instrumentation), air spargers (agitators), and gases displaced from a vessel when it fills with liquid.

Gases from the PEWE and other INTEC processes, such as the Tank Farm and CPP-659 vessels, vent to the CPP-604 VOG system. The CPP-604 VOG system consists of a mist eliminator, superheater, and HEPA filter banks. The mist eliminator and superheater are included to protect and extend the life expectancy of the HEPA filters.

Several facility process and vessel offgas systems, including the CPP-604 VOG system, combine in the Process APS located in CPP-649. The Process APS is a back-up system that treats the combined process and vessel offgas streams from CPP-601, CPP-604, Tank Farm, and the NWCF. The Process APS treatment consists of a mist eliminator, superheater, and HEPA filters. Next, the process and vessel offgases are routed to the INTEC Main Stack (CPP-708) where they mix with building ventilation air and are exhausted to the atmosphere. The vessel and process offgas systems are maintained under a vacuum to control contamination. The system equipment and piping are fabricated from acid resistant stainless steel for corrosion resistance. Additionally, the Process Condensate Collection Tanks can be vented to the process condensate collection cells, which vent to the CPP-604 building ventilation system. The VOG and APS systems are described further in Section D-8b of this application.

Each PWL tank has an open vent line to prevent over pressurization.

CPP-604 TFT Feed Systems

Wastes are jetted or pumped to VES-WM-100. From VES-WM-100, waste may overflow to VES-WM-101, which in turn overflows to VES-WM-102. Additionally, each of the three tanks (VES-WM-100, VES-WM-101, and VES-WM-102) is equipped with a transfer jet that can transfer waste to a companion CPP-604 TFT system tank. A jet in VES-WM-100 transfers solution to VES-WM-102, a jet in VES-WM-102 transfers solution to VES-WM-101, and a jet in VES-WM-101 transfers solution to VES-WM-100. Additionally, each of the tanks can be jetted to the PEWE, the ETS, TFTs, or the TFF.

CPP-604 TFT Safety Cutoffs

If liquid accumulates in either of the two sumps associated with the CPP-604 TFT system, the accumulated liquid in the sump will initiate an alarm on the DCS. These sumps are equipped with steam jets to remove the liquid. Liquid accumulation in both sumps is jetted to the PEWE feed tanks or to the TFF.

The instruments for the CPP-604 TFT system tanks are monitored by the DCS from control panels in the Waste Processing Control Room. The instrumentation consists of instruments and alarms to detect system upset.

The purpose of the level drop alarms is to alert operators of potential leakage. The purpose of the high level alarms is to warn operators of the potential for tank overfilling. In the event of a level drop alarm or high level alarm for these tanks, the condition is investigated, and appropriate action taken.

CPP-604 TFT Bypass Systems

The CPP-604 TFTs may be used to store dilute waste feed, concentrated evaporator bottoms, or for segregation of wastes. INTEC management decides on the type of waste stored in the tanks and the frequency of use based on plant operating conditions and needs. The CPP-604 TFTs may be used to segregate wastes based on chemical or radionuclide content. The CPP-604 TFTs can be used as surge tanks to store dilute evaporator feed solution should the normal feed collection be full or otherwise unable to receive additional waste. Likewise, the CPP-604 TFTs can also be used to store concentrated evaporator bottoms if the normal bottoms system is unable to receive waste. When used to segregate wastes or to store evaporator feed or bottoms solutions, the CPP-604 TFTs are used as surge tanks for additional waste storage. When surge capacity is not needed, the tanks may be bypassed. There are no safety or waste treatment issues associated with either using or bypassing the tanks.

CPP-604 TFT Pressure Controls

The CPP-604 TFT system tanks vent to the INTEC VOG System.

CPP-641 WWH Tanks Feed Systems

The feed piping systems are designed to slope toward the WWH tanks. If any liquid accumulates in these tanks or sumps, steam jets will be used for internal transfers between tanks whereas pumps are used for transfers to the PEWE system.

CPP-641 WWH Tanks Safety Cutoffs

The level recorder alarms (LRA) for tanks VES-WL-103, VES-WL-104, and VES-WL-105 alert the operator to shut down the transfer pumps at a procedurally determined low level, to protect the pump bearings. There are no high level cutoffs. However, an alarm is provided to notify the operator when the upper limits of the tanks are being approached. Upon high level alarm, the condition will be investigated and appropriate action taken. Sump level alarms alert the operator of potential leaks. Upon high level alarm, the condition will be investigated and appropriate action taken.

CPP-641 WWH Tanks Bypass Systems

There are no bypass systems associated with the WWH tanks. No safety or waste treatment issues are associated with an inability to bypass these tanks.

CPP-641 WWH Tanks Pressure Controls

The WWH tanks vent to the INTEC VOG system via CPP-601.

CPP-601 Feed Systems

The feed piping systems are designed to slope toward the CPP-601 Deep Tanks. The flow into the tanks is by gravity and then the solutions are pumped to the PEWE.

CPP-601 Safety Cutoffs

There are no high level cutoffs. An alarm is provided to notify the operator that the upper limits of the tanks are being reached. Upon high level alarm, the condition will be investigated and appropriate action taken. If liquid is detected in the sumps, the operator notifies the shift supervisor and appropriate action is taken.

There are very few events that would interrupt/shutdown CPP-601 Deep Tank activities since there are four redundant systems. Typically, interruptions would be minor and limited to switching to another tank for collection. A total loss of plant air (such that all four tanks were affected) would be one of the few occurrences that would impact operations. Otherwise, loss of one tank's sparge flow, loss of a level instrument, or overflow of a tank to the sump would merely require switching to another collection tank, investigating the problem, and proceeding with the appropriate corrective actions for repairs. Collection in these cases would continue in another vessel and would not interrupt or shutdown Deep Tank operations.

CPP-601 Bypass Systems

There are no bypass systems associated with CPP-601 tanks. No safety or waste treatment issues are associated with an inability to bypass these tanks.

CPP-601 Pressure Controls

The CPP-601 Deep Tanks are vented to the INTEC VOG system.

CPP-1618 LET&D Feed Systems

Waste accumulated in the condensation tanks at the PEWE is pumped directly to the Fractionator Waste Feed Head Tank, VES-WLK-197, in Fractionator Cell 1. The ancillary piping for VES-WLK-197 begins at the transfer pump from the PEWE overhead condensate tanks. From VES-WLK-197, the waste stream is gravity fed to either of the acid fractionators for treatment. There are no other feed systems for the LET&D.

Concentrated nitric acid recovered in the LET&D fractionators gravity drains to the Acid Fractionator Bottoms Tank, VES-WLL-195.

CPP-1618 LET&D Safety Cutoffs

The LET&D is operated from the DCS for waste side operations. The LET&D process control contains instrumentation and a control system to monitor process variables and provide for safe and efficient operation and shutdown of the process by remote control of process equipment. The control room is used to control both LET&D and PEWE process systems.

Conditions that may cause the fractionators to be shut down or feed to the fractionators to be discontinued are high and low level in the fractionator, low vacuum in the fractionator, low fractionator differential pressure, high Tray 1 temperature, high separator level, high differential pressure across HEPA filters, lack of feed, and/or loss of utilities.

The systems that the DCS monitors and controls include PEWE waste transfers to the LET&D feed tank, fractionation, bottoms tank transfers to CPP-604 or the Acid Recycle Tank, and building ventilation. Indication of transfer to the Acid Recycle Tank is also provided in the NWCF control room.

VES-WLL-195 is equipped with a high level alarm. Upon high alarm the recovered nitric acid is transferred to VES-NCR-171, VES-WL-133, VES-WL-101, or the TFF.

CPP-1618 LET&D Bypass Systems

There are no bypass systems at the LET&D facility. No safety or waste treatment issues are associated with an inability to bypass this facility.

CPP-1618 LET&D Pressure Controls

The LET&D is vented to the Main Stack via its offgas system.

CPP-659 Annex Acid Recycle System (VES-NCR-171, VES-NCR-173) Feed Systems

VES-NCR-171 receives recovered nitric acid, which is pumped from VES-WLL-195 via the LET&D facility. The acid is then airlifted to VES-NCR-173 and distributed into a header for use elsewhere at the INTEC.

CPP-659 Annex Acid Recycle System Safety Cutoffs

VES-NCR-171 is equipped with a high level alarm. Transfers to the vessel are stopped when the high level alarm is reached. In the case of a high liquid level alarm, the condition will be investigated and appropriate action taken.

VES-NCR-173 is equipped with an overflow that returns the concentrated nitric acid to VES-NCR-171.

CPP-659 Annex Acid Recycle System Bypass Systems

There are no bypass systems associated with the Acid Recycle Tanks system. No safety or waste treatment issues are associated with an inability to bypass these tanks.

CPP-659 Annex Acid Recycle System Pressure Controls

VES-NCR-171 and VES-NCR-173 are vented to the NWCF VOG system.

D-2e Diagrams of Piping, Instrumentation, and Process Flow [IDAPA 58.01.05.012; 40 CFR 270.16(d)]

The piping systems to be permitted with the PEWE system include the piping and tanks depicted in the bolded area of Exhibit D-2. The piping systems to be permitted with the LET&D system include the piping and tanks depicted in Exhibit D-3.

Ancillary piping and equipment associated with the PEWE system, includes all the piping and equipment upstream of the collection tanks depicted in Exhibit D-2, except the piping and equipment identified below:

- This permit application does not include piping and equipment associated with the TFF. The piping and equipment associated with the TFF will be operated under interim status/Consent Order and will be RCRA closed with the tank farm closure.

- This permit application does not include piping and equipment associated with CPP-666. The CPP-666 (Fluorinel Dissolution Process) lines are not included because they carry only radioactive waste.

- This permit application does not include piping and equipment associated with CPP-603. The line from CPP-603 is not included in this permit because it will be closed with VES-SFE-106. VES-SFE-106 is currently operated under interim status and will be RCRA closed.

- This permit application does not include piping and equipment associated with CPP-640 (VES-HW-101, VES-HW-102 and VES-HW-103). The line associated with these vessels will be operated and closed under interim status.

The ancillary piping and equipment upstream of the collection tanks are included in the Diagram Package, Appendix D-1.

The INTEC was designed and built using a variety of Architectural Engineers (AE) over the past 50 years. Those AEs used different line identifiers, instrumentation identifiers, etc. As buildings were designed and constructed, the current architectural engineering standards for the time period were used. The diagrams of the processes submitted to the Idaho Department of Environmental Quality (DEQ) span the last 50 years. Therefore, when looking at these diagrams, careful attention must be paid to the identifiers to ensure proper interpretation.

The following is an explanation of the symbols the Idaho National Engineering and Environmental Laboratory (INEEL) has chosen to identify the RCRA-regulated tank systems associated with the INTEC on the diagrams:

R Indicates an active RCRA-regulated liquid transport line requiring secondary containment and inspections.

E Indicates that the lines in question are not used to routinely manage hazardous waste. They would only receive hazardous waste if an unplanned spill or release occurred. As such, the lines are not subject to secondary containment, daily inspections, or closure. Where drains are located with the secondary containment system for regulated units, they are considered an integral part of a secondary containment system and subject to applicable regulatory requirements associated with secondary containment systems.

O Indicates an active evaporator/fractionator offgas line.

C Indicates an inactive transfer line. The line may have been used for the RCRA waste in the past but is no longer being used.

A typical legend accompanies each diagram representing the various systems to help identify the symbols used in the diagram. These legends do not include all symbols used at the INTEC. The symbols may differ, depending on the timeframe in which the buildings/processes were designed and built. The diagram list for the PEWE system is provided in Table D-4.

Table D-4. List of PEWE System Diagrams

Diagram Number	System
056203	CPP-604 Vessel Offgas P&ID
056204	CPP-604 CPP-605 CPP-649 Dissolver Offgas System and APS Process Offgas System P&ID
056612[a]	CPP-648 Radioactive Solid And Liquid Waste Storage Vessel VES-SFE-106 P&ID
057375[a]	CPP-601 Service Waste System Flowsheet
057490[a]	CPP-601 East & West Sample Corridor North End P&ID
057498	Process Flow for CPP-604 TFT system
057499[a]	CPP-Area Tank Farm Primary waste collection and storage, Sheet 2 of 6. Also shows CPP-1619 Truck Bay. Contains piping from both CPP-601 and CPP-641 going to the PEWE
092711[a]	CPP-601 PEW Tank System WH-Cell P&ID
092712[a]	CPP-601 PEW Tank System WG-Cell P&ID
094276 Sheets 1 – 4	CPP-604 PEWE Evaporators Process P&ID
094762[a]	CPP-601 Process Building Pew Collection System Flowsheet
094933[a]	CPP-601 Process Building VOG DOG SOG & Vt System P&ID
096156	CPP-604 PEW Evaporators Collection Tanks VES-WL-102, -101, -133, -132. Inlet piping from CPP-601 and CPP-641
097291[a]	CPP-602 Process Building And Process Equipment Waste System Flowsheet
098397[a]	CPP-601 Bulk Nitric And Strip Solution Makeup Flowsheet
103308	CPP-604 Sampler Flowsheet Waste Storage Tanks VES-WM-100, -101, -102 and VES-WL-101 and 102
103589	CPP-604 Waste Treatment Building Drain & Service Waste Flowsheet
104097[a]	CPP-601 Process Building And Process Equipment Waste System P&ID
111757	CPP-640 Hot Pilot Plant Waste Tankage Piping & Instrumentation Diagram
111804	CPP-641 Westside Waste Holdup Tank System P&ID VES-WL-103, -104, & -105
133406	CPP-659 Outside Yard Piping Flow Diagram
133408	CPP-659 Mechanical P & ID Hot Sump Tanks Cell NWCF
133409	CPP-659 Mechanical Flow Diagram Hot Sump Tanks Cell NWCF
133423	CPP-659 Mechanical Flow Diagram Offgas Cell Sheet 2 of 4
133424	CPP-659 Mechanical Flow Diagram Offgas Cell NWCF

Table D-4. (continued).

Diagram Number	System
133425	CPP-659 Mechanical Flow Diagram Offgas Cell NWCF
133610[a]	CPP-601 C-Cell Flowsheet
133764[a]	CPP-684 Remote Analytical Facility Upgrade & Expansion RAL P&ID Process Equipment Drain
176274	CPP-659 LET&D Acid Recycle System P&ID
176275	CPP-604 CPP-649 PWL Collection System Floor and Wall Penetrations Sump Details
179009	CPP-604 Vessel VES-WL-150 P&ID
347791	LET&D Notes & Abbreviations
356596 Sheets 1-11	CPP-1618 Liquid Effluent Treatment and Disposal Facility P&ID
368921	CPP-604 CPP-649 PWL Collection System Process and Instrument Diagram DVB-OGF-DG-D5 Vault
368922	CPP-604 CPP-649 PWL Collection System Process and Instrument Diagram DVB-OGF-DG-D8 Vault
368923	CPP-604 CPP-649 PWL Collection System Process and Instrument Diagram APS Process
368924	CPP 604/649 PWL Collection System and Instrument Diagram Offgas Blower
368925	CPP-604 CPP-649 PWL Collection System Process and Instrument Diagram Offgas Filter Cell
368926	CPP-604 CPP-649 PWL Collection System P&ID South Cell
368927	CPP-604 CPP-649 PWL Collection System P&I D Middle Cell
368929	CPP-604 CPP-649 PWL Collection System P&I D North Cell
368930	CPP-604 CPP-649 PWL Collection System Separation Condensation P&ID
368931	CPP-604 CPP-605 CPP-649 CPP-708 PWL Collection System Process & Instrument Diagram Main Stack & 161 Evaporator Cell
383444[a]	CPP-684 RAL Drain System Repairs Drain System P&ID

a. Drawing identifies ancillary equipment upstream of the collection tanks.

D-2f Containment and Detection of Releases

D-2f(1) Plans and Description of the Design, Construction, and Operation of the Secondary Containment System [IDAPA 58.01.05.012 and 008; 40 CFR 270.16(g) and 264.193]

D-2f(1)(a) Tank Age Determination [IDAPA 58.01.05.008; 40 CFR 264.193(a)]

Tables D-1 and D-2 list the tank numbers and descriptions, the year operations began, materials of construction, and the design standards used for the tanks in the PEWE and LET&D systems.

D-2f(1)(b) Requirements for Secondary Containment and Leak Detection [IDAPA 58.01.05.012 and 008; 40 CFR 270.16(g) and 264.193]

Construction specifications for the concrete, stainless steel liners, Hypalon membranes, and paint are located in Section B of this permit application.

Water stops were installed during construction of buildings, vaults, and cells associated with the PEWE and LET&D systems where required.

Level data for all of the sumps/tanks are recorded at least once every 24 hours. For further discussion on PEWE system inspections, see Section F, Procedures to Prevent Hazards.

Since the requirements of IDAPA 58.01.05.008 (40 CFR § 264.196) apply to spills or leaks that constitute a threat to human health or the environment, the following activities will be performed in response to the detection of system discharges in order to determine whether the requirements cited above will be implemented.

- Evaluate the system to determine if an integrity issue exists (this may not involve entering the radiological area). In making this determination, facility personnel will consider whether a discharge has migrated or could potentially migrate and whether it constitutes or could constitute a threat to human health or the environment. Any system discharge that is indicative of an integrity issue will trigger a response under 40 CFR § 264.196. Examples of system discharges that might indicate an integrity issue include pipe breaks, through-wall failures of tank or component boundaries, and system breeches resulting from incorrect maintenance (e.g., pipe or component not reinstalled). A system discharge that is not indicative of an integrity issue will not trigger a response under 40 CFR § 264.196. Examples include discharges caused by opening a pipe system and discharging residual liquids, pump and valve package discharges, mechanical joint and fitting discharges, discharges resulting from transients or maintenance activities that cause pressure surges, discharges from openings in systems where normal operations are at vacuum, and planned decontamination activities.

- Integrity assessments will be conducted in accordance with written and approved procedures
- Results of integrity assessments will be documented in the facility operating record
- For discharges into secondary containment, the liquids will be transferred to compliant storage areas within 24 hours or at the earliest practicable time.

Upon detection of spilled or leaked materials, the following actions are taken:

- Within 24 hours, remove as much of the waste as is necessary to prevent further releases of hazardous waste to the environment and to allow inspection and repair of the treatment system, in accordance with IDAPA 58.01.05.008 [40 CFR § 264.601]
- Prevent migration of and remove visible contamination from soil or surface water, in accordance with IDAPA 58.01.05.008 [40 CFR § 264.601]
- If the collected material is an HWMA/RCRA-regulated material, manage it in accordance with all applicable requirements of IDAPA 58.01.05.005 through 58.01.05.008 [40 CFR Parts 261 through 264].

Because a pipe or duct is not a container, the Environmental Protection Agency (EPA) believes gases/vapors flowing through pipes or ductwork are not solid wastes subject to RCRA regulation. However, any liquid condensate from such a gas/vapor stream may be subject to RCRA requirements (December 11, 1989, 54 FR 50968). The ILWMS is designed to remove condensable liquids from offgas. These condensable liquids are collected in tanks equipped with secondary containment and leak detection devices.

The offgas systems at the INTEC are designed, constructed, and managed in a manner that protects human health and the environment. Through a series of control devices (e.g., mist eliminators, condensers, superheaters, piping insulation, and heat traces) the offgas systems are designed to remove condensate from the offgas stream, thereby minimizing the potential for failure of downstream offgas equipment and releases to the environment. While the offgas systems are designed to remove condensate from the offgas streams, the systems are designed to handle liquids, should they form. The offgas lines are constructed of Series 300 stainless steel or Inconel. Each of these alloys provides excellent corrosion and temperature resistance. Additionally, the offgas piping is sloped to drain to low spots located throughout the offgas system. Each low spot where hazardous waste may accumulate is equipped with a drain line that drains to an HWMA/RCRA-regulated tank system and each drain line is secondarily contained. Prior to discharge to the INTEC Main Stack (CPP-708), each offgas stream is passed through a series of HEPA filters to minimize the potential release of airborne radioactive contamination.

With the exception of the 12-in. offgas line exiting the LET&D, each ILWMS out-of-cell offgas line manages a dry offgas stream. The formation of condensate within these lines would be detected via collection of liquids in downstream condensate collection tanks or high differential pressure across associated HEPA filters. Formation of condensate in these offgas lines or an increase in the pressure differential across associated HEPA filters could constitute an off-specification or upset condition. Such upset conditions are noted in the facility operating record and corrective actions taken, as appropriate.

Moist offgas from the LET&D first passes through a superheater, followed by a HEPA filter, prior to discharging to the heat-traced, insulated, out-of-cell offgas piping to the INTEC Main Stack. The offgas stream is maintained at an elevated temperature to minimize the potential formation of condensate. Off-specification and upset conditions are detected via an increase in the pressure differential across the LET&D HEPA filters and via monitoring of the heat trace. Any upset conditions are recorded in the facility operating record and corrective actions taken, as appropriate.

PEWE System Feed Sediment and Feed Collection Tank Vaults

The PEWE Feed Sediment and Feed Collection Tanks, VES-WL-132 and VES-WL-133, are located in connected underground vaults at the north end of CPP-604. Although these vaults are located at different floor elevations, they share a common sump for leak detection.

The VES-WL-132 vault is constructed of reinforced concrete and is 17 ft long, 16 ft 6 in. wide, and 13 ft 8 in. high. The floor and lower 2 ft 6 in. of the walls are lined with stainless steel.

The VES-WL-133 vault is constructed of reinforced concrete and is 42 ft long, 16 ft 6 in. wide, and 17 ft high. The floor of the cell and the lower 5 ft of the walls are lined with stainless steel.

The floor of the VES-WL-133 vault slopes to a sump along the west wall of the cell, which measures 2 ft by 2 ft by 2 ft. The floor of the VES-WL-132 vault slopes to a 3-in. drain line that leads to the VES-WL-133 vault sump. Liquid accumulation in this sump is monitored and, upon high alarm, liquid is jetted to the inlet line to VES-WL-132.

VES-WL-135, -136, -137, -138, -139, -142, -144, and -150

The PWL tanks are located in sumps in CPP-604, CPP-649, and associated valve boxes. The system is comprised of tanks VES-WL-135, -136, -137, -138, -139, -142, -144, and -150. VES-WL-136, -139, and -142 are located in sumps with measurements of 2ft by 2ft by 1ft 8 in. VES-WL-137, -138, and -144 are located in sumps with measurements of 2ft 6 in. by 2ft 6 in. by 2ft. VES-WL-135 is located in valve box D5, with measurements of 6ft by 8ft by 11ft 9 in. VES-WL-150 is located in the VES-WL-101/102 cell with measurements of 30 ft 6 in. wide, 43 ft long, and 16 ft high. Upon high alarm, the tanks/sumps are jetted as part of the PWL collection system to VES-WL-133 or VES-WL-132.

VES-WL-101 and VES-WL-102 Cell

The vault floor, walls, and ceiling of the VES-WL-101/VES-WL-102 cell are constructed of reinforced concrete that range in thickness from two to four feet. The vault is 30 ft 6 in. wide, 43 ft long, and 16 ft high.

The secondary containment consists of the concrete floor lined with a Hypalon membrane that extends four feet up the walls.

This cell drains to a stainless-steel-lined floor sump in the center of the cell. Upon high alarm, the sump is jetted to the PWL collection system VES-WL-150 and then to VES-WL-132.

EVAP-WL-161 Cell

The EVAP-WL-161 cell is located on the northeast side of CPP-604. The cell is constructed of reinforced concrete and is 22 ft long, 18 ft wide, and 34 ft high. The cell floor and lower 3 ft of the walls are lined with stainless steel. The Evaporator Head Tank, VES-WL-109, and the Bottoms Collection Tank, VES-WL-111, are also located in this cell. This cell drains to a stainless-steel-lined floor sump (SU-WL-147) 10 in. in diameter and 1 ft deep, in the northwest corner of the cell. Upon high alarm, the sump is jetted as part of the PWL collection system to VES-WL-133.

There are known defects (cracks) in the CPP-604 EVAP-WL-161 Evaporator cell concrete walls. INTEC structural engineering personnel have evaluated the condition of the WL-161 Evaporator cell and have determined the cell to be structurally sound. RCRA regulations [40 CFR § 264.15(c)] require repair of structures to ensure the problem does not lead to an environmental or human health hazard. The existing condition of the WL-161 cell does not pose a hazard to the environment or to human health. The portion of the cell that provides secondary containment and leak detection is the lower three-foot stainless steel cell liner, which has no defects. The defects in the cell are only in portions of the concrete walls located above the cell liner. Any leaks from the process vessels or ancillary piping will be completely contained within the stainless steel liner and will not subject the concrete wall to any sustained exposure to hazardous waste. The cell is maintained under negative pressure. Any offgas from a leak or spill would be collected in the CPP-604 VOG system. Inspections of the cell during periods of maintenance or repair are made to ensure that deterioration of the concrete does not increase.

EVAP-WL-129 Cell and Feed Pump Cell

The EVAP-WL-129 cell and the feed pump cell are located on the east side of CPP-604. Access to both cells is gained through the condensate collection cell. Both cells are constructed of reinforced concrete. The EVAP-WL-129 cell has internal dimensions of 14 ft by 21 ft 4 in. (including the access area) by 34 ft high (the access area is only 8 ft high). The EVAP-WL-129 cell floor and walls are lined with stainless steel. The access area floor and lower 1 ft of the walls are lined with stainless steel. The EVAP-WL-129 cell floor slopes to a 2-in. floor drain that drains to the feed pump cell sump.

The feed pump cell is located just north of the EVAP-WL-129 cell and has internal dimensions of 9 ft 2 in. by 14 ft 6 in. by 8 ft high. The cell floor and lower 1 ft of the walls are lined with stainless steel. The feed pump cell floor also slopes to a 2-in. floor drain that drains to the sump in the northeast corner of the cell. This sump has dimensions of 1 ft 6 in. by 1 ft 6 in. by 2 ft 6 in. Upon high alarm, the sump is jetted to VES-WL-133.

If liquid accumulates in one of the above-mentioned sumps, the accumulated liquid in the sump will initiate an alarm in the Waste Processing Control Room. These sumps are all equipped with steam jets to remove the waste from the secondary containment systems.

Process Condensate Collection Cell

Tanks VES-WL-106, VES-WL-107, and VES-WL-163 are located in the process condensate collection cell. The Condensate Surge Tanks, VES-WL-131 and VES-WL-134, are located in this cell as well. This cell is located on the east side of CPP-604. The cell is constructed of reinforced concrete and has dimensions of 46 ft by 21 ft by 35 ft 6 in. high. The cell floor and lower 1 ft of the walls are lined with stainless steel, which is sealed to the concrete walls to prevent liquid from getting between the liner and the walls. This configuration is common to all stainless steel liners in the ILWMS. A 6-in.-high barrier is located in front of the condensate collection cell door to prevent leakage to the access corridor. This cell drains to either of two sumps, both of which are 10 in. diameter and 1 ft deep. Upon high alarm, the sumps (SU-WL-145 and SU-WL-146) are jetted as part of the PWL collection system to VES-WL-133.

Level data for all of the above-mentioned sumps are recorded at least once every 24 hours. For further discussion on PEWE system inspections, see Section F, Procedures to Prevent Hazards.

If liquid accumulates in one of the above-mentioned sumps, the accumulated liquid in the sump will initiate an alarm in the Waste Processing Control Room. These sumps are all equipped with steam jets to remove the waste from the secondary containment systems.

CPP-604 TFT Vaults

The CPP-604 TFT system tanks are located in two underground connected vaults at the north end of CPP-604.

The west vault, containing VES-WM-100, is constructed of reinforced concrete and is 17 ft wide, 43 ft long, and 16 ft high. The vault adjacent to it on the east contains VES-WM-101 and VES-WM-102, and is 30 ft 6 in. wide, 43 ft long, and 16 ft high. The floors and lower 3 ft 6 in. of the walls in both vaults are lined with stainless steel.

The VES-WM-100 vault slopes to a sump that is 2 ft by 2 ft by 4 ft-deep along the east wall of the vault. The VES-WM-101/VES-WM-102 vault slopes to a sump that is 2 ft by 2 ft by 4 ft deep in the center of the vault. Upon high alarm the sump is jetted to VES-WL-132.

CPP-641 Tanks Vaults

VES-WL-103, VES-WL-104, and VES-WL-105 are located in two underground vaults north of CPP-641. The vault complex measures 39 ft 8 in. by 20 ft (outside dimensions). The outside walls are 1 ft thick, and the inside wall separating the two vaults is 3 ft 6 in. thick. The east vault measures 18 ft by 22 ft by 12 ft 6 in. The west vault measures 18 ft by 12 ft 2 in. by 12 ft 6 in. VES-WL-104 and -105 share the east vault; VES-WL-103 is located in the west vault. The floors, ceilings, and walls of the vaults are coated with epoxy paint that is compatible with the waste being stored. Both vaults are equipped with sumps and leak detection. Upon high alarm, the sump in the west vault is jetted to VES-WL-103 and the east vault is jetted to VES-WL-104.

CPP-601 Deep Tanks Vaults

The WG/WH tanks are located on the lowest level of CPP-601. Two tanks are located in each of the two reinforced concrete vaults. The cells each measure 38 ft 6 in. by 15 ft by 21 ft 6 in., with a stainless-steel-lined floor that extends 3-ft up the walls. Both vaults are provided with sumps and leak detection. Upon high level alarm, the sumps are jetted back to either VES-WG-100/-101 or VES-WH-100/-101 tanks.

PEWE Secondary Containment System Calculations

The secondary containment structures for the regulated tanks within the PEWE system will contain 100 percent of the capacity of the largest tank (19,000 gal), and are stainless steel-lined.

PEWE System Feed Sediment and Feed Collection Vault

In the event that VES-WL-132 were to fail, its contents would drain to the VES-WL-133 vault. The VES-WL-133 vault will contain 100 percent of the capacity of the largest tank, which is 19,000 gallons, within this secondary containment system. The volume of the VES-WL-133 secondary containment system is 3,465 ft^3 or 25,918 gal.

Equation 1: (42 ft × 16 ft 6 in × 5 ft)

= 3,465 ft^3

= 25,918 gal

VES-WL-101 and VES-WL-102 Cell

The vault will contain 100 percent of the capacity of the largest tank (18,400 gal) within this secondary containment system. This vault also contains VES-WL-150. The volume of the secondary containment system is 5,246 ft^3 or 39,242 gal.

Equation 2: (43 ft × 30 ft 6 in. × 4 ft)

= 5,246 ft^3

= 39,242 gal

Evaporator 161 Cell, EVAP-WL-129, the Feed Pump Cell, Condensate Cell, and the Access Area

40 CFR 264.193(e)(1)(i) and 264.193(e)(2)(i), state that external liner systems and vault systems must be designed or operated to contain 100 percent of the capacity of the largest tank within its boundary.

EVAP-WL-161, EVAP-WL-129, the Feed Pump Cell, the Condensate Cell, and the access area are considered to be contained within one boundary. They are separated by personnel doorways or labyrinths, which only provide personnel protection from radiation exposure and do not act as liquid containment.

In the event that the largest tank within this secondary containment system boundary was to fail, its contents would drain to the Condensate Collection Cell sumps. The floor linings in the Condensate Cell, the pump pit, and the access area slope uniformly towards these sumps. The stainless steel liner in the lower portion of the cell would contain 100 percent of the contents of the largest tank (5,000 gallons) in the cell.

Equation 3:

Total Volume = condensate collection cell volume [*equation 3(a)*] +
evaporator VES-WL-129 cell volume [*equation 3(b)*] +
feed pump cell volume [*equation 3(c)*] +
access area volume [*equation 3(d)*] +
feed pump cell sump volume [*equation 3(e)*] +
VES-WL-161 cell volume [*equation 3(f)]*

Total Volume = 483 ft^3 + 109.6 ft^3 + 66.5 ft^3 + 23.3 ft^3 + 5.6 ft^3 + 198 ft^3

Total Volume = 886 ft^3 or 6,627 gal

Equation 3(a):

Condensate Collection Cell Volume = 46 ft × 21 ft × 6 in.

Condensate Collection Cell Volume = 483 ft^3

Equation 3(b):

Evaporator VES-WL-129 Cell Volume = 15 ft 8 in. × 14 ft × 6 in.

Evaporator VES-WL-129 Cell Volume = 109.6 ft^3

Equation 3(c):

Feed Pump Cell Volume = 14 ft 6 in. × 9 ft 2 in. × 6 in.

Feed Pump Cell Volume = 66.5 ft^3

Equation 3(d):

Access Area Volume = 14 ft × 3 ft 4 in. × 6 in.

Access Area Volume = 23.3 ft^3

Equation 3(e):

Feed Pump Cell Sump Volume = 1 ft 6 in. × 1 ft 6 in. × 2 ft 6 in.

Feed Pump Cell Sump Volume = 5.6 ft^3

Equation 3(f):

161 cell volume = 18 ft × 22 ft × 6 in.

161 cell volume = 198 ft^3

CPP-604 TFT Secondary Containment System Calculations

Both of the stainless-steel liner systems that provide secondary containment for the regulated tanks within the CPP-604 TFT system will contain 100 percent of the capacity of the largest tank (18,400 gal.) within the secondary containment systems.

VES-WM-100 Vault

The VES-WM-100 vault will contain 100 percent of the capacity of the largest tank (18,400 gal) within this secondary containment system. The volume of the VES-WM-100 secondary containment system is 2,558 ft^3 or 19,135 gal.

Equation 4: (17 ft × 43 ft × 3 ft 6 in.)

$= 2{,}558\ ft^3$

= 19,135 gal

VES-WM-101/VES-WM-102 Vault

The VES-WM-101/VES-WM-102 vault will contain 100 percent of the capacity of the largest tank (18,400 gal) within this secondary containment system. The volume of the VES-WM-101/VES-WM-102 secondary containment system is $4{,}590\ ft^3$ or 34,335 gal.

Equation 5: (30 ft 6 in. × 43 ft × 3 ft 6 in.)

$= 4{,}590\ ft^3$

= 34,335 gal

Concrete-embedded transfer lines have been identified at the ILWMS. In order to ensure compliance with the requirements of 40 CFR § 264.193(f), these lines will be upgraded or rerouted in accordance with the following schedule:

- Conceptual design complete by 9/30/04
- Title design complete by 9/30/05
- Work package development complete by 3/31/06
- Identified lines upgraded/rerouted and Professional Engineer certifications submitted to the DEQ on or before 9/30/06.

CPP-641 WWH Tanks Vault

The WWH tanks are contained within concrete vaults, which are coated with epoxy paint that is compatible with the waste stream. The tanks do not receive acidic waste. During the PEWE Facility Assessment, two sections of piping were identified as potential barriers to permitting. The two lines with tile encasement have grouting which is not compatible with the D002 EPA hazardous waste number. The line PWA-1560 comes from the VES-WL-104, and PWA-1561 comes from the VES-WL-105. Table D-6 describes these piping sections.

The epoxy coating is able to withstand constant immersion in 70% nitric acid at 70 °F for up to two weeks with no deterioration of quality.

The D002 hazardous waste number was recently removed from the Part A permit application for these tanks, making the secondary containment system compatible with the wastes that could be stored/treated here. This action made the tanks and ancillary equipment compliant with RCRA regulations.

Table D-5. CPP-641 Transfer Lines.

Location	Line Number	Diagram Number	Comments
East of CPP-641	PWA-1560	057499	This is a stainless steel transfer line approximately 600 ft long from VES-WL-104 through C28 valve box to C29. This line is currently encased in a tile pipe with joint compound, which is not compatible with nitric acidic waste. This tank system is administratively controlled to prevent receipt and transfer of acidic solutions.
East of CPP-641	PWA-1561	057499	This is a stainless steel transfer line approximately 600 ft long from VES-WL-105 to DVB-YDB-PW-C29. This line is currently encased in a tile pipe with joint compound, which is not compatible with nitric acidic waste. This tank system is administratively controlled to prevent receipt and transfer of acidic solutions.

CPP-641 Containment System Calculations

Both of the vaults that provide containment for the regulated tanks within CPP-641 will contain 100 percent of the capacity of the largest tank, (5,000 gal) within the containment systems.

VES-WL-103 Vault

The VES-WL-103 vault will contain 100 percent of the capacity of the largest tank (5,000 gal) within this secondary containment system. The volume of the VES-WL-103 containment system is 821 ft^3 or 6,141 gal.

Equation 6: (18 ft × 12 ft 2 in. × 3 ft 9 in.)

= 821 ft^3

= 6,141 gal

VES-WL-104/VES-WL-105 Vault

The VES-WL-104/VES-WL-105 vault will contain 100 percent of the capacity of the largest tank (5,000 gal) within this containment. The volume of the VES-WL-104/VES-WL-105 containment is 1,485 ft^3 or 11,108 gal.

Equation 7: (18 ft × 22 ft × 3 ft 9 in.)

= 1,485 ft^3

= 11,108 gal

PWL Tanks Containment System Calculations

VES-WL-135, Vessel in Sump SU-WL-135

This tank collects offgas condensate. The tank is located in the D5 Valve Box. The tank has an approximate capacity of 10 gallons. The approximate capacity of the secondary containment including the sump is 1,346 gallons.

Equation 8: 6.0ft × 8.0ft × 3ft 9in = 180ft^3

180 ft^3 = 1,346 gallons

VES-WL-136, Vessel in Sump SU-WL-136

This tank collects offgas condensate. The tank is located in the D8 Valve Box. This tank has an approximate capacity of 10 gallons. The approximate capacity of the sump is 50 gallons.

Equation 9: $2ft \times 2ft \times 1ft\ 8in = 6.67ft^3$

$6.67ft^3 = 50$ gallons.

VES-WL-137, Vessel in Sump SU-WL-137

This tank collects offgas condensate. The tank has an approximate capacity of 25 gal. The approximate capacity of the sump is 93 gallons.

Equation 10: $2ft\ 6in \times 2ft\ 6in \times 2ft = 12.5ft^3$

$12.5ft^3 = 93$ gallons.

VES-WL-138, Vessel in Sump SU-WL-138

This tank collects condensate from the vessel offgas system. The tank has an approximate capacity of 25 gal. The approximate capacity of the sump is 93 gallons.

Equation 11: $2ft\ 6in \times 2ft\ 6in \times 2ft = 12.5ft^3$

$12.5ft^3 = 93$ gallons.

VES-WL-139, Vessel in Sump SU-WL-139

This tank collects offgas condensate. The tank has an approximate capacity of 10 gal. The approximate capacity of the sump is 50 gallons.

Equation 12: $2ft \times 2ft \times 1ft\ 8in = 6.67ft^3$

$6.67ft^3 = 50$ gallons.

VES-WL-142, Vessel in Sump SU-WL-142

This tank collects offgas condensate. The tank has an approximate capacity of 10 gal. The approximate capacity of the sump is 50 gallons.

Equation 13: $2ft \times 2ft \times 1ft\ 8in = 6.67ft^3$

$6.67ft^3 = 50$ gallons.

VES-WL-144, Vessel in sump SU-WL-144

This tank currently collects liquids released to the pump pit enclosure sump. The tank has an approximate capacity of 25 gal. The approximate capacity of the sump is 93 gallons.

Equation 14: $2ft\ 6in \times 2ft\ 6in \times 2ft = 12.5ft^3$

$12.5ft^3 = 93$ gallons.

CPP-601 WG/WH Tanks Vault

The WG/WH tanks are located on the lower level of CPP-601. Two tanks are located in each of the two stainless-steel-lined, reinforced concrete cells. The cells each measure 38 ft 6 in. by 15 ft. The floors and the lower 3 ft of the walls are lined with stainless steel. Both vaults are provided with sumps and leak detection.

CPP-601 Containment System Calculations

The WG/WH tank cell will contain 100 percent of the capacity of the largest tank (4,500 gal) within this containment. The volume of the containment is 1,732 ft^3 or 12,956 gal.

Equation 15: (38 ft 6 in. $\times$ 15 ft $\times$ 3 ft)

= 1,732 ft^3

= 12,956 gal

LET&D Cells and Vaults

LET&D Fractionator Cell 1

For discussion on LET&D system inspections, see Section F, Procedures to Prevent Hazards.

Acid Fractionator Cell 1 is 17 ft long and 14 ft 6 in. wide. The cell is constructed of steel-reinforced concrete with a stainless-steel liner that is 3 ft high. The cell has a door in the east wall. In front of the door is a step measuring 3 ft 10 in. by 3 ft 10 in. by 4 in. The floor is sloped toward a sump, which is located slightly to the northeast of the center of the cell. The cell walls are steel-reinforced, concrete. The stainless steel is compatible with the waste and decontamination solutions received at the LET&D.

The floor sump is provided with liquid level detection. The liquid level detection transmits an alarm to the DCS, which alerts the operator to the presence of any liquid that has spilled and drained to the sump, which is the low point in the cell. The sump is provided with a steam jet to remove accumulated material from the sump. These wastes are jetted to the Bottoms Tank, VES-WLL-195, PEWE tanks, VES-WL-101 and VES-WL-133, or the Acid Recycle Tank, VES-NCR-171.

LET&D Fractionator Cell 2

Acid Fractionator Cell 2 is 17 ft long and 14 ft 6 in. wide. The cell is constructed of steel-reinforced concrete with a stainless-steel liner that is 3 ft high. The cell has a door in the west wall. The floor is sloped toward a sump, which is located in the cell.

The floor is sloped to drain toward the sump. In the northwest corner of Fractionator Cell 2 is the vault containing the Bottoms Tank, VES-WLL-195. Although the floor of the fractionator cell does not slope directly to the bottoms tank vault, the vault would serve as the containment mechanism if a leak caused the sump to become full. The vault containing the Bottoms Tank is completely lined with stainless steel. The floor of the bottoms tank vault slopes toward the west, where the vault sump is located.

A floor sump is provided in the acid fractionator cell. Level transmitters actuate alarms on the DCS and alert the operator to the presence of any liquid that has spilled and drained to the sump, which is the low point in the cell. In addition, the bottoms tank vault sump is equipped with level instrumentation monitored by the DCS.

The sumps in the cell are provided with steam jets to remove any spilled material from the sumps promptly. The liquid wastes that accumulate in either of the sumps are removed via a steam jet to the Bottoms Tank, VES-WLL-195, PEWE tanks, VES-WL-101 and VES-WL-133, or the Acid Recycle Tank, VES-WL-171.

Acid Recycle Tank Vault

The Acid Recycle Tank, VES-NCR-171, and Head Tank, VES-NCR-173, are located in the CPP-659 Annex. The Annex is approximately 17 ft wide and 42 ft long, with a stainless-steel liner that is 4 ft

8 in. high. In the southeast corner of the vault is a large sump, which conservatively is not included in the capacity calculation.

The floor is sloped to drain to the gutter on the south side of the vault. The gutter drains to the southeast into the sump unit.

A floor sump is provided at the southeast corner of the vault. The liquid level detector is a pneumatic system that measures leaks using differential pressure. The detector transmits a signal to the NWCF DCS system. Any leaks will initiate an alarm on the DCS and alert the operator to the presence of any liquid that has spilled and drained to the sump, which is the low point in the vault. The sump in the vault is provided with a steam jet to remove any spilled material from the sump promptly. The liquid wastes that accumulate in the sump are jetted to appropriate tanks.

LET&D and Acid Recycle Tank Vault Secondary Containment System Calculations

Most of the ancillary equipment and piping for the tank systems in the LET&D system are contained in the same cells as the waste tanks. Those process piping systems that are not located within cells with secondary containment are underlain with drip troughs comprised of stainless steel, which has been shown to be compatible with the types of wastes exiting the cells. The lines in the pipe bridge are equipped with leak detection that alarms on the DCS. Drip troughs and collection bottles are discussed in greater detail later in this section.

The acid recycle line from the Bottoms Tank to the Acid Recycle Tank has full secondary containment. The waste and secondary containment pipe are both stainless steel. Any leaks in the acid recycle line will gravity drain toward the acid recycle vault sump.

Acid Fractionator Cell 1

Cells 1 and 2 have the same dimensions. Acid Fractionator Cell 1 has a 17-ft by 14 ft 6 in.-floor area. The cell is constructed of steel-reinforced concrete with a stainless-steel liner that is 3 ft high. The cell has a door in the east wall. In front of the door is a step measuring 3 ft 10 in. by 3 ft 10 in. by 4 in. The floor is sloped toward a sump, which is located slightly to the northeast of the center of the cell.

The Acid Fractionator (FRAC-WLK-171) and associated equipment in Cell 1 have a maximum capacity of 460 gal. The capacity of the secondary containment system is 577 gal. The cell will contain

100 percent of the capacity of the Acid Fractionator. This cell also contains VES-WLK-197. The maximum capacity of the tank is 270 gal.

The secondary containment system capacity exceeds the capacity of the Acid Fractionator (460 gal).

Equation 16: (cell – step off pad)

$$(17 \text{ ft} \times 14 \text{ ft } 6 \text{ in.} \times 4 \text{ in.}) - (3 \text{ ft } 10 \text{ in.} \times 3 \text{ ft } 10 \text{ in.} \times 4 \text{ in.})$$

$$= 82.17 \text{ ft}^3 - 4.9 \text{ ft}^3 = 77.19 \text{ ft}^3$$

$$= 577 \text{ gal}$$

Acid Fractionator Cell 2

Acid Fractionator Cell 2 has a floor area of 17 ft by 14 ft 6 in. The cell is constructed of steel-reinforced concrete with a stainless-steel liner that is 3 ft high. The cell has a door in the east wall. The floor is sloped toward a sump, which is in the cell.

The Acid Fractionator (FRAC-WLL-170) and associated equipment in Cell 2 have a maximum capacity of 460 gal. The capacity of the secondary containment system is 2,103 gal. The cell will contain 100 percent of the capacity of the Acid Fractionator. This cell also contains VES-WLL-195, which is located in a pit. VES-WLL-195 has a maximum capacity of 270 gal. The pit volume minus VES-WLL-195 volume will contain 100 percent of the capacity of the Acid Fractionator.

Equation 17: (PIT – VES-WLL-195)

$$(7 \text{ ft } 10 \text{ in.} \times 6 \text{ ft } 9 \text{ in.} \times 6 \text{ ft}) - 36.1 \text{ ft}^3$$

$$= 317.2 \text{ ft}^3 - 36.1 \text{ ft}^3 = 281.1 \text{ ft}^3$$

$$= 2{,}103 \text{ gal}$$

Acid Recycle Tank Vault

The Acid Recycle Tank, VES-NCR-171, and Head Tank, VES-NCR-173, vault is 17 ft 4 in. wide and 41 ft 3 in. long and has a stainless-steel liner that is 4 ft 8 in. high. In the southeast corner of the vault is a large sump, which conservatively is not included in the capacity calculation. The overall capacity of the vault is 24,955 gallons.

The capacity of the secondary containment in the acid recycle vault will contain 100 percent of the capacity of the largest tank (22,500 gal).

Equation 18: (17 ft × 41 ft 7 in. × 4 ft 8 in.)

= 3,299 ft^3

= 24,676 gal

Drip Troughs and Collection Bottles

Drip troughs are located beneath process transfer lines within CPP-604, CPP-605, and CPP-1618. A drip trough also extends below the pipe bridge that spans from CPP-605 to the LET&D facility. The troughs are designed to collect liquid (e.g., recovered nitric acid) in the event of a leak from the process transfer lines. These drip troughs are sloped and drain to collection bottles located within each system.

The drip troughs located within the LET&D facility are not equipped with leak detection devices. Therefore, LET&D collection bottles are inspected daily for the presence of liquid. These inspections are noted on Form INTEC-4055, which is included in Appendix F-1 of the Part B Permit Application. Documentation of all inspections is maintained in the facility operating record.

All drip troughs located in CPP-604, CPP-605, and the pipe bridge are equipped with leak detection cables that are continuously monitored by the DCS.

Upon alarm, or when liquids are discovered in the LET&D collection bottles, samples are taken to determine whether the source of the liquid is a hazardous waste (e.g., pH, acidity). If the liquid is hazardous, it is characterized as described in Section C of this Part B permit application and managed appropriately.

Run-on or Infiltration of Precipitation

This is addressed in Section F-4b of this permit application.

D-2g Controls and Practices to Prevent Spills and Overflows [IDAPA 58.01.05.012 and 008; 40 CFR 270.16(i) and 264.194(b)]

Overfilling of the Feed Collection Tank, evaporators, Condensate Surge Tanks, Bottoms Collection Tank, Process Condensate Collection Tanks, and the Acid Fractionator Waste Feed Head Tank is prevented by instrumentation in the Waste Processing Control Room that monitors liquid levels and by operators controlling liquid flow accordingly. Operators record the levels of liquid in the tanks at least every 4 hours when an evaporator is operating.

In addition to these operating controls, liquid level instrumentation for the Feed Collection Tank, evaporators, Condensate Surge Tanks, and Bottoms Collection Tank will alarm in the control room upon high level (or high-high level in the case of the VES-WL-131 Condensate Surge Tank). In the case of a high (or high-high) liquid level alarm, the condition will be investigated and appropriate action taken.

Facility personnel monitor the processes for the tank systems addressed in this permit application. System instrumentation and alarms are monitored to ensure that no errors have been made or process changes have occurred. Administrative controls are implemented to ensure that the processes are performed safely.

To prevent hazardous waste spills and overflows, facility personnel visually inspect or monitor instrumentation for tanks, piping, valves, and secondary containment devices on a daily basis when these tank systems are in use. For more information regarding inspections and monitoring, refer to Section F of this permit application.

CPP-604 TFT System

Overflow lines are connected from VES-WM-100 to VES-WM-101 and then to VES-WM-102. Monitoring level instrumentation located in the CPP-604 alerts the operators to prevent overfilling of VES-WM-102. In addition to these operating controls, liquid level instrumentation for VES-WM-102 will alarm in the Waste Processing Control Room upon high level. In the case of a high liquid level alarm, the condition will be investigated and appropriate action taken.

The PWL Tanks, VES-WL-150, and the Acid Recycle Storage Tank

Overfilling of the collection tanks is prevented by monitoring the level instrumentation in the waste processing DCS via a combination of tank level instrumentation and monitoring of the secondary containment system. Any leaks or spills from the unit would be detected in the sumps and removed upon high-level alarm. In the case of a high liquid level alarm, the condition will be investigated and appropriate action taken.

CPP-641

Overfilling of the WWH tanks is prevented by monitoring of liquid level instrumentation in CPP-641, and by operators controlling liquid flow accordingly. In addition to these operating controls, liquid level instrumentation for the WWH tanks will alarm in CPP-641 upon high level. In the case of a high liquid level alarm, the condition will be investigated and appropriate action taken.

CPP-601

Overfilling of the WG/WH tanks is prevented by monitoring of liquid level instrumentation in CPP-601, and by operators controlling liquid flow accordingly. In addition to these operating controls, liquid level instrumentation for the WG/WH tanks will alarm in CPP-601 upon high level. In the case of a high liquid level alarm, the condition will be investigated and appropriate action taken.

CPP-1618 LET&D

Spills and overflows in the LET&D facility are controlled and prevented by administrative and DCS process control systems. The Acid Fractionator Waste Feed Head Tank, VES-WLK-197, has a high level alarm on the DCS to alert the operators of a potential overfill condition and a high-high alarm that automatically shuts down the feed inlet valve and pump. The feed tank is equipped with a line that drains into the Bottoms Tank. The fractionators and associated separators have high level alarms on the DCS, which will alert the operators and a high-high level alarm that automatically shuts the system down. The Bottoms Tank has a high level alarm on the DCS to alert the operators of a potential overfill condition and the need to transfer the waste. Fractionators have low and low-low alarms, which would alert the operators to a possible leak. In the case of a high liquid level alarm, the condition will be investigated and appropriate action taken.

CPP-659 Annex LET&D Nitric Acid Recycle Tank

Spills and overflows in the CPP-659 Annex LET&D Nitric Acid Recycle Tank are controlled and prevented by administrative and DCS process control systems. Prior to a transfer to VES-NCR-171, the level indicator is checked to verify adequate capacity to accept a transfer. As an added measure of protection, a high level alarm for VES-NCR-171 notifies facility personnel when a predetermined set point is reached. Upon high alarm, all transfers to VES-NCR-171 are discontinued and no further transfers to the tank are made. The condition will be investigated and appropriate action will be taken.

CPP-659 Annex VES-NCR-173, Acid Head Tank

CPP-659 Annex VES-NCR-173, Acid Head Tank, has an overflow line that drains back to VES-NCR-171. VES-NCR-173 has no instrumentation installed in the vessel.

D-8. MISCELLANEOUS UNITS [IDAPA 58.01.05.012 AND 16.01.05.008; 40 CFR 270.23 AND 264.601]

D-8a. Description of Miscellaneous Units [IDAPA 58.01.05.012; 40 CFR 270.23(a)(1) and (2)]

The PEWE system and the LET&D facility buildings are described in the Facility Description in Section B and the processes are described in the Process Information section of Section D of this permit application.

The miscellaneous units are:

- PEW evaporator EVAP-WL-129, which includes flash column (VES-WL-129), a mist eliminator (VES-WL-130), a reboiler (HE-WL-307), and a condenser (HE-WL-308);
- PEW evaporator EVAP-WL-161, which includes flash column (VES-WL-161), a separator (VES-WL-162), a reboiler (HE-WL-300), and a condenser (HE-WL-301);
- FRAC-WLL-170, which includes the fractionator, a condenser (HE-WLL-396), a reboiler (HE-WLL-398), and a separator (VES-WLL-198); and
- FRAC-WLK-171, which includes the fractionator, a condenser (HE-WLK-397), a reboiler (HE-WLK-399), and a separator (VES-WLK-199).

D-8b Environmental Performance Standards for Miscellaneous Units [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR 264.601 and 270.23(c)]

No viable pathway exists for migration of hazardous waste or hazardous constituents from the waste treated in the PEWE and LET&D systems to the soil, ground water, and/or surface water.

A potential pathway for release of waste constituents is through exhaust air either from the PEWE system or from the LET&D system. Any release would be limited to the period during which the PEWE system or LET&D system was operating.

The potential for a release through the exhaust air system of hazardous constituents that could potentially have adverse effects on human health or the environment is minimized by the PEWE and LET&D offgas system.

The PEWE system condenses and collects the process offgas (POG) and transfers it to the LET&D system for further treatment as discussed previously. The only releases from the PEWE system are non-condensables such as instrument air. The PEWE offgas is routed to the VOG system, the APS, and then is released to the atmosphere via the Main Stack. The LET&D POG is HEPA filtered before it is released to the Main Stack. Although they are not specifically designed to trap organic constituents, HEPA filters trap any particulates that may contain hazardous constituents. The process will contain the waste constituents in the liquid and, thus, only minute amounts of waste constituents can potentially escape the process. The PEWE and LET&D systems exhaust air systems are discussed below.

Vessel Offgas (VOG) System and Process Atmospheric Protection System

The PEWE system tanks vent to the INTEC VOG system. The system provides vacuum and HEPA filtration for the offgas from the tanks in the connected facilities. The VOG system flows to the process APS, which is located in CPP-649. The process APS system provides additional HEPA filtration to the VOG system. From the APS, the offgas is exhausted to the INTEC Main Stack.

When the LET&D system is operating, the tanks vent to the INTEC Main Stack through the LET&D process offgas HEPA filters. When the LET&D is not operating, the tanks vent to the Ventilation Atmospheric Protection System.

Ventilation Atmospheric Protection System Sources

The ventilation air system is composed of ventilation air from CPP-601, -604, -640, -649, and -1618. This air is used to heat, to ventilate, and to provide contamination control for the above facilities. The ventilation air, which is the bulk of the flow to the Main Stack, flows from the occupied office/laboratory areas, through the operating corridors, through the cells, and finally, passes through the Ventilation Atmospheric Protection System.

The ventilation offgas cleanup system consists of a fiberglass bed prefilter (CPP-756) and HEPA filters arranged in 26 parallel banks of four parallel filters. The ventilation air is exhausted to the Main Stack through blowers.

D-8b(1) Miscellaneous Unit Wastes [IDAPA 58.01.05.008; 40 CFR 264.601(a)(1), 264.601(b)(1), and 264.601(c)(1)]

The chemical characteristics of the wastes are described in Section C of this permit application.

D-8b(2) Containment System [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR 264.601(b)(2) and 270.23(a)(2)]

The containment systems are described in Section D-2f of this permit application. The structure of the building is described in Section B, and run-on or infiltration of precipitation is addressed in Section F-4b of this permit application.

D-8b(3) Site Air Conditions [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR §§ 264.601(c)(4) and (5), and 270.23(b)]

The climatology and meteorology at the INEEL are addressed in the *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS –0203F, Volume 1, Appendix B). A copy of this document has already been provided to DEQ.

D-8b(4) Prevention of Air Emissions [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR §§ 264.601(c) and 270.23(b)]

The NWCF Screening Level Risk Assessment (SLRA), which was approved by DEQ and EPA Region 10 on April 15, 1999, INEEL, 1999c, *Screening Level Risk Assessment for the New Waste Calcining Facility*, INEEL/EXT-97-000686, Rev. 5a, May) conservatively assessed potential atmospheric releases of all known and potentially present compounds of potential concern (COPC) in the INTEC liquid waste system (including all of the above systems). The emission rate calculations assumed that 100 percent of the inventory (total mass) of organic COPCs in the total tank farm volume of 1,400,000 gallons of liquid waste was released out the INTEC main stack over a period of a year (a few compounds were assumed to have 99% thermal destruction in the calciner). Conservative modeling results indicated that human health and ecological impacts from all organic compounds were significantly less than EPA acceptance criteria for combustion units (1×10^{-5} total risk and 0.25 total hazard index for all COPCs). The majority of these calculated risks resulted from calculated Products of Incomplete Combustion (PICs) emissions formed by combustion of the kerosene fuel and chlorine in the offgas, not from organic constituents present in the feed. Since the potential mass of COPCs managed by the PEWE and LET&D in a year is significantly less than the 1,400,000 gallons of liquid waste assumed to be released in the SLRA, the potential COPC emission rates and resulting environmental impacts from PEWE and LET&D operations will be significantly less than the acceptable values calculated in the NWCF SLRA.

D-8b(5) Operating Standards [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR 264.601(c)(3) and 270.23(a)(2)]

In order to ensure safe and effective operation of the miscellaneous treatment units, the following physical and chemical operational constraints and tolerance limits have been imposed. A list of items prohibited from treatment by these miscellaneous treatment units is provided in Section C-2a(1) of this permit application.

Process Equipment Waste Evaporators (EVAP-WL-129 and EVAP-WL-161)

Feed Limits

Chloride	≤ 150 parts per million (ppm), as fed
Fluoride	maintain at least a 1:1 mole ratio of aluminum to fluoride, as fed
Sulfate	≤ 500 ppm, as fed
Total organic carbon	≤ 1,100 ppm

Operational Constraints – shutdown of the process is initiated when:

Evaporator operating temperature exceeds 110° C

Specific gravity in the evaporator exceeds 1.3

Liquid Effluent Treatment and Disposal Facility Fractionators (FRAC-WLL-170, FRAC-WLK-171)

Feed Limits

Fluoride	maintain at least a 1:1 mole ratio of aluminum to fluoride, as fed

Total organic carbon ≤ 1,100 ppm

Operational Constraints – shutdown of the process is initiated when:

Fractionator level drops below 10 in. water column (WC)

Fractionator level rises above 40 in. WC

Differential pressure across the fractionator exceeds 30 in. WC

Temperature on Tray #1 exceeds 265° F

Separator level exceeds 10 in. WC

Differential pressure across each HEPA filter stage exceeds 5 in. WC

D-8b(6) Site Hydrogeologic Conditions [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR 264.601(a)(2), (3), and (4), 264.601(b)(3) and (5), and 270.23(b)]

The hydrology conditions at the INEEL are addressed in the *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS - 0203F, Volume 1, Appendix B). A copy of this document has already been provided to DEQ.

D-8b(7) Site Precipitation [IDAPA 58.01.05.008; 40 CFR 264.601(b)(4)]

Site precipitation is addressed in *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS - 0203F, Volume 1, Appendix B). A copy of this document has already been provided to DEQ.

D-8b(8) Groundwater Usage [IDAPA 58.01.05.008; 40 CFR 264.601(a)(5)]

The ground water usage is addressed in *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS –0203F, Volume 1, Appendix B). A copy of this document has already been provided to DEQ.

D-8b(9) Surface Waters and Surface Soils [IDAPA 58.01.05.008; 40 CFR 264.601(b)(6), (7), and (8)]

The surface waters and surface soils are addressed in *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS –0203F, Volume 1, Appendix B). A copy of this document has already been provided to DEQ.

D-8b(10) Area Land Use [IDAPA 58.01.05.008 and 58.01.05.012; 40 CFR 264.601(a)(6) and (b)(9), and 270.23(b)]

The area land uses is addressed in *DOE Programmatic Spent Nuclear Fuel Management and INEEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* (DOE/EIS –0203F, Volume 1, Appendix B). A copy of this document has already been provided to DEQ.

D-8b(11) Migration of Waste Constituents [IDAPA 58.01.05.008; 40 CFR 264.601(a)(7)]

The PEWE and LET&D are not land treatment facilities and do not involve surface or subsurface soils; hence, application of this section is not appropriate.

D-8b(12) Evaluation of Risk to Human Health and the Environment [IDAPA 58.01.05.008; 40 CFR 264.601(a)(8) and (9), 264.601(b)(10) and (11), and 264.601(c)(6) and (7)]

For information on the risk to human health and the environment, see Section D-8b(4).

APPENDIX D-1

Diagram Package

These Piping and Instrumentation Diagrams will be included in hard copy only.

APPENDIX D-2

Professional Engineer Certifications

PWL SYSTEM

ETAS

PRJ-WNCO.604 Mod 1
RPT-CERT.604 Mod 1

Certification Document for fhe Design and Installation of The Transfer Tank Systems of The PWL Collection System

Idaho Chemical Processing Plant Buildings CPP-604, 605, 649 & 708
Idaho National Engineering Laboratory
Idaho Falls, Idaho

Submitted To:

Westinghouse Idaho Nuclear Company, Inc.

July 8, 1994

ETAS Corporation
8828 North Stemmons Freeway, Suite 413
Dallas, Texas 75247-3726
Tel (214) 630-6610 Fax (214) 630-7494

CERTIFICATION DOCUMENT

FOR

THE DESIGN AND INSTALLATION OF

THE TRANSFER TANK SYSTEMS OF

THE PWL COLLECTION SYSTEM

Idaho Chemical Processing Plant Buildings CPP-604, 605, 649, & 708

Idaho National Engineering Laboratory

Idaho Falls, Idaho

Prepared for:

Westinghouse Idaho Nuclear Company, Inc.
Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

July 8, 1994

ETAS Corporation

PRJ-WNCO.604\RPT-CERT.604\T-TANK SYSTEMS

CERTIFICATION OF THE DESIGN AND INSTALLATION OF THE TRANSFER TANK SYSTEMS OF THE PWL COLLECTION SYSTEM

Idaho Chemical Processing Plant Buildings CPP-604, 605, 649, & 708
Idaho National Engineering Laboratory
Idaho Falls, Idaho

The attached report entitled "Certification Document for the Design and Installation of the Transfer Tank Systems of the PWL Collection System, Idaho Chemical Processing Plant Buildings CPP-604, 605, 649, & 708, Idaho National Engineering Laboratory, Idaho Falls, Idaho," dated July 8, 1994, serves as the basis for this certification, which follows the guidance provided under both the Federal regulation 40 CFR 264.192, 264.193, 265.192 and 265.193, and the Idaho rules, regulations and standards for hazardous waste. We attest that the system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste.

The certification provided herein by ETAS Corporation is limited to the transfer tank systems of the PWL Collection System and the linings of the vaults/cells providing secondary containment for these systems. This certification does not include the existing tank systems to which the PWL System is connected (Tanks WL-102, WL-132, and WL-133) or the old drainage system for those tanks.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Stanley A. Heath 7-8-94
Stanley A. Heath, Ph.D., Project/QA Manager — Date
ETAS Corporation

7-8-94
T. Y. Richard Lo, P.E., Lead Engineer — Date
ETAS Corporation

James S. Kilburn, P.E. 7-8-94
James S. Kilburn, P.E., Idaho Professional Engineer — Date
ETAS Corporation

REGISTERED PROFESSIONAL ENGINEER 4504 7/8/94 STATE OF IDAHO JAMES STEWART KILBURN

ETAS

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APPENDICES

1.0 INTRODUCTION

The Transfer Tank Systems of the PWL Collection System are small transfer tanks (less than 90 day storage) and the piping that feeds the transfer tanks. These systems collect hazardous waste liquid from various facility units and transfer it through connections with some existing piping and drains into three existing hazardous waste storage tanks (WL-102, WL-132, and WL-133) located in Building CPP-604 of the Idaho Chemical Processing Plant (ICPP) at the Idaho National Engineering Laboratory (INEL) near Idaho Falls, Idaho. This transfer is achieved via new piping contemporaneously installed between the seven transfer tanks and the three storage tanks. This piping is considered ancillary to the storage tanks and is not the focus of this report. The seven transfer tanks, the piping that feeds them and the new piping connecting them to the three storage tanks are referred to in this report as the PWL Collection System. These new transfer tanks and the ancillary piping that feeds them partially replace a group of old, single-walled underground pipes. The remainder of the old pipes have been replaced by the new piping that connects the transfer tanks with the three storage tanks.

The hazardous waste liquids are collected from the following facility units located in the Building Complex CPP-604, 605, 649, and 708: Vaults D-5 and D-8, the APS Off-Gas Prefilter Cell (hereafter referred to as Off-Gas Cell), VOG Blower Cell (hereafter referred to as Blower Cell), VOG Filter Cell (hereafter referred to as Filter Cell), South Cell, Middle Cell, Pump Room, North Cell, Piping Corridor, Access Corridor, Separation/Condensation Cells, Evaporation Cell, and the Main Stack.

Each facility unit is a self-contained structure consisting of a vault or cell constructed with thick concrete walls, floors, and ceilings. In relationship to this new PWL Collection System, these facility units serve two functions: 1) they contain the process piping and equipment where the waste liquids are originated and removed by the new piping system; 2) they also serve as the secondary containment for the transfer tanks, for certain sections of the new piping, and for the process piping and equipment. Should leaks occur inside any facility unit, the leakage will flow to a floor sump and subsequently be transferred through the new piping system connected to existing pipes that drain to the three existing hazardous waste storage tanks.

Regulations 40 CFR 264.192, 265.192 and 40 CFR 264.193, 265.193 require all underground piping that transfers hazardous waste liquid to have secondary containment and to include leak detection. The old piping system was an underground system buried in the soil, or piping within the building which did not have adequate secondary containment. Under these conditions, this old piping could not meet the requirements of new regulations. Therefore, the new PWL Collection System was installed to meet these requirements.

As new tank systems, the transfer tank systems must be certified by an independent professional engineer [40 CFR 264.192(a) and 265.192(a)] and, if applicable, an independent installation inspector [40 CFR 264.192(b) and 265.192(b)] and/or an independent corrosion expert [40 CFR 264.192(f) and 265.192(f)] to attest that the new tank systems are adequately designed and properly installed. Ebasco Services Incorporated, through a contract with EG&G Idaho, Inc. (EGGI), was initially retained by Westinghouse Idaho Nuclear Company, Inc. (WINCO), who operates the ICPP at the INEL, to provide this independent certification under 40 CFR 265.192. ETAS Corporation, a sub-contractor to Ebasco Services Incorporated, provided the Lead Engineer to assist Ebasco on this certification project. Subsequently, WINCO contracted directly with ETAS Corporation to review the original certification and certify the system under both 40 CFR 264 and 265, and the Idaho rules, regulations and standards for hazardous waste. Under this certification, James S. Kilburn, ETAS Corporation's Idaho Professional Engineer, reviewed the original certification document entitled "Certification Document for the Design and Installation of the PWL Collection System, Idaho Chemical Processing Plant Buildings CPP-604, 605, 649 and 708, Idaho National Engineering Laboratory, Idaho Falls, Idaho" by Ebasco Services Incorporated and ETAS Corporation, April 18, 1991. Mr. Kilburn also conducted a site inspection of the system and interviewed at length its operating manager as to system operation and materials processed. Dr. Stanley A. Heath, ETAS Project/QA Manager, also reviewed the original certification document for completeness.

The certification provided herein by ETAS is limited to the transfer tank systems of the PWL Collection System, and the lining of the vaults/cells providing secondary containment for these systems. This certification does not include the existing hazardous waste tank system (Tanks WL-102, WL-132, and WL-133 in Building CPP-604), the old drain system, or any modifications or new components added after April 18, 1991 except repairs to the CPP-604 liner which was certified under the document entitled "Certification Document for the Repair of the Stainless Steel Liner in Building CPP-604 North Evaporator Cell, Evaporator Feed Pump Cell, WL-129 Evaporator Cell, Separation and Condensation Cell, and Adjacent Hallway", dated March 2, 1994 (PRJ-WNCO.118). As the basis of this certification, this certification document provides signatures and statements of those persons providing the certification as specified in 40 CFR 264.192(a), (b) and (f) and 265.192(a), (b) and (f) and satisfies the documentation requirement of 40 CFR 264.192(g) and 265.192(g).

2.0 CERTIFICATION TEAM

The ETAS certification team was composed of three qualified professionals. Mr. James S. Kilburn is a registered Idaho professional engineer with over 40 years of engineering experience, much of it related to tank and piping systems. He inspected the system, interviewed operations personnel, reviewed the original certification document, and provided certification as per 40 CFR 264 and 265, and Idaho hazardous waste regulations. The Lead Engineer, Dr. T.Y. Richard Lo, is a registered professional engineer with 16 years of experience in hazardous waste and environmental engineering. He was responsible for the overall certification that, under the conditions specified in this certification document, the new system meets the requirements of 40 CFR 264 and 265. The Project Manager, Dr. Stanley A. Heath, has had 14 years experience in chemical plant operations and environmental compliance. He was responsible for the total project, including the certification document.

3.0 DESIGN AND INSTALLATION ASSESSMENT

3.1 Description of PWL Collection System

The primary components of the PWL Collection System are the seven transfer tanks and the piping system that collect and transfer the waste liquid. There are, however, other supporting components such as utility pipes that provide high pressure steam for the jet pumps, and conduits for electrical controls of the pump switch, valves, liquid level sensors and leak detectors in the double-walled piping. Under this certification, ETAS has assessed only those pipes and tanks that transfer waste liquids. Pipes that do not transfer hazardous waste liquid are not assessed; however, the results of the system operability tests (S.O. Tests) were reviewed to ensure the workability of the instrumentation and electrical controls.

3.1.1 Waste Collection and Transfer

The PWL Collection System collects waste liquid from 14 facility units within the Building Complex CPP-604, 605, 649, and 708 (Reference 2c). These collection units include: Vault D-5, Vault D-8[a], Off-Gas Cell, Blower Cell, Filter Cell, South Cell, Middle Cell, Pump Room, North Cell, Piping Corridor, Access Corridor, Separation/Condensation Cell, Evaporation Cell, and Main Stack. The system collects waste liquid either directly from process sources or indirectly, collecting the leakage released from pipes and equipment located inside each facility unit.

The waste collection and transfer are, in general, accomplished by three steps: first, waste liquid from existing pipes is gravitationally drained into transfer tanks, or, in the case of system leakage, it gravitationally flows along the floor of the secondary containment and is collected in sumps. In the second step, the accumulated waste liquid in the tank/sump is then transferred by jet pumps upward to the PWL header pipe. Third, the liquid in the new header pipe is then transferred by gravitational flow through some existing pipes, and drained into the three existing hazardous waste

[a] The design and construction documents (References 1 and 2) often incorrectly refer to Vault D-8 as D-6.

tanks. There are four locations at which the waste transfer is accomplished by direct connection of existing process pipes into the new header pipe, bypassing the first two transfer steps, and draining into the existing hazardous waste tanks by gravity. These four direct transfer locations are described in the last paragraph of Appendix A.

3.1.2 Tanks, Piping and Piping Components

The waste collection piping consists of approximately 145 feet of piping to collect waste liquid from existing piping and temporarily hold it in seven transfer tanks; it also consists of 13 sumps and their associated piping. The system has a total of 16 jet pumps lifting the waste liquid from the tanks/sumps through approximately 320 feet of pipe to a header pipe, which is approximately 398 feet long. The transfer tanks and the transfer pipes are stainless steel, mostly single-walled, except for some sections of the header pipes that are exposed above ground outside the building complex, and in the Piping Corridor and the Access Corridor. These sections are double-walled. There are two sections of double-walled header pipes that are exposed outside the building complex – one originates from Vaults D-5 and D-8, and the other runs from the Main Stack to Vault D-4. These sections are insulated. The double-walled pipes in both the Piping Corridor and the Access Corridor are not insulated. There is an addition of approximately 25 feet of single-walled pipes involving the four locations that have direct connections from existing process pipes to the new header pipe. The diameter of waste transfer piping varies, ranging from 1/2-inch to 2-inches in diameter. For double-walled pipes, the outer casing diameter ranges from 2-inches to 4-inches. An in-depth description of waste collection piping is provided in Appendix A. This appendix was prepared by the Lead Engineer, T.Y. Richard Lo, based on Reference 2.

The collection pipes are assembled by putting together numerous pipe sections, reducers, tees, and elbows, together with auxiliary components such as sumps, transfer tanks, jet pumps, check valves, and control valves. These components are joined together by flanges with gaskets, nuts, bolts, studs, and by welding. A listing of these piping parts and fitting components are identified in the design specification document (Reference 2).

3.1.3 Piping Support

The piping is anchored to floors, walls and ceilings of the building structure in numerous locations. There are 11 types of pipe anchors and support designs as detailed in the Design Drawings 369377 through 369380 (Reference 2c). Approximately 221 anchors and pipe supports are installed for the entire PWL Collection System, including both waste transfer piping and utility piping (e.g., steam or air piping).

3.1.4 Structure Penetrations

The PWL Collection System waste transfer piping penetrates through concrete walls, ceilings, and floors in 13 locations. There are eight types of designs for structure penetration as illustrated in Design Drawings 369375 and 369376 (Reference 2c), including those for electrical conduits and utility pipes (e.g. for steam and air). Only five types are pertinent to the waste transfer piping. Among the 13 penetration locations, three (one in the Blower Cell and two in the Middle Cell) are of the Type 1 Penetration – double-walled pipes through a concrete wall with non-shrink grout filled between the outside casing and the core drill hole. Two (one in the Filter Cell, one in the Pump Pit) are of the Type 2 Design – single-walled pipe through an existing stainless steel sleeve serving as secondary containment through the concrete wall; the annulus is filled with non-shrink grout to allow for ventilation control of potential radiation contamination. One (in the Piping Corridor) is of the Type 4 – same as Type 1, except that the penetration is through the concrete floor rather than the wall. Five (one for each of the Blower Cell, South Cell, Separation/Condensation Cell, and two for the North Cell) are of the Type 6 – same as Type 2 Design, except that the sleeve is new, while the Type 2 Design has an existing sleeve; and in between the single-walled pipe and the stainless steel sleeve, to minimize radiation exposure, the annulus is filled with steel shot material rather than non-shrink grout. And two (in Vaults D-4 and D-5) are of Type 7 – design similar to Type 4, except that the penetration is through concrete ceiling, and that the double-walled pipe is insulated and the annulus between the insulation jacket and the core drill hole is filled with RTV foam sealant.

3.1.5 Secondary Containment and Leak Detection

While some sections of the PWL waste piping are double-walled for secondary containment, the majority of the piping that route through the underground buildings are single-walled pipes. All the double-walled piping (not including those discrete sections for structure penetration), is installed with electronic sensing leak detection, with an alarm and readout installed in the Distributed Control System (DCS) for the area. Should a leak occur, the operator will be alerted. Through the leak sensing equipment, the location of the leak in the primary containment piping can be determined.

For the single-walled hazardous waste piping, and for the waste collection transfer tank systems, secondary containments are installed with liners and leak detection capability. Since all of the single-walled waste transfer pipes and transfer tanks are installed inside the self-contained facility units (e.g., cells or vaults), the facility units are used as secondary containments. These include Vaults D-5 and D-8, Off-Gas Cell, Blower Cell, Filter Cell, South Cell, Middle Cell, Pump Pit, North Cell, Separation/Condensation Cell, Evaporation Cell, and the floor structure of the Main Stack. Some of these secondary containments already had existing stainless steel liners. These include Vault D-5, the Pump Pit, Separation/Condensation Cell, the Evaporation Cell, and the Main Stack. For the remaining secondary containments that did not have existing liners, new liners were installed. The new liners are constructed of chemical resistant epoxy, using the #3500 system material manufactured by Keeler and Long. All of the liners are constructed so that epoxy coating is applied to the entire floor surface and up to a three foot height from the floor along the surrounding walls. The existing stainless liners are also constructed with the entire floor covered and extending from the floor up the surrounding walls for at least 18 inches. All of the lined secondary containments are designed with relatively smooth floor surfaces sloping toward a stainless steel sump.

Should a leak occur, the accumulated liquid in the sump will then signal a level sensor and trigger an alarm to alert the operator in the DCS control room. Two types of level sensors are used: capacitance probe and bubbler probe. For Vaults D-5 and D-8, capacitance probes are used, with the transmitters installed at the outside wall of Building CPP-604/605. For the remaining sumps and transfer tanks, bubbler probes are used. Differential pressure transmitters for bubbler probe assembly are installed outside each cell, with the exception of the Middle Cell where the transmitter is installed inside the cell.

Leakage or condensate contained in the annula of the double-walled pipes will either drain back directly to the vaults or drain through the secondary containment of the double-walled header pipes to another location, depending upon the location of the leak. Direct back drainage occurs in Vaults D-5 and D-8. Leakage from the header pipes located in Vaults D-5 and D-8, downstream of the highpoint, will drain to the Blower Cell; leakage in the header pipes from the Piping Corridor and Access Corridor will drain to the Separation/Condensation Cell; leakage in the header pipe of the Main Stack will drain to Vault D-4. The PWL Collection System is designed with the capability of using jet pumps to automatically remove accumulated leakage as soon as it is collected in the sump.

3.2 Design

The PWL Collection System was designed by Stearns-Roger according to the requirements set forth by WINCO. The requirements for design (References 1a and 1b) were set forth by WINCO's Project Task Manager, Mr. R. F. Mozes, in January 1990. Based on these requirements, the Title II engineering design was initiated. The Title II engineering design (Reference 2) was prepared under the direction of Mr. K. H. Huth of Stearns-Roger, and approved by WINCO's Project Task Manager, Mr. R. F. Mozes.

This project was managed by the Environmental Compliance Project Section of WINCO's Engineering and Plant Projects Department. The Project Manager was Mr. James E. Kaylor, and the Project Task Manager was Mr. R. F. Mozes. ETAS reviewed and evaluated the pertinent design documents: the design criteria

(References 1a and 1b), which defines the functional and design requirements, design codes, quality standards, etc.; the Quality Program Plan (Reference 3a), which sets forth the quality standards for general engineering design; and the Design Specifications and Drawings (References 2a, b and c), which provide the procurement specifications, construction specifications and design drawings. Based on the regulatory requirements and the guidelines set forth in regulation 40 CFR 264.192 and 265.192 and 40 CFR 264.193 and 265.193, ETAS assessed the adequacy of the PWL Collection System.

3.2.1 Regulatory Requirements

The regulatory requirements to ensure adequate design of new tank systems and/or components are cited in environmental regulations 40 CFR 264.192 and 265.192 and 40 CFR 264.193 and 265.193. In general, the regulations set forth two sets of design requirements: one set pertains to the integrity of the tank systems and the other set pertains to secondary containment of potential leaks. ETAS has summarized the pertinent CFR requirements below. The regulations are included as Appendix B.

Design Requirements To Ensure Structural Integrity:

(a) Tanks and Piping: Materials of construction must be compatible with the wastes [40 CFR 264.192(a)(2) and 265.192(a)(2)]. Must be designed with sufficient structural strength [40 CFR 264.192(a) and 265.192(a)] and must be able to withstand the effects of frost heave [40 CFR 264.192(a)(5)(iii) and 265.192(a)(5)(iii)] and vehicular traffic [40 CFR 264.192(a)(4) and 265.192(a)(4)].

(b) Seams and Connections: Must be inspected by an independent, qualified installation inspector [40 CFR 264.192(b) and 265.192(b)] and must be tested for tightness [40 CFR 264.192(d) and 265.192(d)].

(c) Tank Foundation: Must be designed, at a minimum, to support the load of a full tank [40 CFR 264.192(a)(5)(i) and 265.192(a)(5)(i)].

(d) Structural Support: Must be anchored to prevent flotation or dislodgment from saturation or seismic effect [40 CFR 264.192(a)(5)(ii) and 265.192(a)(5)(ii)].

(e) Backfill and Pressure Controls: Backfill material must be noncorrosive, porous and homogeneous and must be placed to ensure that the tank and piping are fully and uniformly supported [40 CFR 264.192(c) and 265.192(c)].

(f) Corrosion Protection: If the new tank systems or components will be in contact with the soil or with water, a corrosion expert must determine the corrosion potential of the environment and the necessary external corrosion protection [40 CFR 264.192(a)(3) and 265.192(a)(3)].

Design Requirements for Secondary Containment of Potential Leaks:

The need for secondary containment for ancillary equipment, such as the PWL Collection System, is specified in 40 CFR 264.193 and 265.193. If needed, the secondary containment system must meet the following minimum criteria:

(a) General Design: The secondary containment must be designed, installed and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater or surface water [40 CFR 264.193(b)(1) and 265.193(b)(1)]. Any accumulated liquid wastes resulting from leaks, spills or precipitation must be drained and removed within 24 hours [40 CFR 264.193(c)(4) and 265.193(c)(4)].

(b) Type of Secondary Containment: Secondary containment for tanks must include at a minimum a liner external to the tank, a vault, a double-walled tank or an approved equivalent device [40 CFR 264.193(d) and 265.193(d)]. Examples of full secondary containment for ancillary equipment are a trench, jacketing or double-walled piping [40 CFR 264.193(f) and 265.193(f)].

(c) Design Capacity: The secondary containment must be designed with the capacity to contain all of the potentially released liquid should a tank (or pipe) fail [40 CFR 264.193(e)(1)(i), (e)(2)(i), (e)(3)(i) and 40 CFR 265.193(e)(1)(i), (e)(2)(i) and (e)(3)(i)].

(d) Runoff Diversion/Moisture Barrier: The secondary containment must be designed to prevent run-on or infiltration of precipitation into the secondary containment and must be provided with an exterior moisture barrier to prevent moisture migration into the secondary containment [40 CFR 264.193(e)(1)(ii), (e)(2)(ii) and (e)(2)(vi) and 40 CFR 265.193(e)(1)(ii), (e)(2)(ii) and (e)(2)(vi)].

(e) Foundation: The secondary containment must be supported by an adequate foundation [40 CFR 264.193(c)(2) and 265.193(c)(2)].

(f) Liner: The secondary containment must be constructed of or lined with materials that are compatible with the waste(s) [40 CFR 264.193(c)(1) and 265.193(c)(1)]. The liner must be free of cracks or gaps [40 CFR 264.193(e)(1)(iii) and 265.193(e)(1)(iii)] and must prevent migration of waste into the concrete [40 CFR 264.193(e)(2)(iv) and 265.193(e)(2)(iv)].

(g) Leak Detection: Leak detection systems must be able to detect the failure of either the primary or secondary containment structure or any release of hazardous waste or accumulated liquid in the secondary containment system within 24 hours [40 CFR 264.193(b)(2), 264.193(c)(3), 265.193(b)(2), and 265.193(c)(3)].

3.2.2 Structural Integrity Assessment

Design Standards: The general design standards are set forth in the design documents (References 1a and 1b) and defined in the Quality Program Plan, QPP-197 (Reference 3a), which was developed to meet the requirements of ASME/ANSI B31.3 and the National Quality Assurance Standard ASME/ANSI NQA-1 for nuclear facilities, as required by the DOE Idaho under DOE-ID Order 4700.1 (Reference 4) and DOE-ID Order 5700.6c, and to provide quality requirements for the project. Specific design standards are discussed in the following paragraphs. The design standards are provided herein to meet the requirement of 40 CFR 264.192(a)(1) and 265.192(a)(1).

Tanks and Piping: The Transfer Tank Systems of the PWL Collection System design specifies the use of 304L stainless steel for the tanks and piping that transfers hazardous waste liquid (Reference 1b). The composition of the hazardous waste liquids being handled in the PWL Collection System is specified in the Project Drawings No. 368919 and No. 368920 (Reference 2c). They include HNO_3, NaOH, dilute acid, dilute caustic, contaminated condensate, stack condensate, steam, and water. The liquid waste is classified as hazardous waste due to its corrosivity. ETAS assessed the compatibility of the piping material with these waste constituents and concluded that the piping material, which is acid or caustic resistant, is compatible with the wastes, meeting the requirements of 40 CFR 264.192(a)(2) and 265.192(a)(2).

The piping system is specified to be designed to meet the requirements for a moderate seismic hazard as defined in document UCRL-15910 (Reference 1b and 1c). It is ETAS's opinion that such design standards will provide sufficient structural strength for the PWL Collection System under normal operating conditions.

The indoor sections of the waste transfer piping are mounted on the walls and existing structures inside the buildings so vehicular traffic will have no significant effect on the structural integrity. The outdoor sections of the piping are also anchored to the structure of the buildings, vaults, and the main stack and its base, but from the outside. Because these outside above ground lines do not extend to any areas of vehicular traffic, ETAS concluded that these pipe sections do not have the need to withstand the effects from vehicular traffic. The outside sections of the piping system that run above ground are designed to have a weather protection cover with electrical heat tracing under the insulation. The insulation in the protection cover conforms with ASTM C795, Standard Specifications for Wicking-Type Thermal Insulation for Use Over Austenitic Stainless Steel. The heating system, which was provided by PermAlert Environmental Specialty Products (ESP), Inc., is specified to maintain a minimum temperature of 5°C/40°F with a visual readout/alarm to warn of any potential failure. The system has two independent heat cables so that if one cable fails, the second cable can be activated (Reference 2a). The majority of the waste transfer piping is indoor, located inside building structures (CPP-604, 605, and 649), vaults (D-4, D-5, and D-8), or the main stack (CPP-708). This piping is anchored to structures which extend below the frost line; therefore, frost heave is not a concern.

Seams and Connections: ETAS reviewed the protocols for welding, leak testing, liner coating, and inspection as set forth in Sections 01005, 05060 and 15400 of the Construction Specification (Reference 2b); and in the various Quality Engineering Inspection Plans (References 3b (iii) and (iv)). The specified procedures and methods for installation and inspection are adequate to ensure proper seams and connections. Installation work, as detailed in Section 3.3.3, was performed by various contractors pre-qualified by WINCO. Inspection of the contractor's work was conducted by WINCO's QA personnel, as discussed in Section 3.3.4, meeting the requirements of 40 CFR 264.192(b) and 265.192(b). Through surveillance by ETAS's Lead Engineer, and review of the results of pertinent inspection records (Reference 3b) by Ebasco's Quality Assurance Engineer, ETAS determined that the seams and connections are designed to be leak free and that the Transfer Tank Systems of the PWL Collection System have been tested to be tight, meeting the requirement of 40 CFR 264.192(d) and 265.192(d).

Tank Foundation: The design of the tank foundations were specifically considered as required by 40 CFR 264.192(a)(5) and 265.192(a)(5) (Reference 1f).

Structural Support: The potential seismic effect was taken into consideration in designing the Transfer Tank Systems of the PWL Collection System (Reference 1c). The piping system, including the transfer tanks, is anchored or supported by facility structures including Buildings CPP-604, 605, and 649; Vaults D-4, D-5, and D-8; and the Main Stack CPP-708. According to WINCO's Facility Manager, Mr. Robert H Davis [Robert H Davis 7-7-94 (Signature/Date)], no load subsidence, noticeable structural problems, or any indications of structural problems, have been identified since those facility structures were constructed that have not been repaired. However, Mr. Davis' signatory attestation is limited to the structural support of the piping system, including the transfer tanks, related to this project. ETAS did not inspect the buildings, vaults, or the main stack, and cannot be responsible for any consequences of building structure failure, but we have no reason to suspect any structural danger in Buildings CPP-604, 605, and 649; Vaults D-4, D-5, and D-8; or the Main Stack and its base, which support the PWL Collection Piping System. ETAS reviewed the design of the anchor plates and the other pipe supports (Project Drawings 369377 through 369380 of Reference 2c) and concluded that the structural support for the PWL Collection System is designed adequately.

Backfill and Pressure Controls: This section does not apply to the PWL Collection System because none of the piping is installed below grade, buried in contact with soils.

Corrosion Protection: This section is not applicable to the PWL Collection System because none of the piping is installed below grade, buried in contact with soils.

3.2.3 Adequacy for Handling Potential Leaks

General Design: The Transfer Tank Systems of the PWL Collection System are designed with secondary containment systems to prevent migration of wastes and accumulated liquid out of the systems to the soil, groundwater or surface water, meeting the regulatory requirement of 40 CFR 264.193(b)(1) and 265.193(b)(1). All piping sections located outside the building structures and some of the sections located inside the underground building structures are constructed with double-walled piping and include a leak detection system. For those sections located inside the underground building structures with single-walled piping, secondary containments with liners, collection sumps and leak detection systems are installed. Any accumulated liquid wastes in the secondary containment resulting from leaks can be detected with alarms to alert the operator. For the double-walled piping system, the alarm is signaled through an electronic cable installed in the annulus between the waste piping and the outer encasement pipe. For the single-walled piping system, leakage is detected by a level sensing instrument installed in the sump of the secondary containment. Once a noticeable leak is detected, the accumulated leakage can be removed within 24 hours, meeting the requirement of 40 CFR 264.193(c)(4) and 265.193(c)(4). For the double-walled piping system, accumulated waste liquid can be released manually to a process cell or a vault through a valve installed at a low point in the piping system. For the single-walled piping system, accumulated leakage can be removed by jet pumps installed for each sump. An overview of secondary containment and leak detection capability for the PWL Collection System is described in Section 3.1.5.

Type of Secondary Containment: All of the transfer tanks are installed in lined cells/vaults. For the ancillary equipment, two types of secondary containment are used: double-walled piping and cells/vaults. These two types of secondary containments are defined by the regulation 40 CFR 264.193(f) and 265.193(f) as "full secondary containment". There are three portions of the PWL Collection System employing double-walled pipes as the secondary containment: first, the portion that originates from Vaults D-5 and D-8 and Building CPP-649 and ends at Building CPP-604 before entering the Blower Cell; second, the portion inside the building structure in the Piping and Access Corridors; third, the portion that originated from the Main Stack and ends at Vault D-4. Detailed description of the double-walled pipes is provided in Appendix A. The remaining portions of the PWL Collection System employ existing building structures such as cells or vaults as the secondary containment (Section 3.1.5). When the single-walled pipes route through the various cells/vaults, they encounter thirteen structural penetration locations (Section 3.1.4). Encasement pipes or outer sleeves are installed in all of the thirteen structural penetrations as discussed in detail in Section 3.1.4. Should a leak occur in the waste pipe while penetrating through the cell wall or building structure, the encasement pipe or the outer sleeve will serve as a secondary containment to divert the waste liquid into the adjacent cell/vault serving as secondary containment. Detailed discussion of secondary containments involving structural penetration is included in Appendix D.

Design Capacity: The two types of secondary containment for the PWL Collection System are designed with the capacity to contain the released liquid should the transfer tanks or piping system fail. For the double-walled piping system, the encasement pipe is designed to withstand the same pressure (100 psig) as the waste pipe with both ends of the encasement pipe sealed to the waste pipe. Since both pipes can withstand the design pressure, the encasement pipe will be capable of containing all of the potentially released liquid if the process pipe fails.

All of the single-walled pipes and the transfer tanks are contained in relatively large cells or vaults serving as secondary containment, as discussed in Section 3.1.5. These cells or vaults are either stainless steel lined or epoxy coated throughout the entire floor and up to a three foot height from the floor along the surrounding walls. Each cell or vault has at least one sump to collect waste liquid with the capability of using a jet pump to remove leakages. Should a leak occur, the accumulated liquid in the sump will signal a level sensor and alert the operator. According to WINCO's Facility Manager, Mr. Robert H. Davis [Robert H. Davis 7-7-94 (Signature/Date)], WINCO has in place an operational procedure to shut off the source of the leaking pipe and activate the waste removal jet pump to ensure that the leakage will not exceed the capacity of the lined portion of the secondary containment. Implementation of this operational procedure ensures that the secondary containments have the capacity to contain potentially released liquid should the pipe system fail.

Run-off Diversion/Moisture Barrier: The two types of secondary containments used in the PWL Collection System are designed to prevent entering of run-off or infiltration of precipitation. For the double-walled piping, the encasement pipe providing secondary containment is sealed to the waste pipe at both ends.

For the cell/vault secondary containment, the concrete structure of the building complex prevents run-off and moisture entering the secondary containment. The Building Complex CPP-604, 605, 649 and 708 was originally designed and constructed to prevent surface run-off or infiltration into the building. There are no known problems of flooding inside this building complex due to surface run-off or groundwater seepage according to WINCO's Facility Manager, Mr. Robert H. Davis [Robert H Davis 7-7-94 (Signature/Date)]. Therefore, ETAS concluded that the secondary containments are adequately designed from the run-off diversion/moisture barrier standpoint.

Foundation: The Building Complex CPP-604, 605, 649 and 708 provides anchoring support to the double-walled type secondary containment, and serves as the foundation to the cell/vault secondary containment. According to WINCO's Facility Manager, Mr. Robert H. Davis [Robert H Davis 7-7-94 (Signature/Date)], there have been no reported problems with building foundations. However, ETAS has performed no structural assessment of the Building Complex CPP-604, 605, 649 and 708, and cannot attest to the structural integrity of these building structures.

Liner: The secondary containments are constructed or lined with materials that are compatible with the wastes. The composition of the wastes has been presented in Section 3.2.2 under Tanks and Piping. Stainless steel is used for all encasement pipe of the double-walled piping. All cells/vaults are either lined with stainless steel liners or coated with chemical resistant epoxy, using the #3500 system material manufactured by Keeler & Long, Inc. (Reference 1d). The sump(s) inside each cell/vault secondary containment are constructed of stainless steel, either welded to the stainless steel liner or overlapped with the chemical resistant epoxy coating. The issue of liner compatibility is discussed in detail in Appendix C.

The liners are specified to be constructed in accordance with proper procedures to eliminate cracks or gaps preventing migration of waste into the concrete or out to the environment. For the stainless steel liners, all new weldings, including the double-walled pipes and the sumps, are specified to be constructed in accordance with the same procedures and requirements as the waste pipe (Section 3.2.2 under Seams and Connections) followed by liquid penetrant testing and visual inspection. All of the stainless steel liners in the cells/vaults are existing liners (Section 3.1.5). According to WINCO's Facility Manager, Mr. Robert H. Davis [Robert H Davis 7-7-94 (Signature/Date)], the containment area of the liner is free of visible cracks or gaps so that migration of potential waste into the concrete is unlikely. For the epoxy liners, the coating was specified to be applied in accordance with manufacturer approved procedures and requirements as provided in References 1d and 3b(iii). Actual installation of liners and coating were subject to inspections to ensure that the specified procedures and requirements were followed. Inspection plans to ensure proper welding are provided in Reference 3b(iv), and to ensure proper epoxy coating are provided in Reference 3b(iii). Execution of these inspection plans is discussed later in Section 3.3, Installation and Inspection.

Leak Detection: Leak detection systems are installed for both the double-walled piping and for the cell/vault secondary containment. The double-walled piping system is equipped with the PermAlert AT leak location/detection system, which is manufactured by PermAlert ESP, Inc. The system consists of a leak sensing cable which is installed within the encasement secondary containment and transmits signals to a microprocessor monitoring unit whenever a leak occurs. The monitoring unit, which is equipped with an alarm system, is mounted on a wall inside Buildings CPP-604/605, near the operator(s) of the Distributed Control System (DCS). The system applies the principle of pulsed energy reflection which facilitates continuous monitoring for leaks and mapping of leak locations. ETAS had witnessed the general Operating Conditions for the same type of PermAlert AT leak detection system in another location within the plant site (Reference 5) and attested that the system is designed adequately to allow for continuous leak detection. It is ETAS's professional opinion that the leak detection system is able to detect failures of double-walled pipes and capable of detecting noticeable leaks within the 24 hour time requirement, meeting the requirements of 40 CFR 264.193(b)(2), 264.193(c)(3), 265.193(b)(2) and 265.193(c)(3).

The cell/vault secondary containments are equipped with level sensor leak detectors. As described in detail in Section 3.1.5, two types of level sensors are used: capacitance probe and pneumatic bubbler probe. Should a leak occur, the accumulated liquid in the sump will signal the level sensor, and activate an alarm to alert the operator in the DCS Control Room in Building CPP-604. Both types of level sensors can be adjusted for various levels of sensitivity. According to WINCO's Facility Manager, Mr. Robert H. Davis [Robert H Davis 7-7-94
Signature/Date)], WINCO's operational procedures ensure that the leak detectors are set to allow for detection of noticeable leaks within 24 hours, meeting the requirements of 40 CFR 264.193(b)(2), 264.193(c)(3), 265.193(b)(2) and 265.193(c)(3).

3.2.4 Summary of Assessment

Based on the assessment described in Section 3.2.2, it is ETAS's opinion that the Transfer Tank Systems of the PWL Collection System are designed to provide adequate structural integrity. According to Section 3.2.3, ETAS concluded that the design for handling potential leaks in the Transfer Tank Systems is also adequate.

3.3 Installation and Inspection

To ensure proper installation of the system, ETAS:

(1) Evaluated the adequacy of the installation and inspection protocols,

(2) Reviewed the qualifications of the constructors,

(3) Examined actual installation and inspection records, and

(4) Provided surveillance of inspection and installation activities and discussed the results of S.O. testing.

Based on the regulatory requirements and the guidelines set forth in regulation 40 CFR 264.192 and 265.192, ETAS assessed the adequacy of the installation of the Transfer Tank Systems of the PWL Collection System.

3.3.1 Regulatory Requirements

The applicable regulatory requirements to ensure proper installation of new tank systems or components are cited in 40 CFR 264.192(b), (d) and (f) and 40 CFR 265.192(b), (d) and (f) as follows:

40 CFR 264.192 and 265.192

(b) The owner or operator of a new tank system must ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing, or placing a new tank system or component in use, an independent, qualified installation inspector or an independent, qualified, registered professional engineer, either of whom is trained and experienced in the proper installation of tank systems, must inspect the system or component for the presence of any of the following:
(1) Weld breaks;
(2) Punctures;
(3) Scrapes of protective coatings;
(4) Cracks;
(5) Corrosion;
(6) Other structural damage or inadequate construction or installation.
All discrepancies must be remedied before the tank system is covered, enclosed, or placed in use.

(d) All new tanks and ancillary equipment must be tested for tightness prior to being covered, enclosed or placed in use. If a tank system is found not to be tight, all repairs necessary to remedy the leak(s) in the system must be performed prior to the tank system being covered, enclosed, or placed in use.

(f) The owner or operator must provide the type and degree of corrosion protection necessary, based on the information provided under paragraph (a)(3) of this section, to ensure the integrity of the tank system during use of the tank system. The installation of a corrosion protection system that is field fabricated must be supervised by an independent corrosion expert to ensure proper installation.

3.3.2 Installation and Inspection Protocols

WINCO's installation and inspection protocols are defined in the Construction Specification (Reference 2b) and various Quality Engineering Inspection Plans (Reference 3b). These protocols incorporate the quality assurance standards set forth in the Quality Program Plan, QPP 197 (Reference 3a), which was developed to meet the National Quality Assurance Standard NQA-1 as required by the DOE Idaho under DOE-ID Order 4700.1 (Reference 4) and DOE-ID Order 5700.6c. Although the U.S. Environmental Protection Agency (USEPA) does not set any specific quality assurance standard for the installation and inspection of tanks and piping systems, it is ETAS's professional judgement that the NQA-1 standard and ASME/ANSI B31.3 will ensure that the designs discussed in Sections 3.2.2 and 3.2.3 are properly installed and meet the requirements of 40 CFR 264.192(b), (d) and (f) 40 CFR 265.192(b), (d) and (f).

ETAS assessed WINCO's installation and inspection protocols, which include procedures for receipt and transfer of piping materials on site and off site (Reference 3b(i)); procedures and requirements for civil concrete work, sumps and wall penetration (Reference 3b(ii)); procedures for epoxy liner application (Reference 3b(iii)); procedures for welding, fabrication control, installation control, leak testings (Reference 3b(iv)); procedures for electrical and instrumentation works (Reference 3b(v) and (vi)). The Quality Program Plan, QPP 197 (Reference 3a), was prepared by Mr. W. S. Harker, a Quality Engineer in WINCO's Quality Engineering Department; the electrical portion of the inspection plans (Reference 3b(v)) was prepared by Mr. Mike Barker with WINCO; and all of the remaining inspection plans (References 3b(i) through (iv), and 3b(vi)) were prepared by Mr. W. S. Harker and Mr. M. D. Jorgensen with WINCO. These plans were subsequently reviewed and approved by WINCO's Project Task Manager, Mr. R. F. Mozes, WINCO's Project Task Manager/Project Engineer, Mr. D. L. Penwell and/or by WINCO's Field Engineer, Mr. J. E. Claver. Based on this assessment, ETAS concluded that WINCO's installation and inspection protocols are adequate.

3.3.3 Qualifications of the Constructors

Construction management for all installations was provided by Morrison Knudson-Ferguson of Idaho, a construction management company approved by the Department of Energy (DOE). Industrial/Amelco, Inc. was the primary subcontractor for the installation of the PWL Collection System. Industrial/Amelco, Inc. is qualified by WINCO (Appendix E) for the installation of the mechanical and electrical portions of the system. Insulation for double-walled pipe, except at field joints in the double-walled pipe, was installed by PermAlert ESP, Inc., the manufacturer of the double-walled piping. Pipe insulation at the double-walled pipe joints was installed by Waters Insulation and Supply Company under contract to Industrial/Amelco, Inc. All other pipe insulation was installed by Waters Insulation and Supply Company. Electrical work, including installation of the leak detection system, was performed by Industrial/Amelco, Inc. or Wheeler Electric. Leak detection system installation oversight was provided by PermAlert ESP, Inc. Painting was performed by E & E Painting under contract to Industrial/Amelco, Inc. Concrete sawing and drilling was performed by Adamson's Concrete Sawing and Drilling under contract to Industrial/Amelco, Inc. Concrete and grout installation was performed by C & H Construction, Inc. under contract to Industrial/Amelco, Inc. Near the end of the job, Industrial/Amelco, Inc. was supplemented by Atlas Mechanical, Inc., Eagle Rock Mechanical, Inc., Dynamics Incorporated, and Wheeler Electric, allowing the piping, mechanical and electrical work to be completed in a rapid manner.

Based on the qualifications of these companies (Appendix E) and a review of the certification records of the welders (Appendix F), ETAS concluded that the installation was performed by a qualified team.

3.3.4 Independent Inspection

To ensure that the installation was implemented in accordance with the installation and inspection protocols defined in the Construction Specification (Reference 2b) and various Quality Engineering Inspection Plans (Reference 3b), WINCO assigned their own Quality Engineers, Mr. W. S. Harker and Mr. M. D. Jorgensen, with the support of a group of inspectors (Appendix F), overall responsibility for inspection. ETAS's Quality Assurance Manager examined WINCO's inspection records (Reference 3b) and concluded that the inspection was done in accordance with the inspection plans.

3.3.5 Inspection Surveillance

On August 2 through 8, September 5 through 7 and October 10 through 12 of 1990, ETAS's Lead Engineer, Dr. T.Y. Richard Lo, provided surveillance of installation and inspection activities. Mr. Lo's activities during these visits included surveillance of the welding process; visual examination of piping and support welds; surveillance of grouting and epoxy liner installation, witnessing liquid penetrant examination, pneumatic pressure testing and inspection activities; and reviewing inspection records and procedures; discussions of the activities on S.O. testing (Reference 3c); and conducting a final walk through. Based on surveillance of the inspection activity and a review of the inspection records and S.O. test results, it is ETAS's opinion that the new Transfer Tank Systems of the PWL Collection System were installed properly and the auxiliary equipment, including the leak detection system and the epoxy liners, was placed adequately.

3.3.6 Summary of Assessment

ETAS reviewed the installation and inspection protocols; reviewed the qualifications of the constructors, welders and inspectors; examined the pertinent inspection records, and reviewed the S.O. test results; and concluded that the installation and inspection protocols were adequate and were implemented satisfactorily. Based on this assessment, ETAS concluded that the Transfer Tank Systems of the PWL Collection System was installed properly and meets the regulatory requirements of 40 CFR 264.192(b) and (d) and 40 CFR 265.192(b) and (d). Since the PWL Collection System does not involve any piping that is installed underground (buried in the soil) the requirements on corrosion protection, 40 CFR 264.192(f) and 265.192(f), are not applicable.

4.0 CONDITIONS OF ATTESTATION

ETAS reviewed the documents listed in the References Section which pertain to the design and installation of the Transfer Tank Systems of the PWL Collection System and provided assessments as detailed in Section 3.0. These assessments are the basis for this certification. The lines excluded from the certification are lines which bypass the transfer tanks and discharge directly to the sumps of secondary containments in several cells. These lines should not be used to discharge hazardous waste liquids to the PWL Collection System, and therefore, they are excluded from this certification.

ETAS's interpretation of the adequacy of the design and installation were strictly based on environmental regulatory requirements, and this certification should not be construed as a warranty of the PWL Collection System.

REFERENCES

1. Design Documents:

(a) "Scope of Work Statement for Title II Design On the ICPP 604, 605, 649 Process Waste Liquid (PWL) Collection System," Revision 1, prepared for Department of Energy, Idaho Operations Office, Approved by R. F. Mozes of WINCO, January 19, 1990.

(b) "Project Design Criteria, CPP-604, CPP-605, CPP-649 Process Waste Liquid (PWL) Collection System Project," Revision 0, by R. F. Mozes of WINCO, January, 1990.

(c) "Design Files for Title II Design on the ICPP 604, 605, 649 Process Waste Liquid (PWL) Collection System," Design Completed by United Engineers and Constructors, Project No. 9354.081, DOE-ID Contract No. DE-AC07-89ID12679, WR No. 90-11, Volumes 1, 2 and 3, December, 1990.

(d) "Engineering Specifications for PWL Collection System Floor Coating," Specification No. S-290016-1 (Revision 0), by M. D. Lebeck/ C. L. Porter of WINCO, (Approved by R. F. Mozes of WINCO, April 25, 1990).

2. Specifications and Drawings:

(a) PermAlert Pipe Procurement Specification (12 pages), Subcontract No. S-290016, A-E Support and Services Contract with Idaho National Engineering Laboratory, prepared under DOE-ID Contract No. DE-AC06-89ID12679, WR 90-11B, by Stearns-Roger Division/UE&C, Project No. 9354.081, April 10, 1990.

(b) "Specification for ICPP PWL Collection System Project," Subcontract No. S-290016, A-E Support and Services Contract with Idaho National Engineering Laboratory," prepared under DOE-ID Contract No. DE-AC06-89ID12679, WR 90-11B, by Stearns-Roger Division/UE&C, Project No. 9354.081, prepared by Kenneth Huth, April 12, 1990. (Approved by S-RD Project Manager, April 13, 1990.)

(c) PWL Collection Project Drawings:

DRAWING NO. (REVISION)	DRAWING DESCRIPTION (CPP-BLDG. LOCATION)
GENERAL INFORMATION	
369382 (0)	PWL Collection System Site Plan
058560 (0)	Instrument Identification, Legend and Symbols (604)
090221 (0)	Piping Service Code Index (604)
PROCESS FLOW AND INSTRUMENTATION DIAGRAM	
368919 (0)	Process Flow Diagram (604, 649)
368920 (1)	Process Flow Diagram
368921 (0)	D-5 Vault (604, 649)
368922 (0)	D-8 Vault (604, 649)
368923 (0)	APS Process, Building 649 (604, 649)
368924 (1)	Off Gas Blower Cell (604, 649)
368925 (0)	Off Gas Filter Cell (604, 649)
368926 (0)	South Cell (604, 649)
368927 (1)	Middle Cell (604, 649)
368928 (0)	Pump Pit Enclosure (604, 649)
368929 (1)	North Cell (604, 649)
368930 (0)	Separation/Condensation Cell (604, 649)
368931 (0)	Main Stack and Evaporation Cell (604, 649, 708)
PIPING PLAN AND SECTIONS	
368941 (1)	North Cell (604)
368942 (0)	North Cell - Plan Only (604)
368943 (1)	Middle, North, and South Cells (604)
368944 (1)	Middle and South Cells (604)

DRAWING NO. (REVISION)	DRAWING DESCRIPTION (CPP-BLDG. LOCATION)
368945 (1)	Pump Pit - Plan Only (604)
368946 (1)	Pump Pit - Sections Only (604)
368947 (1)	Pump Pit - Sections Only (604)
368948 (1)	Piping Corridor (604)
368949 (0)	Piping Corridor - Plan and Elevation (604)
368951 (0)	Pipe Corridor - Sections Only (604)
368952 (1)	Sep. - Cond. & Evap. Cell - Plan Only (604)
368953 (0)	Sep., Cond., & Evap. Cells - Sections Only (604)
368954 (1)	Sep. & Cond. Cell - Section Only (604)
368955 (0)	Sep. & Cond. Cell - Section Only (604)
368956 (1)	VOG Blower & Filter Cells - Plan Only (604)
368957 (1)	Piping Plan (649)
368958 (0)	Piping Sections (649)
368959 (0)	Main Stack - Sections Only (708)
368960 (0)	Piping Plan and Sections (708)
368961 (1)	Main Stack - Plan Only (708)
368962 (0)	Piping Plan and Sections (D-4, D-5)
368963 (0)	Demolition Piping Plan (D-5)
368964 (0)	Demolition Piping Plan (D-8)
368965 (1)	Exhaust Fan Area - Plan Only (605)
368966 (1)	Piping Plan and Section (605)
368967 (1)	HEPA Filter Area, D-5, D-8 - Sections Only (649, D-5,
368968 (1)	Piping Plan (604)
368969 (0)	Access Corridor (604)
368970 (0)	Demolition Piping, Pipe Corridor (604)

DRAWING NO. (REVISION)	DRAWING DESCRIPTION (CPP-BLDG. LOCATION)
368980 (0)	Piping Details
368981 (0)	Pipe Attachment Details (604, 605, 649)

TANK AND SUMP SYSTEM

368988-FI (1)	25 Gal. Tank and Sump
368989-FI (1)	10 Gal. Tank and Sump
368990-FI (1)	10 Gal. Tank and Supports for Vault D-5

INSTRUMENTATION INSTALLATION DETAILS

369336 (0)	Level Instruments (604, 649, 708)
369337 (0)	Level Instruments (604, 649, 708)
369338 (0)	Control Valves (604, 649, 708)
369339 (0)	Miscellaneous Instruments (604, 649, 708)
369340 (0)	Mounting Details (604, 649,708)
369341 (0)	Control Valves (604, 649, 708)

ELECTRICAL AND CONTROL SYSTEM LOCATION PLAN

369361 (1)	Oper. Corridor & Switchgear Room (604)
369362 (1)	Piping Corridor (604)
369363 (1)	North, Middle and South Cells (604)
369364 (1)	Separation/Cond. & Evap. Cells (604)
369365 (1)	D-5 & D-8 Vaults (649)
369366 (1)	Main Stack, D-4 Vault (605, 692, 708)
369367 (0)	Off Gas Filter & Blower Cells (604, 605)

DRAWING NO. (REVISION)	DRAWING DESCRIPTION (CPP-BLDG. LOCATION)
TERMINATION DRAWINGS	
369368 (0)	JB-WN-EE-39 Termination Drawing, Piping Corridor (604)
369369 (0)	JB-WN-EE-38 Termination Drawing, Access Corridor (604)
369370 (0)	JB-WL-EE-43 Termination Drawing, VOG Filter Blower Rooms (604)
369371 (0)	JB-OGF-EE-42 Termination Drawing, D-5/D-8 Building 649 (604)
369372 (0)	PCU #13 Termination Drawing, Zone A and Zone B (604)
369373 (0)	PCU #13 Termination Drawing, Zone C and Zone D (604)
SUMP AND FOUNDATION DETAILS	
369374 (0)	Sump and Foundation Details (604, 649)
FLOOR AND WALL PENETRATION	
369375 (1)	Floor and Wall Penetrations and Sump Details - Sheet 1 (604, 649)
369376 (0)	Floor and Wall Penetrations and Sump Details - Sheet 2 (604, 649)
PIPE SUPPORTS	
369377 (1)	Pipe Supports - Sheet 1 (604, 649)
369378 (1)	Pipe Supports - Sheet 2 (604, 649)
369379 (1)	Pipe Supports - Sheet 3 (604, 649)
369380 (1)	Pipe Supports - Sheet 4 (604, 649)
PIPING ISOMETRIC	
369443 (1)	Vault D-8
369444 (1)	Vault D-5 (604)

DRAWING NO. (REVISION)	DRAWING DESCRIPTION (CPP-BLDG. LOCATION)
369445 (1)	Blower and Filter Cell (604)
369446 (0)	South Cell (604)
369447 (1)	Middle Cell
369448 (0)	Access Corridor (604)
369449 (0)	Sep. & Cond. Cell (604)
369450 (1)	North Cell (604)
369451 (0)	North Cell (604)
369452 (1)	Middle and South Cell (604)
369453 (1)	Main Stack (708)
369454 (1)	Piping Isometric (649)
369455 (0)	Blower Cell (604)
369456 (0)	D-5, D-8 Vault and Building 649 (649)
369457 (1)	Blower Cell (604)
369458 (1)	Piping Isometric (649)
369459 (0)	Filter Cell (604)
369460 (1)	Filter Cell (604)
369461 (1)	Pump Pit, North Cell (604)
369462 (0)	North Cell (604)
369464 (1)	Pump Pit, North Cell (604)
369465 (1)	Pipe Corridor (604)
369466 (1)	Sep. & Cond. (604)
369467 (1)	Sep. & Cond. (604)
369468 (1)	Evap. Cell (604)
369469 (1)	Vault D-5 and D-8 (649)
369470 (1)	Filter and Blower (604)

DRAWING NO. (REVISION)	DRAWING DESCRIPTION (CPP-BLDG. LOCATION)
369471 (0)	Middle Cell (604)
369472 (0)	Middle Cell (604)
369473 (1)	Middle Cell (604)
369474 (0)	Piping Isometric Pipe Corridor (604)

3. Quality Assurance and Installation Inspection Documents:

(a) "Quality Program Plan for the ICPP 604, 605, 649 PWL Collection System Project," QPP 197, Revision 1, by W. S. Harker of WINCO, January 3, 1990. (Approved by R. F. Mozes of WINCO, January 4, 1990.)

(b) Quality Engineering Inspection Planning and Logs:

(i) Inspection for Receiving On Site, Off Site, and Schedule "X" Transfer of GFE:
"Plan No. Q-90016-R1, Revision 0," June 20, 1990
"Plan No. Q-90016-R2, Revision 0," June 20, 1990
"Plan No. Q-90016-X-1, Revision 0," June 18, 1990
Plans prepared by W. S. Harker/M. D. Jorgensen of WINCO.

(ii) Inspection for Civil Work (Civil/Sumps/Penetrations/Concrete):
"Plan No. Q-90016-C1, Revision 3," August 4, 1990
"Plan No. Q-90016-C2, Revision 0," August 31, 1990
"Plan No. Q-90016-C2(S), Revision 0," August 23, 1990
Plans prepared by W. S. Harker/M. D. Jorgensen of WINCO.

(iii) Inspection for Floor Coatings:
"Plan No. Q-90016-F1, Revision 1," September 7, 1990
Plan prepared by M. D. Jorgensen of WINCO.

(iv) Inspection for Piping/Mechanical (Receiving Materials, Verify Welder's Qualifications, Fabrication/Installation Control, Welding Inspections, Liquid Penetrant Examination, Radiographic Examinations, Weld Repairs, Pressure Leak Testing, Tie-In Welds, Double-Wall Pipe, Valves, Insulation, Piping Identification and Painting, Pipe Supports, Sumps, Penetrations):
"Plan No. Q-90016-P1, Revision 14," September 17, 1990
"Plan No. Q-90016-P2, Revision 2," July 27, 1990

"Plan No. Q-90016-P3, Revision 0," July 10, 1990
Plan No. Q-90016-P4, Revision 0," August 23, 1990
Plan No. Q-90016-PEN-1, Revision 0," October 11, 1990
Plans prepared by W. S. Harker/M. D. Jorgensen of WINCO.

(v) Inspection for Electrical:
"Plan No. Q-90016-E1, Revision 12," October 3, 1990
Plan prepared by Mike Barker of WINCO.

(vi) Inspection for Instrumentation (Materials, Installation, Air Tubing and Fitting, Air Supply, Pneumatic Testing, Functional Testing):
"Plan No. Q-90016-I1, Revision 1," August 20, 1990
Plan prepared by W. S. Harker/M. D. Jorgensen of WINCO.

(c) S.O. and Integrated Test:

(i) "S.O. and Integrated Test Procedure, S.O. Test for CPP-604, 605, and 649 PWL Collection Project, Revision 1," WHAS-WL-SO-1, Prepared by J. B. Sherman of WINCO, September 11, 1990; Procedure Approved by Responsible Manager, R. F. Mozes, and others, September 14, 1990; Test Completed by Test Engineer, J. B. Sherman, October 31, 1990; Test Completed and Approved by Test Results Review Team (TRRT), November 1, 1990.

(ii) "Plan No. Q-90016-SO-1, Revision 0," October 9, 1990
Plans prepared by Bill Harker of WINCO.

4. DOE-ID Order 4700-1, Project Management System, Chapter IX, Construction Quality Assurance, by U.S. Department of Energy.

5. "Certification Document for the Design and Installation of the PEW Condensate Discharge Piping System, Idaho Chemical Processing Plant Building CPP-604/605, Idaho National Engineering Laboratory, Idaho Falls, Idaho," Prepared for Westinghouse Idaho Nuclear Company, Inc. by Ebasco, June 15, 1990.

VES-WL-101/VES-WL-111

WL101
11.1
S/N 530588

JETSEAL PO BOX 28043 • SPOKANE, WASHINGTON 99228-8043 • 509/467-9133

May 20, 1997

Cesar Sanchez
Lockheed-Martin Idaho Technologies Company
P.O. Box 1625
Idaho Falls, ID 83415

Subject: Interim Certification for HV-WLE-67, HV-WLE-69 and PWLV-WLE-161A

Dear Cesar:

You indicated that the SO Testing for the subject valves will be performed with liquid classified as hazardous waste (water added to existing contaminated equipment). Specifically, water added to the 129 Evaporator will be transferred to VES-WL-101 via valve 67. The boundary valves for this test are to be HV-WLE-18, -66, -69, and PSV-WLE-70. Similarly, the flowpath from the 161 Evaporator will be tested via valves 161A and 69. Boundary valves HV-WLE-67, -68, and PSV-WLE-70 will ensure flow is directed only to VES-WL-101. Since the testing will be performed with liquid classified as hazardous waste an interim certification is needed prior to the SO testing. The purpose of this letter is to provide that interim certification based upon our review of:

- applicable design documents
- installation and inspection records
- qualification records of installation personnel
- current certification of the secondary containment
- your verbal report of SO Testing to date

plus our personal observation of the installed components.

It is our professional opinion that the subject valves and adjoining piping system (newly installed) have sufficient structural integrity and are acceptable for SO testing using hazardous waste.

The certification provided herein by Jetseal, Inc., is limited to SO Testing of valves HV-WLE-67, -69 and PWLV-WLE-161A via the flowpath defined by the boundary valves (see attached sketch).

[signature] 5/20/97
Craig L. Porter, Project Manager — Date
Jetseal, Inc.

[signature] 5/20/97
Michael J. Shannon, P.E., Idaho Professional Engineer — Date
Jetseal, Inc.

IDAHO FALLS OFFICE: PO BOX 50186 • IDAHO FALLS, ID 83405-0186 • 208 / 529-3006

CERTIFICATION DOCUMENT

FOR THE

VES-WL-111 AND ANCILLARY PIPING

Idaho Chemical Processing Plant
Idaho National Engineering and Environmental Laboratory
Idaho Falls, ID

Prepared for:

Lockheed-Martin Idaho Technologies Company (LMITCO)
P.O. Box 1625, Idaho Falls, ID 83415-3521

February 16, 1998

JETSEAL

Craig Porter
208/529-3006

JETSEAL
Post Office Box 50186
Idaho Falls, ID 83405-0186

RCRA CERTIFICATION OF

VES-WL-111 and Ancillary Piping

Idaho Chemical Processing Plant

Idaho National Engineering and Environmental Laboratory

Idaho Falls, ID

The attached report entitled, "CERTIFICATION DOCUMENT FOR VES-WL-111 AND ANCILLARY PIPING , Idaho Chemical Processing Plant, Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID", dated February 16, 1998, serves as the basis for this certification, which follows the guidance provided under both Federal regulation 40 CFR 264.192, 264.193, 265.192, 265.193, and the Idaho rules, regulations and standards for hazardous waste. We attest that the system has sufficient structural strength, compatibility with the wastes and corrosion protection (conditional as per Certification Document) to ensure it will not collapse, rupture or fail. The certification provided herein by Jetseal, Inc., is limited to the work set forth in the certification document.

We certify under penalty of law that this document and all attachments were prepared under our direction or supervision and in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

2-17-98

Craig L. Porter, Project Manager — Date
Jetseal, Inc.

2-18-98

Michael J. Shannon, P.E., Idaho Professional Engineer — Date
Jetseal, Inc.

2-17-98

Lloyd R. Hardy, Corrosion Protection Specialist — Date
Jetseal, Inc.

TABLE OF CONTENTS

1.0 Introduction

In 1990 WINCO, the operating contractor for the Idaho Chemical Processing Plant (ICPP), commissioned an independent assessment of intermediate level waste storage tanks, WL-101 and WL-102.[1] The objectives of the assessment were to demonstrate, to the extent practical, that the WL-101 system was fit for continued use. Due to the results of that assessment and the impracticability of performing an ultrasound survey to determine the remaining wall thickness of the tank, it was determined that a new vessel was needed as a backup. The "Replacement of VES-WL-101 Project" was subsequently initiated in 1993 with intermittent periods of construction continuing through 1997. Final acceptance testing was completed in December of 1997. In accordance with 40 CFR 264.192/193 and 40 CFR 265.192/193, the owner/operator is required to obtain a certification by an independent, qualified, registered professional engineer that the system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. Jetseal, Inc., through a contract with LMITCO, operator for the Department of Energy (DOE) of the ICPP, was retained to provide the independent certification for the "Replacement of VES-WL-101 Project".

This assurance document defines the system boundary to which the certification applies. It delineates the applicable regulatory requirements, how each requirement was assessed, and attests to the integrity of the installed system. Although an assessment of other systems are required for the total regulatory assessment, the certification is limited to the newly installed components of the system.

2.0 Certification Team

The key personnel of the Jetseal certification team are Craig L. Porter, Project Manager, Michael J. Shannon, certifying professional engineer, and Lloyd R. Hardy, Corrosion Specialist. Mr. Porter has a Bachelors Degree in Chemical Engineering and a Masters Degree in Environmental Remediation and Waste Management. He has over sixteen years of experience in piping system design and testing within the chemical and nuclear industries. He is familiar with the ICPP and his experience includes six years supporting environmental compliance work similar to that being accomplished via the subject project. Mr. Shannon has a Bachelors Degree in Civil Engineering and a Masters Degree in Structural Engineering. He is a professional engineer registered in the State of Idaho. His thirteen years of engineering experience include over ten years of design and analysis work at various facilities within the Idaho National Engineering and Environmental Laboratory (INEEL). Mr. Hardy has 23 years of experience in the nuclear and waste management arena. The majority of his experience (18 years) has been in designing, constructing and monitoring cathodic protection systems for underground tanks and piping. He is a T10 Committee (Underground Corrosion Control) member for the National Association of Corrosion Engineers (NACE). He is very familiar with the cathodic protection systems at the INEEL.

3.0 Design and Installation Assessment

3.1 System Description

Facility Overview - The fuel processing complex at the ICPP was designed to provide fuel reprocessing capability for a variety of government owned and research nuclear reactor fuels. Liquid and gaseous waste generation is concomitant to the fuel reprocessing activities. The CPP-604/605 facility was designed to reduce the volume of and treat the liquid and gaseous waste generated during the course of reprocessing nuclear fuel. The CPP-604 building contains the Process Equipment Waste (PEW) system. This system processes acidic intermediate level radioactive waste streams resulting from the activities of the ICPP. CPP-604 was designed and constructed in the early 1950's to the building, steel, concrete, and piping codes that existed at that time. The industry codes and standards were supplemented by the Atomic Energy Commission specifications.[2] The 604 portion of the CPP-604/605 facility is a reinforced concrete structure, approximately 130 feet long by 75 feet wide and extends 42 feet below grade at its lowest point (see Figure 1).

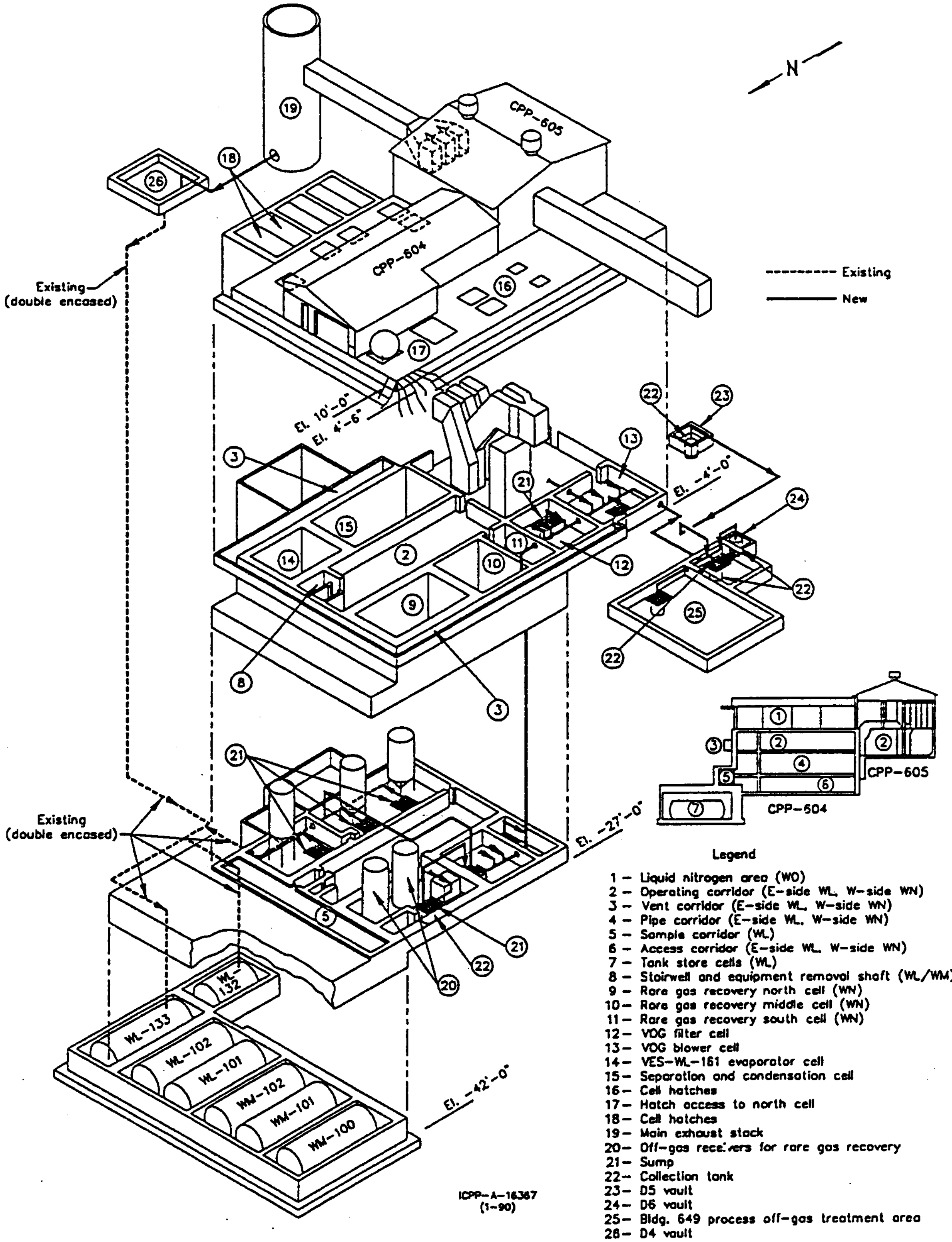

Figure 1 - CPP 604/605 Layout

The interior cells are situated on either side of a central corridor running the full length of the 604 portion of the building. The cell floors and part way up the walls are lined with stainless steel (liquid treatment cells). The liquid treatment cells, along the east side of the building, contain the evaporation equipment used to achieve a volume reduction of the low/intermediate level liquid waste. The PEW Evaporator system and its associated condensate system are located in the respective cells. The gaseous waste treatment cells are located along the west side of the building. At the north end of the building are three liquid waste storage vaults. Two of the vaults are lined with stainless steel while the third vault was backfit with a Hypalon liner. Two of the vaults contain tanks which receive high-level liquid wastes prior to transfer to any of the 300,000 gallon tanks in the Tank Farm. The tanks in the third vault receive the evaporator bottoms waste.

Project Description - This specific project, "Replacement of VES-WL-101" provides a new back-up tank, VES-WL-111, for discharges from the PEW Evaporator System. [3] The new vessel is located within the CPP-604 WL-161 Evaporator Cell. The existing vessel (VES-WL-101) and the new vessel accept gravity feed from PEW evaporators 161 and 129, and from the bottoms tank of the Liquid Effluent Treatment and Disposal system (LET&D). Additional piping allows flow diversion to the collection tank VES-WL-133. Tank effluent is jetted to the Tank Farm. The original design provided for transfers from VES-WL-111 to the Tank Farm through double-contained underground lines via new valve box C-40. Subsequent design changes rerouted the path through existing valve box C-37.[4] Within CPP-604 the existing structure provides secondary containment and leak detection and removal. Associated with the new tank installation are new valves, a demister, piping (process and utility), wall penetrations, instrumentation, and the cathodic protection system which protects the exterior surfaces of the underground portions of the system.

3.1.1 Tankage

The new Process Equipment Waste (PEW) Evaporator System Collection Tank, VES-WL-111 was fabricated from 304L stainless steel in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Part UW, and Appendix 13, Vessels of Noncircular Cross Section.[5] The rectangular tank has nominal dimensions of 12' X 4'8" X 3'6" with design parameters as shown in Table 1.

Table 1 Design Parameters for VES-WL-111

	Design	Operating
Pressure	+15 to -5 psig	-0.2 psig
Temperature	300°F	200°F (max)

A 1/8th inch corrosion allowance was specified for all stainless steel wetted parts. The original tank included flanged penetrations for waste transfers, sampling, sparging, level instrumentation, corrosion probes and access. The vessel nozzles were subsequently modified by the qualified fabricator, Heat Transfer Systems, Inc.,(St. Louis, Mo) to minimize the overall tank profile to accommodate lowering the vessel into the cell.[6]

3.1.2 Piping and Valves

The installation of VES-WL-111 included the installation of new transfer lines, influent and effluent, as well as utility connections, and lines for bypass flow, sampling, decontamination and instrumentation. Table 2 identifies the new lines and associated valves which are covered by the scope of this certification.

Table 2 New Lines Associated with VES-WL-101 Replacement Project

Type	Line No.	Valves/ Jet
Influent	3" PSA-AR-155616 3" PSA-AR-155617	HV-WLE-66 HV-WLE-68 PWLV-WLE-161A
Effluent	1½" PL-AR-152062 1½" PL-AR-155423	HV-WLE-5 HV-WLE -6 HV-WLE -7 HV-WLE -67 HV-WLE -8 HV-WLE -9 PLV-WLE-248 Jet-WL-511 HV-WLE-65
Sample	3/8" PSL-AM-155428	PSLV-WLT-57 PSLV-WLT-63 PSLV-WLT -64.
Bypass	3" PS-AR-155618 3" PS-AR-100603 2" PS-AR-156190	HV-WLE-69 HV-WLE-67 HV-WLE-18
Decon	1" DC-AR-155433	DCV-WLO-413

3.1.2.1 Underground Piping

Two underground transfer lines were installed as part of this project, 1½" PL-AR-152062 and 1½" PL-AR-155423. Both lines are constructed of Schedule 40 stainless steel (304L) and provided with secondary containment (4 in. schedule 40, 304L SS). Additionally, the secondary containment is wrapped with a corrosion resistant coating and connected to the cathodic protection system.

3.2 Regulatory Requirements

The regulatory requirements applicable to the design and installation of new hazardous waste tank systems are 40 CFR 264.192, 264.193, 265.192, and 265.193. In general, the regulations set forth two sets of design requirements. One set pertains to the integrity of the systems and the other set pertains to secondary containment and leak detection.

System Integrity - In order to ensure that hazardous waste tank systems are designed and built in a manner that is protective of human health and the environment, RCRA specifies, in 40 CFR 264.192 and 265.192, a set of criteria against which the system must be assessed. The criteria are used by an independent professional engineer to determine that the " system has sufficient structural strength, compatibility with the wastes and corrosion protection to ensure that it will not collapse, rupture, or fail." The specific criteria include:

- Design standards
- Hazardous characteristics of the waste(s)
- Corrosion protection (if external portions are in contact with soil or water)[a]
- Vehicular traffic, frost heaves, backfill, and floatation (if tank system is located underground)[a]
- Tank foundation
- Installation procedures
- Leak testing for tightness
- Ancillary equipment support

Secondary containment - Specifically dealing with hazardous waste tank systems (including ancillary piping), 40 CFR 264.193 (a) and 265.193(a) state:

[a] This criteria is relevant only for the underground portions of the system, i.e., 1½"-PS-AR-155423 and 1½"-PL-AR-152062.

> In order to prevent the release of hazardous waste, or hazardous constituents to the environment, secondary containment that meets the requirements of this section must be provided...

Two general requirements are outlined in paragraph (b) of the 193 section:

> Secondary containment must be:
>
> 1. Designed, installed, and operated to prevent any migration of wastes, or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system; and
> 2. Capable of detecting and collecting releases and accumulated liquids until the collected material is removed.

To meet the requirements of paragraph (b), specific minimum criteria for secondary containment systems are given in paragraph (c). These can be summarized as follows:

1. Constructed of or lined with materials that are compatible with the wastes such that the structural integrity will not be impaired due to contact with the waste.
2. Placed on a foundation or base capable of providing support to the secondary containment system.
3. Provided with a leak detection system that is designed and operated to detect the failure of the primary or secondary containment.
4. Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills, or precipitation.

3.3 System Assessment

3.3.1 Design Standards

Existing systems - CPP-604 was constructed in the early 1950s to the building, steel, concrete, and piping codes that existed at that time. The industry codes and standards were supplemented by the Atomic Energy Commission specifications (Reference 2). Jetseal is familiar with the design standards applicable to the existing system as well as the performance history of the CPP-604 facility.

New systems - The various design documents (see Appendix A) governing the subject Project reference DOE Order 6430.1A and the DOE-ID Architectural Engineering Standards for the applicable codes and standards. These include other DOE, federal, state, local, and national consensus standards and codes (as developed by such organizations as the American Concrete Institute, American National Standards, American Society of Mechanical Engineers, American Welding Society, etc.) as well as approved Management Control Procedures. The project specifications[7] required the material, workmanship, and testing of the process piping to conform to ANSI/ASME B31.3 Category M requirements. The new vessel was designed, fabricated, tested, and Code stamped in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, Part UW, and Appendix 13, Vessels of Noncircular Cross Section. Jetseal reviewed the design drawings and governing project documents listed in Appendix A and concludes that the design of the VES-WL-101 Replacement Project correctly implements the applicable design standards and that the implemented design standards are adequate to meet the regulatory requirements.

3.3.2 Hazardous Characteristics of the Wastes

Existing systems - When originally designed and built in the 1950's a variety of processing scenarios were anticipated for the ICPP. Consequently the Process Equipment Waste (PEW) system was designed to handle corrosive waste including 3 molar HNO_3, solvent wash streams (caustic), decon solutions, and organics (hexone). This was accomplished by specifying the use of 304L stainless steel for the piping. The system has successfully handled the anticipated wastes over the last forty years.

New system - The low/intermediate level waste to which the new tank system is exposed is generally described as moderate concentrations of nitric acid with over-complexed fluorides and low levels of chlorides. Table 3 provides a detailed listing of the nominal solutions expected to be present in the liquid waste:

Table 3 Nominal Solutions in Liquid Waste[8]

Compound	Amount	Compound	Amount
H^+	1.62 (N)	B	0.076 (g/l)
NO_3^-	2.93 (M)	Cd	trace
Al	0.21 (M)	Ca	trace
Na	0.78 (M)	Cl^-	1.52 (g/l)
K	0.10 (M)	Cr	0.68 (g/l)
F^-	0.17 (M)	Fe	3.02 (g/l)
Zr	trace	SO_4^{-2}	6.82 (g/l)

The selected material of construction for the tank and piping was 304L stainless steel. This selection was based upon laboratory corrosion tests, field corrosion tests, and over 40 years of satisfactory performance of 300 series stainless steel in equivalent waste solutions at the ICPP (see Reference 8). In addition to doubling the corrosion allowance recommended in the material of construction study, the final construction incorporated on-line corrosion monitoring: a Polarization Admittance Instantaneous Rate (PAIR) probe, a Electrical Resistance (ER) probe and corrosion coupons.

Jetseal concludes that the material of construction (304L stainless steel) is compatible with both the existing system and the hazardous waste.

3.3.3 Corrosion Protection

From a regulatory standpoint the purpose of corrosion protection is to minimize the deterioration of the tank system components by the *external* environment such as soil and water. The two underground lines are the only portions of the system to which this discussion applies. Four design features contribute to the protection afforded the underground lines from the corrosive effects of the external environment:

1. Corrosion resistant materials of construction (304L SS)
2. Increased wall thickness of the double containment piping
3. Corrosion resistant wrapping
4. Cathodic protection system

The selection of 304L steel was based on laboratory corrosion tests, field corrosion tests and over 40 years of satisfactory service of 300 series stainless steel in systems handling the subject waste. (see Reference 8) Neither of the underground lines which transfer the waste are in direct contact with soil and water. They are separated from the external environment by the 4" secondary containment. The designed thickness of the secondary containment (Schedule 10) was based upon a conservative corrosion allowance (double that which was recommended in the materials of construction study). Additionally, the installed secondary containment is actually Schedule 40 (double the wall thickness of Schedule 10).[9] As mentioned earlier, the secondary containment piping which is in direct contact with the soil was wrapped with a corrosion resistant coating. The coating was holiday tested in accordance with NACE Standard RP-02-74, "Recommended Practice for High Voltage Electrical Inspection of Pipeline Coatings Prior to Installation". No defects in the coating were detected by the holiday testing.

3.3.3.1 Cathodic Protection

The objective of using cathodic protection is to control the corrosion of metallic surfaces in contact with electrolytes.[10] There are two basic mechanisms by which metals in contact with soil corrodes. One mechanism is called electrolytic corrosion. This corrosion results from stray direct current (DC) from an outside source picked up by metals in the soil. At the point where the current leaves the metal, corrosion occurs. The second mechanism is called galvanic corrosion. It arises from differences in the electrical potential when metal is placed in the soil. The potential differences can develop from various nonuniformities. Examples of such nonuniformities are variations in soil moisture, oxygen concentration, or soil resistivity. When an electrical potential develops, it provides a driving force for the flow of current. A flow of current from one structure to another will corrode the structure that acts as the anode.

The most effective method of protecting metallic surfaces in contact with electrolytes is called active or impressed current cathodic protection. It operates by passing direct current from impressed current anodes installed in the soil adjacent to the underground metallic surfaces to be protected (the cathodes). An external source of power is used to make the protected metal structures cathodic. Corrosion is halted and directed to the anodes which can be designed for a long life and are replaceable. It is possible to prevent the electrolytic corrosion of underground metallic structures indefinitely by this method with proper maintenance and periodic anode replacement. However, if a cathodic system is improperly designed, operated, or maintained corrosion of the "protected" system can be accelerated.

The subject underground piping was tied into the existing cathodic protection system. However, the system is not operating properly and is therefore shutdown. LMITCO is currently in the midst of conducting a feasibility study to determine the scope of the upgrade needed to make the cathodic protection system operational. It is anticipated that the upgrade will not be completed for several years.

Based on the above considerations, Jetseal is compelled to provide a conditional interim certification relative to the corrosion protection. Cathodic protection is one of four design elements affecting the overall corrosion protection. Without cathodic protection the other corrosion protection elements provide sufficient protection from the external environment. However, an unbalanced cathodic protection system has the potential to entirely negate the protection afforded by the other design features. Therefore the certification is conditioned upon the cathodic protection system remaining de-energized (except for brief periods required to determine the scope of the upgrade) and is only valid until the system is upgraded. At that point a cathodic protection test procedure can be conducted. Acceptable results from the test procedure will then allow issuance of an unconditional certification.

3.3.4 Vehicular Traffic, Frost Heaves, Backfill and Floatation

The original design drawings and construction specification as modified by the subsequent ECR's contained provisions affecting the structural integrity of the underground piping installation. Depth of installation, type and placement of backfill, compaction requirements, and tie-point details were included in the design. Based on its review of these design requirements and considering the environs (unsaturated zone) in which the underground piping is placed, Jetseal concludes that the subject piping is adequately protected from the affects of vehicular traffic, will withstand the effects of frost heave, and will not be subject to floatation concerns.

3.3.5 Tank Foundation

Existing systems - As discussed in the *Facility Overview* of Section 3.1, the existing PEW system is housed primarily in the CPP-604 building. The 604 facility is a reinforced concrete structure containing a number of processing cells. Various tanks are located in the respective cells, mounted either on a cell wall or a cell floor. The respective foundations of the tanks of the existing system have maintain the load of a full tank as evidenced by their satisfactory performance to date.

New system - This project included in-cell placement of a new vessel, VES-WL-111. The existing Evaporator Cell floor provides the foundation for the new tank. Anchorage to the foundation was accomplished with 3/4" Hilti Kwik-Bolt II's (four on the east side and two on the west side) embedded a minimum of 6 inches.

Jetseal has reviewed the pertinent engineering design and analysis records as well as the related installation and inspection records. Based on that review and in consideration of the performance of the existing building structure as a foundation for existing tanks, Jetseal concludes that the foundation system has sufficient structural strength.

3.3.6 Installation Procedures, Leak Testing, and Ancillary Equipment Support

Existing system - Based on the satisfactory performance history of the CPP-604 facility and the foregoing discussion of design and construction standards no supplementary description is warranted for these topics.

New system - Jetseal reviewed the protocols for welding, leak testing, and inspection as set forth in the specifications (Reference 7) and implementing project documents. The specified procedures and methods for installation, inspection, and leak testing are adequate to ensure proper seams and connections and leak tightness of the system.

Regarding ancillary equipment support, the potential seismic effect was taken into consideration in designing the piping system. The piping is anchored to cell walls and ceilings using either existing structures or newly installed pipe supports. There are four basic types of pipe anchors and support designs as detailed in the design drawings. Jetseal reviewed the engineering analysis of the original design as well as the updated analysis that reflected the as-built condition.[11,12] Based on these reviews and the satisfactory performance of the existing structure to date, Jetseal concludes that the ancillary equipment is supported such that it will not collapse, rupture or fail during normal operation.

3.4 Secondary Containment Assessment

Secondary containment for all components of this project, except the underground lines, is provided via existing structures. This summary description is provided for the existing system to support the ultimate conclusion that the new system is capable of handling hazardous waste without release to the environment for the intended life of the system.

<u>Existing System</u> - As illustrated in Figure 1 secondary containment is accomplished via existing lined cells and corridors. Some of the cells were originally constructed with stainless steel liners over the entire floor and extending from the floor up the surrounding walls from 6 to 18 inches. In the early 1990's those portions of the existing structures which were needed for secondary containment but were not lined with stainless steel (e.g. Operating Corridor and Piping Corridor) were backfit with new liners. These new liners were constructed of chemical resistant epoxy, using the #3500 system material manufactured by Keeler and Long. The epoxy coating was applied to the entire floor surface and up to a three foot height on the adjoining walls. All of the lined secondary containments are designed with relatively smooth floor surfaces sloping towards a stainless steel sump. The overall secondary containment system has previously been evaluated in detail (general design, type of secondary containment, design capacity, runoff diversion, foundation, liner, and leak detection) and found to be compatible with the waste, adequately supported,

equipped with leak detection capabilities and the ability to remove any detected leakage. Certifications in support of these conclusions are on file with the owner/operator.[13,14] The liner in the Evaporator Cell where the new tank is installed is described in Reference 14 as follows:

> The floor and lower walls of the four cells and hallway are lined with stainless steel (Reference 5a and f and visual inspection). The minimum height of the wall liner is six inches. Reference 5a specifies #11 gage stainless steel sheet, while Reference 5f specifies 10 gage stainless steel. Both drawings show all seams are welded. Reference 5f shows sealant at the top of the wall liner to prevent liquid penetration behind the liner. The floors of the cells are designed to drain liquid to stainless steel sumps...
>
> **REFERENCES**
>
> 5. Drawings
>
> a) 542-41-F1760 Liquid Evaporation Room-S.S. Floor & Wall Lining, July 1951
>
> f) 158768 CPP-604 Condensate Cell Floor Liner, January 1979.

New System - The only new secondary containment installation was associated with the underground transfer piping (1½" PL-AR-152062 and 1½" PL-AR-155423). In addition to assessing this new secondary containment, this section also addresses modifications affecting the existing secondary containment to ensure the existing capabilities were not compromised.

Secondary containment for the subject underground transfer lines is of the "double-walled piping" variety. The outer pipe provides secondary containment for the inner waste transfer piping. For this installation the secondary containment (4 in. Schedule 40, 304L stainless steel) is constructed of the same material as the 1½ inch interior process piping. It is designed with the capacity to contain all the potentially released liquid should the interior pipe fail. The secondary containment pipe is welded to stainless steel sleeves that penetrate the respective cell or valve box walls and extends 2-6 inches into the interior of the structure. Thus a continual secondary containment barrier is formed which prevents run-on or infiltration of precipitation into the secondary containment. Since the slope is towards Valve Box C-37 this continuous barrier allows leak detection and accumulated liquid transfers via the existing secondary containment for the valve box.[15] As discussed in Section 3.3.4, the design requirements resulted in a solid base and cover that is capable of providing support to the secondary containment system.

Anchoring the new vessel to the floor of the Evaporator Cell required penetrating through the existing cell liner. To restore the integrity of the liner the design included seal welding around the penetrations followed by vacuum box testing.

Based on the above considerations Jetseal concludes that the new secondary containment installed as part of the VES-WL-111 Project as designed and installed will prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater or surface water. By virtue of the designed slope to the valve box, any accumulated liquid in the secondary containment would flow directly to the existing secondary containment in the valve box where it would be detected and dealt with in accordance with established plant operating procedures.

3.5 Installation and Inspection

Relative to proper installation and inspection, Jetseal reviewed and evaluated the following:

1. Installation and inspection protocols and procedures,
2. Qualifications of the constructors,
3. Installation and inspection records, and
4. Personally observed the completed work.

3.5.1 Protocols and Procedures

This project was initiated while Westinghouse Idaho Nuclear Corporation (WINCO) was the operating contractor of the ICPP and continued under LITCO and LMITCO. As required and outlined in WINCO and LITCO/LMITCO procedures, management of the project and performance of the construction activity are governed by overall Quality Program Plans and specific QI procedures. These procedures cover such activities as receipt and control of material, welding, installation control, leak testing, instrument calibration, maintaining personnel qualifications, etc. Based on a review of selected procedures and an overall familiarity with the established procedures and protocols in effect at the ICPP, Jetseal concludes that WINCO's, LITCO's and LMITCO's installation and inspection protocols were adequate to ensure that the completed installation is in accordance with the approved design documents.

3.5.2 Constructor Qualifications

The initial construction under WINCO was performed by "MK Force Account" with subsequent construction by LITCO/LMITCO Construction Services (LCS). Although management changed when the operating contract changed from WINCO to LITCO the pool of craftsmen remained the same. This is also true for the underground piping work. Although it was done for this project by the HLWTF Project the actual work was performed by "Force Account" pool of personnel. Jetseal reviewed the relevant documents referred to in Section 3.5.1 to confirm the overall qualification of the "Force Account" pool of craftsmen. Jetseal confirmed through review of the Vender Data submittals and installation records that all welds were performed by qualified welders.

3.5.3 Installation and Inspection Records

Concurrent with the final inspection documentation review by LMITCO QA and Project personnel, Jetseal reviewed the Weld History Record Packages, Leak Testing Examination Reports, Test Data Sheets and other applicable installation and inspection records. The Weld History Record Packages included both the weld records and inspection records for the respective new lines. Based on these reviews Jetseal concludes that the work was satisfactorily performed.

3.5.4 Personal Observations

Due to the restricted access to the work areas and to minimize personnel exposure to radiation, LMITCO installed video cameras for remotely viewing the construction area in the Evaporator Cell. Jetseal personnel viewed the completed construction in the Evaporator Cell in conjunction with the reviews described in Section 3.5.3. This review was in lieu of on-site surveillance of the work and provided independent verification of satisfactory completion of the subject work.

4.0 Conclusions and Attestation

Jetseal reviewed the applicable portions of the documents listed in Appendix A, the References Section and described throughout Section 3.0 which pertain to the design and installation of the "Replacement of VES-WL-101 Project" (VES-WL-111 Installation). Based on this assessment, Jetseal concludes that VES-WL-111 was designed and installed properly and meets the regulatory requirements of Federal regulation 40 CFR 264.192, 264.193, 265.192, and 265.193, and the Idaho rules, regulations and standards for hazardous waste.

5.0 Conditions of Attestation

Although an assessment of other systems was included in this document, this certification is limited to the actual "new systems" as described in Section 3.0. Jetseal's assessments and conclusions regarding the adequacy of the design and installation were strictly based on environmental regulatory requirements and this certification should not be construed as a warranty of the subject work.

The certification of the underground portions of the Project is provided as an interim certification and is conditioned upon the cathodic protection system remaining de-energized. Temporary short-term activation of the cathodic protection system is allowed for determining the scope of the upgrade required to make the system operational. Once the cathodic protection system is upgraded and operational a cathodic protection test procedure can be conducted. Acceptable results from the test procedure will then allow issuance of an unconditional certification to supersede this interim certification.

References

1. *Independent Engineering Assessment for WINCO Intermediate Level Waste Storage Tanks WL-101 and WL-102*, EBASCO Services, November 1990.

2. Phillips Petroleum Company, Chemical Processing Plant, Engineering Standards, CPP Development and History, CPP-ES 01.04 (1958).

3. Design Criteria for Design of Replacement for WL-101 (CE-EW-92-02), Richard L. Jones, October 18, 1993.

4. CID 37 R-1, as incorporated by Engineering Change Request No. 99428-10, dated 1/3/96.

5. WINCO SPEC. NO. 99428-GFE-1, "Process Equipment Waste (PEW) Evaporator System Collection Tank VES-WL-111", December 17, 1993 (with addendums 1,2, & 3).

6. Addenda 1 through 3 (modified) of Specification 99428-GFE-1, RLJ-07-95, July 28, 1995.

7. A-E Construction Specification for Replacement of VES-WL-101 Project, Subcontract No. S-299428, EG&G Idaho, A-ECS - 40738, March 16, 1994.

8. Letter from B.C. Norby to R.L. Jones, "Recommended Materials of Construction for VES-WL-101 Replacement", BCN-8-93, dated August 19, 1993.

9. ECR No. 99428-10, CID 38, "4" Secondary Containment Piping from 604 to C-37, Various Modifications", dated 1/3/96.

10. NACE Standard RP-01-69 (1983 Revision), "Control of External Corrosion on Underground or Submerged Metallic Piping Systems", National Association of Corrosion Engineers, Houston, Texas.

11. *Piping Analysis and Support Design,* Replacement of VES-WL-101 Project, EDF Serial No. 0216, 10/93.

12. *Piping Re-Analysis of As-Built Conditions,* Replacement of VES-WL-101 Project, EDF Serial No. 0610, 2/21/97.

13. *Certification Document for the Design and Installation of the PWL Collection System, Idaho Chemical Processing Plant, Buildings CPP-604, 605, 649 & 708*, ETAS Corporation, April 18, 1991.

14. *Certification Document for the Repair of the Stainless Steel Liner in Building CPP-604 North Evaporator Cell, Evaporator Feed Pump Cell, WL-129 Evaporator Cell, Separation and Condensation Cell, and Adjacent Hallway*, ETAS Corporation, March 2, 1994.

15. *Certification Document for the High Level Waste Tank Farm Replacement Project - Upgrades*, ETAS Corporation, April 10, 1996.

APPENDIX A

PROJECT DOCUMENTS

1. *Design Criteria for Design of Replacement for WL-101*, Revision 0, Richard L. Jones, October 18, 1993.

2. *Process Equipment Waste (PEW) Evaporator System Collection Tank VES-WL-111*, A-E Procurement Specification, WINCO SPEC. NO. 99428-GFE-1, December 17, 1993.

3. LITCO Letter RLJ-07-95, *Manufacture of WL-101 Replacement Vessel, Final Vessel Modifications,* from R.L. Jones to Mr. Hiren Yagnik, Heat Transfer Systems, Inc., dated July 28, 1995.

4. *Replacement of VES-WL-101 Project,* A-E Construction Specification, A-ECS - 40738, March 16, 1994.

5. *Piping Analysis and Support Design,* Replacement of VES-WL-101 Project, EDF Serial No. 0216, 10/93.

6. *Piping Re-Analysis of As-Built Conditions,* Replacement of VES-WL-101 Project, EDF Serial No. 0610, 2/21/97.

7. Letter from B.C. Norby to R.L. Jones, *Recommended Materials of Construction for VES-WL-101 Replacement*, BCN-8-93, dated August 19, 1993.

8. *Vendor Data Report by Selected Vendor Submittal Number,* for VES-WL-101 Replacement Project, April 9, 1997.

9. Inspector Certification Status List dated 03/31/97.

Drawing No.	A-E Sht. No.	Drawing Title
178986	T-1	Site Map, Area Map and Drawing Index
178987	P-1	Legend
178988	P-2	Demolition and Preparatory Piping Plan
178989	P-3	P & I D
178990	P-4	Yard Plans and Sections
178991	P-5	Cell Plans
178992	P-6	Sections and Details
178993	P-7	Sections
178994	P-8	Details
178995	P-9	Details
178996	P-10	Pipe Index and Details
178997	E-1	Bldg. 604 Plans
178998	E-2	Enlarged Plans
178999	E-3	Sections
179000	IN-1	Loop Diagram
179001	IN-2	Loop Diagram
179112	IN-3	Loop Diagram
179003	IN-4	Loop Diagram
179004	IN-5	Loop Diagram

Engineering Change Requests

ECR No.	Date	Design Change Description
99428-1	9/1/94	CID 6 - Minor Design Changes, VDS Change & Valve Packaging
		CID 8 - Use of SW Coupling/Reducer on 3" PS-AR-155618
99428-2	9/1/94	CID 1 - SST Pipe and Fittings
		CID 2 - Added Isolation Valves (70 & 248) and LET&D Tie-in Point; changed discharge line size from 2" to 1.5"
		CID 3 - Approves using 1" valve for HV-WLE-5
		CID 4 - Electrical Conduit Size
		CID 5 - change 3/8" to 1/2" for PSL-AR-155428
		CID 7 - Structural Welding
		CID 9 - Rerouted Discharge lines
99428-3	9/1/94	Hookup of 100# air to actuate the new WL-161A shutoff valve
99428-4	9/1/94	Wedge Flange for WL-161A Valve
99428-5	9/1/94	Rerouting of Evaporator and LET&D lines; addition of WL-161A Valve
99428-6	9/1/94	SW between 4" PWL-1133C and PS-AR-155618
99428-7	11/30/94	100# Air CID 18 - Solenoid power source,
99428-9	4/3/95	CID 11 - Relocate Steam Tie-ins, Sample Corridor, and Add Double valves
		12 - Weld Procedure for CS steam tie-in
		13 - DSC cable
		14 - Cadweld
		15 - Conduit & wire size
		16R-1 - Rerouting of discharge lines
		17 - Conduit sizes
		27 - K-plug
		27R-1 - K-plug
		28 - Reroute decon line, testing in-cell
		29 - Added ASTM A182 to Specification
		30 - CS/SS Transition
		30R-1 - CS/CS Weld Procedure
99428-10	1/3/96	CID 34 - Coredrill of existing K-plug
		35 - DCS power
		36 - Instrumentation designations
		37R-1 - Routing of Discharge lines to Valve Box C37
		38 - 4" secondary containment (various modifications)
		39 - Changed Sch 80 to Sch 40 for discharge piping
		41 - Pipe supports for double containment piping
		42 - Liquid penetrant exam clarified
99428-11	12/3/96	CID 44 - Use of Tank Farm Inspection
		45 - Piping interference between C-37 and 604
		46 - Socket weld approval
		47 - Design pressure for 4" containment piping
		48 - Cathodic protection
		49/49a - Replacement tank shim requirements
		50 - Leak testing
		51 - 1/4" tubing to RCV-WL-161B
		52 - VES-WL-111 flange installation
		54 - Vessel cleaning
		59 - Corrosion coupons
		60 - 24" gasket for VES-WL-111
		61 - Corrosion coupon
		62/62a - Replace section of 1" PWL-2131C
		63 - Allow use of SCH 40 3/8" for instrument probe

		64 - Valve ID 65 - Approved socket welds for in-cell tie-in points 68 - TE-WL-511 69 - Reroute 1½" PL-AR-155423 70 - Material for vessel shims 72 - Additional shim plate for west end of vessel
99428-12	5/28/97	CID 73 - Seal weld elimination for vessel shim 77 - SW in jet discharge line 78 - SW on 3" PSA-100603 79 - T/C Installation 80 - Corrosion probes 81 - Instrument flange connection 84 - Pipe support modifications 86a - No vacuum box test in jet suction line 90a/b/c/d - Actuators for valves 66,67,68,69 93 - Location of corrosion probe 95 - Revise wire type 98 - Sample line tie-in 99 - Sample line components 100 - Cabling and position indicators for WLE-7, -9 103 - Corrosion Probe and change RCV-WL-161A to PWLV-WLE-161A 104 - DCS terminations for HV-WLE-7
99428-13		CID 105 - Add actuators to LET&D isolation valves (70 & 248) 106 - 2 new isolation valves (HSV-WLT-686, -687)

LET&D FACILITY

CERTIFICATION DOCUMENT

FOR

THE DESIGN AND INSTALLATION OF

THE LIQUID EFFLUENT TREATMENT AND DISPOSAL SYSTEM

Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

Prepared For:

Westinghouse Idaho Nuclear Company, Inc.
Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

April 1992

Fluor Daniel Inc.
Irvine, California

CERTIFICATION OF THE DESIGN AND INSTALLATION OF LIQUID EFFLUENT TREATMENT AND DISPOSAL SYSTEM

Idaho Chemical Process Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

The attached report entitled "Certification Document for the Design and Installation of the Liquid Effluent Treatment and Disposal System, Idaho Chemical Processing Plant, Idaho National Engineering Laboratory, Idaho Falls, Idaho" dated April 1992 serves as the basis for this certification which is required under 40 CFR 264.192.

The certification provided herein by Fluor Daniel, Inc. is limited to the new Liquid Effluent Treatment and Disposal (LET&D) System. This certification does not include the existing facilities which provide feed to the LET&D system, nor the existing facilities which accept product or waste streams from the LET&D system.

Based on our review of the LET&D System, our opinion is that the tank system has sufficient structural integrity and is acceptable for the storage and treatment of hazardous waste. In our opinion, the foundations, structural supports, seams, connections, and pressure controls are adequately designed and the tank system has sufficient structural strength, compatibility with the wastes to be stored and treated, and corrosion protection to ensure that the system will not collapse, rupture, or fail.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

FLUOR DANIEL, INC.

Michael J. Hickey, P.E., Lead Engineer | Date 4/3/92

PROFESSIONAL ENGINEER
REGISTERED
6808
STATE OF IDAHO
MICHAEL J. HICKEY

Document Preparation and Peer Review

This RCRA Certification Document for the Liquid Effluent Treatment and Disposal System was prepared under the supervision of Mr. Michael J. Hickey, P.E. This document was prepared by a team of professionals from Fluor Daniel's Irvine, California and Denver, Colorado offices. The following individuals participated in the preparation and peer review of this certification document:

Michael J. Hickey, P.E., Lead Engineer — Date: 4/3/92

Robert D. Bromm, P.E., Mechanical Engineer — Date: 4/2/92

Richard M. Drake, P.E., Civil/Structural Engineer — Date: 4/2/92

Ronald E. Gregg, Environmental Director — Date: 4/2/92

Donald J. Hanny, Chemical/Process Engineer — Date: 4/2/92

William Holub, Quality Assurance Engineer — Date: 4/2/92

Donald L. Walker, Project Manager — Date: 4-2-92

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ACRONYMS/ABBREVIATIONS

ACI	-	American Concrete Institute
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standards Institute
API	-	American Petroleum Institute
ASME	-	American Society of Mechanical Engineers
ASNT	-	American Society of Nondestructive Testing
ASTM		American Society for Testing and Materials
AWS	-	American Welding Society
B.S.	-	Bachelor of Science
CC	-	Construction Component (Test)
CFR	-	Code of Federal Regulations
CID	-	Construction Interface Drawing
CPP	-	Chemical Processing Plant
DCN	-	Design Change Notice
DCS	-	Distributed Control System
DOE	-	U.S. Department of Energy
EPA	-	U.S. Environmental Protection Agency
ft	-	Feet
GFE	-	Government Furnished Equipment
gph	-	gallons per hour
HEPA	-	High Efficiency Particulate Air
HVAC	-	Heating, Ventilation and Air Conditioning
ICBO	-	International Conference of Building Officials
ICPP	-	Idaho Chemical Processing Plant
INEL	-	Idaho National Engineering Laboratory
ksi	-	kips per square inch
LET&D	-	Liquid Effluent Treatment and Disposal
mph	-	Miles Per Hour
M.S.	-	Master of Science
NWCF	-	New Waste Calcining Facility
O&M	-	Operations and Maintenance
OBE	-	Operating Basis Earthquake
PARs	-	Procurement Activity Reports
PEW	-	Process Equipment Waste
psf	-	Pounds Per Square Foot
psi	-	Pounds Per Square Inch
QA	-	Quality Assurance
RCRA	-	Resource Conservation and Recovery Act
SO	-	System Operation (Test)
WINCO	-	Westinghouse Idaho Nuclear Company
304L SS	-	304 L Stainless Steel

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) is the owner of the Idaho National Engineering Laboratory (INEL) and Westinghouse Idaho Nuclear Company (WINCO) will be the operator of the Liquid Effluent Treatment and Disposal (LET&D) facility. Fluor Daniel, Inc. was retained by the U.S. DOE under the Idaho Miscellaneous A-E Projects DOE Contract DE-AC07-84ID12401, Modification No. A172 to perform design, installation and testing certifications in accordance with 40 CFR 264.192 for the new LET&D facility. This work was awarded to Fluor Daniel in August, 1991. Fluor Daniel assembled a team of engineering professionals under the direction of a registered professional engineer to perform the certification activities. Fluor Daniel prepared a project execution plan and schedule, conducted a planning meeting with WINCO and held a project kick-off meeting with the project technical staff. LET&D drawings, specifications, procedures, calculations, and reports were assembled and reviewed. Construction and Quality Assurance (QA) records were reviewed and the qualifications of construction personnel such as welders and inspectors were evaluated. Interviews were conducted with on-site personnel and registered professional engineers from various disciplines visually inspected the LET&D facility. These work activities were checked against the requirements of 40 CFR 264.192 in order to develop this RCRA certification document for the LET&D facility.

The LET&D facility is a self-contained facility that treats and recycles a radiologically and hazardous waste contaminated aqueous overhead stream (dilute nitric acid) from the existing Process Equipment Waste (PEW) evaporators. The facility is housed in Building CPP-1618 of the Idaho Chemical Processing Plant (ICPP) at the INEL near Idaho Falls, Idaho. Dilute nitric acid feed, pumped from existing storage tanks in Building CPP-604, is processed in the facility. The effluent streams from the facility are comprised of water vapor (steam) which is vented to the atmosphere and concentrated nitric acid product which is transferred to existing storage tanks VES-WL-101 or VES-WL-133 in CPP-604 or VES-NCR-171 in CPP-659/NWCF (Future). The facility includes two separate trains each with a fractionation column, reboiler, bottoms cooler, overheads condenser, liquid-vapor separator, superheater, High Efficiency Particulate Air (HEPA) filter and vapor blower; and a common feed tank, product bottoms tank, associated piping, instrumentation, and valves.

Radiologically and hazardous waste contaminated material is contained within building cells constructed with concrete walls, floors, and ceilings. The floors and walls of each cell are lined with type 304L SS up to a height of three feet. The balance of the walls and ceiling is epoxy-coated concrete. The cells serve as secondary containment for the piping and equipment containing the contaminated feed and process solutions. Should leaks occur inside any primary containment, the leakage will flow to a type 304L SS lined floor sump and subsequently can be steam jetted to the product bottoms tank or back to the waste tanks in CPP-604.

The design of the LET&D facility was performed by Fluor Daniel under a contract for the DOE (Miscellaneous A-E Projects, DOE Contract DE-AC07-84ID12401). Fluor Daniel's scope of work relative to the LET&D facility included initial feasibility studies (initiated on December 20, 1984), Conceptual Design, Title I Design, Title II Design, Title II Follow-on, and Testing and Start-up support (concluding December 31, 1991).

Technical direction for design was provided by WINCO, the Operations and Maintenance (O&M) contractor for the ICPP. The design criteria and requirements were set forth in document 82-D-136, Revision 1, Design Criteria for the Liquid Effluent Treatment and Disposal Facility, September, 1987 by WINCO's Project Engineer, Mr. M.L. Gates in September, 1987. Based on these requirements, the Title II design was initiated. The Title II engineering design was prepared under the direction of Mr. S. Marchetti of Fluor Daniel, and approved by WINCO's Manager of Projects, Mr. F. C. Cowart.

The DOE Project Manager responsible for the LET&D facility project during Title II design was Mr. B.G. Edgerton.

2.0 CERTIFICATION TEAM

The LET&D RCRA Certification has been prepared under the direction and supervision of Mr. Michael J. Hickey, P.E. Mr. Hickey holds a bachelor's degree in Civil Engineering, is a registered professional engineer in eight states, including Idaho, and has over 15 years of environmental and engineering management experience. Mr. Hickey has been involved in numerous RCRA and CERCLA projects and he is knowledgeable of the RCRA regulatory requirements. Technical specialists assisting Mr. Hickey in the RCRA certification activities were Messrs. Robert Bromm, P.E., Richard Drake, P.E., William Holub, Donald Hanny, and Ronald Gregg. Mr. Bromm is a mechanical engineer with over 18 years of design experience; Mr. Drake is a civil/structural engineer with over 17 years of design experience; Mr. Holub is a QA engineer with over 25 years of experience; and Mr. Hanny is a chemical process engineer with over 23 years of chemical process design experience. Mr. Gregg is a regulatory specialist within Fluor Daniel and provided project planning and regulatory assistance as well as regulatory conformance review of the certification. Project management was provided by Mr. Donald Walker, an Environmental Project Manager with Fluor Daniel.

3.0 DESCRIPTION OF THE LET&D FACILITY AND CERTIFIED COMPONENT

The LET&D facility will treat and dispose of the overhead streams from the existing PEW evaporators. The process includes acid fractionation which concentrates the liquid waste and HEPA filtration that vents the overhead vapor in an environmentally acceptable manner. The concentrated nitric acid bottoms stream is recovered and used in existing ICPP operations or further processed as waste. Two parallel operating trains are provided to treat acid waste at feed rates of 275 gph to 550 gph either independently or simultaneously. The fractionators are designed to remove at least 99% of the nitric acid in the feed stream from the overhead vapor stream and 99.9% of the nonvolatile radionuclides from the feed stream. The feed is treated with aluminum nitrate solution prior to processing to complex fluoride ions in the feed for corrosion control purposes and to ensure that the fluoride remains in the column's bottoms product.

Low concentration contaminated nitric acid is fed into the fractionating column operating under vacuum to produce a very low-acid vapor overhead stream and a high-acid liquid bottoms stream. The overhead stream, which is essentially water vapor, is superheated and filtered through two stages of HEPA filters. A blower downstream of the filters transfers the superheated vapor to the existing main ICPP stack. Hot air is mixed with the superheated vapor at the base of the stack to ensure that condensation does not occur in the stack. Hot air is also used to preheat the system prior to operation and to maintain the standby process train at operating temperature. This permits the standby train to be brought on-line quickly should the primary train fail. The hot air is also used to purge and dry the system prior to shutdown.

The LET&D system receives and processes a nitric acid waste stream of approximately 0.02 molar to 0.25 molar nitric acid from various on-site processes at the ICPP. The function of the LET&D facility is to use chemical separation technology (fractionation) in order to extract water from the waste stream. The product of this separation process is a stream of approximately 12 molar nitric acid which is recovered and reused in various ICPP processes or further processed as waste. Since the feedstock to the LET&D process is a process waste stream and meets the definition of a corrosive waste under 40 CFR 261.22, the LET&D process engages in the treatment of hazardous wastes under RCRA. Therefore, the LET&D process is regulated under 40 CFR Part 264 - Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities and 40 CFR Part 270 - EPA Administered Permit Programs: The Hazardous Waste Permit Program. The LET&D process uses tanks, vessels, piping and other equipment to treat hazardous wastes and the process is, therefore, specifically regulated under 40 CFR 264 Subpart J – Tank Systems. Subpart J regulates the design, installation, testing, inspection, operation, leak response, and closure of hazardous waste tank systems. Section 264.192(a) of Subpart J requires a Professional Engineer's certification of the LET&D system which is the purpose of this document.

Other sections of 40 CFR 264 contain regulations applicable to the LET&D process under RCRA. These regulations include items such as waste analyses, security, facility inspections, personnel training, preparedness and prevention, contingency plan and emergency procedures, and closure requirements. Regulations relating to the Part A and Part B Permit Applications are contained in 40 CFR 270. This RCRA certification becomes part of the facility RCRA Permit and must be retained on file at the facility and be available for inspection by the cognizant regulatory agency.

4.0 DESIGN ASSESSMENT

4.1 Design Assessment Approach

This design assessment covers the new LET&D facility located at the INEL near Idaho Falls, Idaho. In order to conduct this design assessment, Fluor Daniel assembled and reviewed drawings, calculations and specifications related to the LET&D facility. A site visit was conducted and the facility was visually inspected. Primary containment features of the LET&D facility include tanks, vessels, heat exchangers, piping, valves, fittings, Heating, Ventilation and Air Conditioning (HVAC) exhaust blowers, filters, ductwork and other equipment. Secondary containment features include stainless steel-lined floors (cells), piping troughs, leak containment sumps, and other features.

4.2 Regulatory Requirements

Regulatory requirements to ensure the proper design of hazardous waste tank systems are contained within 40 CFR 264.192, Design and Installation of New Tank Systems or Components and 40 CFR 264.193, Containment and Detection of Releases. The design and integrity of tank systems are regulated under 40 CFR 264.192, and 40 CFR 264.193 regulates the design and integrity of secondary containment and leak detection systems. The design certification requirements are contained within 40 CFR 264.192(a) and 40 CFR 264.192(g). These citations are as follows:

> 40 CFR 264.192
>
> (a) Owners or operators of new tank systems or components must obtain and submit to the Regional Administrator, at time of submittal of Part B information, a written assessment, reviewed and certified by an independent, qualified registered professional engineer, in accordance with § 270.11(d), attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

(g) The owner or operator must obtain and keep on file at the facility written statements by those persons required to certify the design of the tank system and supervise the installation of the tank system in accordance with the requirements of paragraphs (b) through (f) of this section, that attest that the tank system was properly designed and installed and that repairs, pursuant to paragraphs (b) and (d) of this section, were performed. These written statements must also include the certification statement as required in § 270.11(d) of this chapter.

The design assessment must include the following information, as applicable:

Design Standards: Design standards according to which the tanks and the ancillary equipment are constructed [40 CFR 264.192(a)(1)]

Waste Characteristics: Hazardous characteristics of the wastes to be handled [40 CFR 264.192(a)(2)]

Corrosion Protection: For tank systems or components where external components or shells are in contact with soils or water, a corrosion expert must evaluate and certify the corrosion protection system [40 CFR 264.192(a)(3) and 40 CFR 264.192(f)]

Vehicular Traffic Protection: Design measures that will protect the tank system against potential damage [40 CFR 264.192(a)(4)]

Tank Foundation: Foundations must be designed to maintain the load of a full tank [40 CFR 264.192(a)(5)(i)]

Structural Support: Tank systems must be anchored to prevent flotation or dislodgement from groundwater, seismic events or frost heave [40 CFR 264.192(a)(5)(ii) and (iii)]

Backfill: Tank systems and components that are placed underground must be provided with properly prepared and compacted backfill materials [40 CFR 264.192(c)]

Ancillary Equipment Support and Protection: Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction [40 CFR 264.192(e)]

The design and installation of secondary containment systems and leak detection systems are regulated under 40 CFR 264.193. The secondary containment systems must be designed, installed and operated to prevent any migration of wastes or accumulated liquids from the system to the soil, groundwater or surface water during the use of the tank system and be capable of detecting and accumulating released liquids [40 CFR 264.193(b)(1) and (2)]. In order to meet these requirements, the design assessment for the secondary containment systems must include the following information:

Type of Secondary Containment for Tanks: Secondary containment for tanks must consist of a liner, vault, double-walled tank, or an equivalent device [40 CFR 264.193(d)]

Types of Secondary Containment for Ancillary Equipment: Ancillary equipment must be provided with secondary containment; examples of which include trenches, jacketing, and double-walled piping; except for (1) aboveground piping, (2) welded flanges, joints and connections, (3) sealless or magnetic coupling pumps and sealless valves, and (4) pressurized above-ground piping systems with automatic shut-off devices (e.g., excess flow check valves, flow metering shutdown devices, or loss of pressure-actuated shut-off devices) that are visually inspected for leaks on a daily basis [40 CFR 264.193(f)]

Design Capacity: The secondary containment system must be capable of containing 100% of the capacity of the largest tank within the containment boundary [40 CFR 264.193(e)(1)(i), (e)(2)(i) and (e)(3)(i)]

Liner Materials: Materials used to construct secondary containment must be compatible with the wastes to be placed within the tanks [40 CFR 264.193(c)(1)], must be free of gaps and cracks [40 CFR 264.193(e)(1)(iii)] and must prevent waste migration from the liner and into the concrete [40 CFR 264.193(e)(2)(iii) and (iv)]

Secondary Containment Failure Prevention: Secondary containment systems must have sufficient strength and thickness to prevent failure owing to pressure gradients, waste contact, climatic conditions, and the stress of daily operations [40 CFR 264.193(c)(1)]

Foundations: Secondary containment must be placed on a foundation or base capable of providing support to the secondary containment system, resistant to pressure gradients and capable of preventing failure due to settlement, compression or uplift [40 CFR 264.193(c)(2)]

Leak Detection: Secondary containment systems must be provided with leak detection designed to detect a release within 24 hours of a release [40 CFR 264.193(b)(2) and 40 CFR 264.193(c)(3)]

Release Containment and Removal: Secondary containment systems must be sloped or otherwise designed or operated to drain and remove liquids from leaks, spills or precipitation. Spilled or leaked waste must be removed from the secondary containment within 24 hours, or in a timely manner [40 CFR 264.193(c)(4)], and must be designed to completely surround the tank [40 CFR 264.193(e)(1)(iv)]

Run-On Diversion/Moisture Barrier: Secondary containment systems must be designed or operated to prevent run-on or infiltration of precipitation and be provided with an exterior moisture barrier or be otherwise designed or operated to prevent moisture migration [40 CFR 264.193(e)(1)(ii), (e)(2)(ii), and (e)(2)(vi)]

4.3 Potential Process Fluids

The feed stream to the LET&D facility is 0.02 molar to 0.25 molar nitric acid with radiological and chemical contaminants shown in Table 4-1. The system also has the capability of adding aluminum nitrate solution for corrosion control to the feed tank or injecting this solution into the fractionator reflux lines. The effluent process streams are overhead vapor (saturated steam) and fractionator bottoms product which is 10 to 12 molar nitric acid containing the radionuclides and chemicals specified in Table 4-1.

TABLE 4-1

ACID FRACTIONATOR DESIGN BASIS FEED COMPOSITIONS

COMPONENT	CONCENTRATION
HNO_3	0.02-0.25 M
F	10-20-mg/ℓ
Cl	35 mg/ℓ
SO_4	2.25 mg/ℓ
Hg	1.5 mg/ℓ
Cd	<0.02 mg/ℓ
H-3	1.4E-2* - 7.4E-2 mCi/ℓ
I-129	4.8E-6 - 1.7E-5 mCi/ℓ
Sr-90	4.4E-6 - 9.2E-5 mCi/ℓ
Zr-95	1.6E-8 - 3.6E-6 mCi/ℓ
Nb-95	1.9E-8 - 5E-6 mCi/ℓ
Ru-106	3.1E-6 - 3.3E-5 mCi/ℓ
Sb-125	4.9E-7 - 5E-5 mCi/ℓ
Cs-134	1.1E-6 - 5E-6 mCi/ℓ
Cs-137	5.1E-6 - 4E-5 mCi/ℓ
Ce-144	2.3E-6 - 3.6E-5 mCi/ℓ
Pu(total)	7E-7 - 4E-6 mCi/ℓ
TBP	10-19 mg/ℓ
Hexone	0-400 mg/ℓ

* $1.4E\text{-}2 = 1.4 \times 10^{-2}$

4.4 Structural Integrity Assessment

Fluor Daniel identified, located, assembled and reviewed the necessary drawings, specifications and supporting calculations to facilitate the structural integrity assessment. The original as-built drawings, copies of the contract specifications and copies of the supporting calculations are stored in a readily retrievable manner by the operating contractor (WINCO).

4.4.1 Design Standards

The LET&D tank systems and components were designed in accordance with the following design criteria:

- DOE Order 6430.1, "General Design Criteria Manual", December 12, 1987.
- DOE-ID Architectural Engineering Standards, Revision 7, February, 1987.

These design criteria reference and incorporate the following industry standards applicable to the design of the LET&D tank systems and components:

- ACI 318, "Building Code Requirements for Reinforced Concrete," 1983, including 1986 supplement.
- ANSI A58.1, "Minimum Design Loads for Building and Other Structures," 1982.
- AISC, "Load and Resistance Factor Design, Manual of Steel Construction," 1986.
- ICBO, "Uniform Building Code," 1985.
- ASME B31.3, "Chemical Plant and Petroleum Refinery Piping," 1987.
- ASME, "Boiler and Pressure Vessel Code," 1987.

4.4.2 Building Structure

The building structure was designed for the following load conditions in accordance with the identified design standards:

Earthquake:	0.21g Horizontal Acceleration
Wind:	80 mph at 33 ft
Snow:	30 psf Ground Snow Load
Live:	200 psf Floor Load 20 psf Roof Load

The building structure was designed and constructed of the following materials:

Carbon Steel:	ASTM A36 Structural Shapes ASTM A307 Bolts ASTM A325 High-Strength Bolts ASTM A500 Tubing
Stainless Steel:	ASTM A240 Plate ASTM A276 Structural Shapes ASTM A193 Bolts
Concrete:	f'c = 3,000 psi, Normal Weight
Rebar:	ASTM A615, Fy = 60 ksi

Based on the aforementioned design criteria, it is Fluor Daniel's assessment that the building structure is adequately designed to withstand all anticipated loads.

4.4.3 Tank and Vessel Foundations

The supports and foundations for the tanks and vessels will maintain the load of full vessels. The tanks and vessels have inherent structural integrity and will not collapse due to their own weight. (See Section 4.5)

The following tanks, vessels, features, and equipment are supported by the building's structural steel:

AHU-WLH-797	Supply H&V System
F-WLR-176	Vapor HEPA Filter #2
F-WLR-177	Vapor HEPA Filter #1
FRAC-WLK-171	Fractionator #1
FRAC-WLL-170	Fractionator #2
HE-WL-393	Air Heater
HE-WLJ-385	Sample Cooler #3
HE-WLJ-386	Sample Cooler #2
HE-WLJ-390	Sample Cooler #1
HE-WLK-392	Bottoms Cooler #1
HE-WLK-397	Condenser #1
HE-WLK-399	Reboiler #1
HE-WLL-391	Bottoms Cooler #2
HE-WLL-396	Condenser #2
HE-WLL-398	Reboiler #2
HE-WLR-394	Superheater #2
HE-WLR-395	Superheater #1
JET-WLL-531	Sump Steam Jet
JET-WLL-532	Bottoms Tank Steam Jet
JET-WLL-533	Cell No. 2 Sump Jet
JET-WLK-534	Cell No. 1 Sump Jet
P-WLL-296	Bottoms Tank Pump
VES-WLK-197	AF Feed Head Tank
VES-WLK-199	Separator #1
VES-WLL-198	Separator #2
EF-WLR-286	Exhaust Fan

All structural steel was designed in accordance with the identified design standards. It is Fluor Daniel's assessment that all structural steel supports have sufficient strength for the anticipated loads.

The following tanks, vessels, features, and equipment are supported by the building's structural concrete:

BLO-WL-297	Air Blower (Bldg 604)
BLO-WLJ-293	Sample Cabinet Fan
BLO-WLQ-289	Vapor Blower #1
BLO-WLQ-298	Vapor Blower #2
F-WLR-175	Air HEPA Filter
HE-WLR-389	Air Preheater
SAM-WLJ-695	Sampler
SAM-WLJ-696	Sampler
SAM-WLJ-697	Sampler
SAM-WLJ-698	Sampler
SC-WLJ-699	Sample Cabinet
SU-WLL-169	Bottoms Tank Sump
SU-WLL-170	Cell No. 2 Sump
SU-WLK-171	Cell No. 1 Sump
VES-WLL-195	Bottoms Tank

All structural concrete was designed in accordance with the identified design standards. It is Fluor Daniel's assessment that all structural concrete walls and slabs have sufficient strength for the anticipated loads.

All Building 1618 structural steel and concrete is ultimately supported by the building's reinforced concrete foundation. The building foundation consists of a mat and several spread footings tied together with grade beams. The foundations have been designed to withstand the vertical, earthquake, and wind loads specified in Section 4.4.2. The allowable bearing capacity is 6,000 pounds per square foot and the design load is substantially less at 3,300 pounds per square foot. Low bearing values and the foundation design minimizes the concern for significant building settlement. The foundation design with structurally stiff grade beams precludes noticeable differential settlement. Protection of tanks and vessels from flotation or dislodgement is not an issue since they are located inside an above-ground building. It is Fluor Daniel's assessment that the Building 1618 foundation will withstand all the specified design loads without damage to the supported tanks and vessels.

4.4.4 Piping Systems

The LET&D piping systems consist of type 304L SS, Hastelloy-type G-30, Carbon Steel, and Ductile Iron piping and fittings joined together by buttwelding, socketwelding, flanged connections, or screwed fittings. These systems provide a means of transferring the various process and utility streams which makeup the LET&D project. All systems are designed in accordance with the DOE-ID Architectural Engineering Standards, Rev. 7, and ID-12044, Operational Safety Criteria Manual, Rev. 04-85.

All chemical process and hazardous chemical process (Category M) piping systems are designed to the requirements of ASME/ANSI B31.3, "Chemical Plant and Petroleum Refinery Piping". The various service classes which makeup these systems are generally fabricated from Schedule 40-type 304L SS and Hastelloy-type G-30 pipe using buttweld fittings.

Category M chemical process fluids were identified as those fluids contained in the fractionator bottoms transfer piping from the Bottoms Tank, VES-WLL-195, to the CPP-604 Evaporator Cell tie-in. This system was designed without pockets or traps to allow for flushing and free draining. Therefore, the location of valves overhead in personnel access areas was unavoidable. A stainless steel secondary containment trough with leak detection and drainage capability is provided for all horizontal runs in out-of-cell areas where personnel protection is required. All vertical pipe runs in these areas are positioned to drain into the horizontal secondary containment troughs. Protective spray shields are provided for all valve stems and flanges. This transfer system was designed using radius bends, wherever possible, to minimize weld joints. Full-penetration buttwelds are used for all pipe joints where welding is required.

For all Category M and normal fluid service chemical process piping in CPP-1618, CPP-605, and CPP-604, stainless steel pipe sleeves are provided where pipes pass through concrete walls, floors, and roofs. Where sleeves extend through cell walls, the sleeve and process line are sealed together with stainless steel end plates on the cell side of the wall, floor, or ceiling.

All LET&D utility piping systems are designed to the requirements of ASME/ANSI B31.3, "Chemical Plant and Petroleum Refinery Piping". Steam, Condensate, Treated Water and Cooling Water Return piping is fabricated from Schedule 40 carbon steel pipe using socketweld fittings. Where threaded connections are required, Schedule 80 pipe is used. Potable Water, Low Pressure Air, and High Pressure Air piping is fabricated from Schedule 80 carbon steel using screwed fittings.

All chemical process, hazardous chemical process, and utility steam and condensate piping systems were stress-analyzed using the Operating Basis Earthquake (OBE) seismic analysis method based on ASME/ANSI B31.3.

Exterior thermal piping insulation is provided for heat conservation, personnel protection, or for anti-sweat requirements. Pipe insulation and other similar materials containing asbestos are not used.

Buried metallic piping required for utility tie-ins is coated and wrapped with materials manufactured for the specific purpose of preventing pipeline corrosion. Cathodic protection is provided for all buried metallic piping. All piping systems containing hazardous wastes are above-grade.

In general, no piping is routed through electrical rooms or over electrical equipment. However, where such routing is unavoidable, spray guards are provided.

All piping systems are color-coded and tagged in accordance with DOE-ID, A/E Standards and ID-12044, Operational Safety Design Criteria Manual.

4.4.5 Ancillary Equipment

All ancillary equipment has been designed in accordance with the identified design standards to remain attached to the building structure during all design operating conditions. The building structure and foundation have been designed in accordance with the identified design standards to withstand all anticipated design loads.

Structural design considerations include measures to minimize building displacement, differential settlements, and vibrations. As a result, piping systems and ancillary equipment attached to the building will not be subject to excessive stresses induced by building motions. It is Fluor Daniel's assessment that all ancillary equipment is adequately protected from physical damage resulting from anticipated loads.

4.4.6 Structural Integrity of Vessels

All vessels, were designed, fabricated, and tested to ASME Boiler and Pressure Vessel Code, Section VIII requirements. Design temperatures and pressures were selected to be in excess of the maximum operating values.

4.5 Primary Containment System Assessment

The primary containment system for the LET&D facility consists of tanks, vessels, heat exchangers, and other ancillary equipment, plus the interconnecting piping, valves, and fittings. HVAC exhaust blowers, filters, and ductwork are also considered primary containment. During the course of this assessment, mechanical, piping, and HVAC specifications, drawings, and calculations were reviewed. Specifications, drawings and calculations are stored in a readily retrievable manner by the operating contractor (WINCO).

4.5.1 Design Standards

The LET&D facility's primary containment system was designed in accordance with the following design criteria:

- DOE Order 6430.1, "General Design Criteria Manual", December 12, 1987
- DOE-ID Architectural Engineering Standards, Revision 7, February, 1987
- ID-12044, Operational Safety Criteria Manual
- Project Design Criteria for the LET&D facility

- INEL Welding Manual

The following industry standards were used in the design of the primary containment system:

- American National Standards Institute (ANSI)
  - B16.5 Steel Pipe Flanges, Flanged Valves, and Fittings
  - B16.11 Forged Steel Fittings Socket-Welding and Threaded
  - B16.21 Nonmetallic Gaskets for Pipe Flanges
  - B16.25 Buttwelding Ends
  - B16.34 Valves – Flanged and Buttwelding End
  - B31.3 Chemical Plant and Petroleum Refinery Piping
- American Petroleum Institute (API)
  - Standard 598 Valve Inspection and Test
  - Standard 600 Steel Gate Valves Flanged and Buttwelding Ends
  - Standard 660 Shell-and-Tube Heat Exchangers for General Refinery Services
- ASME Boiler and Pressure Vessel Code
  - Section II Material Specifications
  - Section V Nondestructive Examination
  - Section VIII Pressure Vessels

- Section IX Welding and Brazing Qualifications

- American Society of Nondestructive Testing (ASNT)
  - SNT-TC-1A Recommended Practice

- Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)
  - High Pressure Duct Construction Standards

4.5.2 Tanks, Vessels and Heat Exchangers

All liquid-containing tanks, vessels, and heat exchangers were designed, fabricated, inspected, and tested in accordance with the ASME Boiler and Pressure Vessel Code. The maximum expected temperatures and pressures were considered in determining the design values. Equipment in contact with concentrated nitric acid was fabricated from Hastelloy-type G-30 and most were post-weld heat-treated to improve corrosion resistance. The upper half of the fractionator vessel was not heat treated because of size limitations. The Bottoms Tank and the Reboiler tube bundles were not heat treated to preclude physical damage during the quenching operation. Equipment in contact with dilute nitric acid and other corrosives was fabricated from type 304L or 316L SS. No liquid-containing tanks, vessels, or heat exchangers were fabricated from carbon steel. Appropriate corrosion allowances were added to wall thicknesses to provide a 20-year life for a majority of the equipment. Cost studies were performed on capital-intensive equipment and design lives of five to 10 years were selected for some equipment where the cost would be prohibitive for a 20-year design life. These equipment items are under a corrosion monitoring plan and replacement schedule under the supervision of WINCO. It is Fluor Daniel's assessment that the tanks, vessels, and heat exchangers will maintain primary containment under all intended service conditions.

4.5.3 Ancillary Equipment

All ancillary equipment, such as pumps, blowers, filter housings, and air heater housings, was specified to meet the design pressure and temperature requirements for their intended service. Most equipment was leak-tested in the shop prior to delivery to the construction site. The wetted parts of the Bottoms Tank Pump, which is in contact with concentrated nitric acid, were fabricated exclusively from Teflon for corrosion resistance. The Vapor Blowers and HEPA Filter Housings, were fabricated from type 304L SS to resist corrosion from contact with dilute nitric acid vapors. The remaining ancillary equipment is not in contact with corrosive fluids and was fabricated from coated carbon steel. It is Fluor Daniel's assessment that this ancillary equipment will maintain primary containment under all intended service conditions.

4.5.4 Piping, Valves and Fittings

All hazardous waste containing piping was designed in accordance with the ANSI B31.3 Piping Code. Hazardous waste containing valves and fittings were designed in accordance with the ANSI B16.XX codes listed above. The maximum expected temperature, pressure, and thermal expansion were considered in the design of all piping systems. Piping systems in contact with hot concentrated nitric acid were fabricated from Hastelloy-type G-30 and either post-weld heat-treated or welded using special corrosion tested weld filler metal (IN-72) for corrosion protection. Some flanged valves were made from Alloy 20 (cast) or Carpenter 20 (fabricated) when Hastelloy G-30 was not available. Piping systems in contact with cold concentrated or dilute nitric acid were fabricated from type 304L or 316L SS. Some flanged valves were made from Alloy 20 (cast) or Carpenter 20 (fabricated). Piping systems in contact with noncorrosive liquids or gasses were fabricated from carbon steel. Appropriate corrosion allowances were added to wall thicknesses to provide an appropriate design life. Items designed for a relatively short design life are under a monitoring and replacement schedule supervised by WINCO. It is Fluor Daniel's assessment that the piping, valves, and fittings will maintain primary containment under all intended service conditions.

4.5.5 HVAC Exhaust Blowers and Filter Housings

The HVAC exhaust blowers and HEPA filter housings were specified to meet the design pressure requirements for their intended service. Blowers and filter housings were fabricated from type 304L SS for corrosion protection. It is Fluor Daniel's assessment that the HVAC exhaust blowers and HEPA filter housings will maintain primary containment under all intended service conditions.

4.5.6 HVAC Exhaust Ductwork

The HVAC exhaust ductwork is of all welded and gasketed construction, designed in accordance with the SMACNA High Pressure Duct Construction Standards. HVAC exhaust ductwork was fabricated from type 304L SS for corrosion resistance. Intake ductwork was fabricated from galvanized carbon steel. It is Fluor Daniel's assessment that the HVAC exhaust ductwork will maintain primary containment under all intended service conditions.

4.5.7 Welding

All welding and Nondestructive Examination (NDE) for the LET&D facility was performed in accordance with the INEL Welding Manual, the ASME Boiler and Pressure Vessel Code – Sections V and IX, and ANSI B31.3. Weld inspection, except for visual inspection, was performed by personnel certified in accordance with the ASNT recommended practice SNT-TC-1A. It is Fluor Daniel's assessment that the welding and weld inspection is adequate to maintain primary containment under all intended service conditions.

4.5.8 Vehicle Impact

All mechanical and HVAC equipment and most piping and ductwork are located inside buildings where vehicle impacts are not possible. Some piping and ductwork spans between the LET&D building and other on-site buildings. This piping and ductwork are located in a heated, enclosed bridge over the existing roadway. The bridge is approximately 18 feet above the roadway. It is Fluor Daniel's assessment that vehicle impact protection is adequate to maintain primary containment under all intended service conditions.

4.5.9 Materials Compatibility

Materials selection for the LET&D facility was performed by the WINCO Materials Development Group. The selection of materials involved an extensive evaluation and testing of a range of materials using WINCO's fully-equipped, state-of-the-art materials laboratory. Testing and evaluation consisted of materials selection studies, immersion tests, weld tests, explosion bonding tests, and pilot plant studies. The WINCO materials evaluation program was managed by Mr. Ron Mizia, an Advisory Engineer with the Materials Development Group at WINCO. Mr.

Mizia has over 19 years of metallurgical engineering experience and holds an M.S. in Metallurgical Engineering and a B.S. in Mechanical Engineering. The testing program was conducted by Mr. Brad Norby, with assistance from Ms. Colleen McIntyre; both of the Materials Management Group. Mr. Norby was responsible for selection, testing and evaluation of materials. He is a Metallurgical Engineer with 10 years of experience. Ms. McIntyre was responsible for the operation and testing of the pilot plant. She is a Senior Engineer with degrees in both Chemical and Metallurgical Engineering. The selection, testing and evaluation program lasted over two years and the results and recommendations were reviewed by a WINCO Technical Review Committee.

The testing program involved the evaluation of several alloys including type 304L SS, Nitronic 50, Ferralium 255, Sardvik 2205, 254 SMO, Hastelloy-type C-22, and Hastelloy-type G-30. The various alloys were tested against normal and worst-case process conditions, with the main focus being a solution of boiling 12 molar nitric acid in the presence of sulfate, chloride, and fluoride ions. The testing showed that the boiling nitric acid in the presence of fluoride ions was a problem for all materials under evaluation. After first complexing the fluoride ions with a solution of aluminum ions, it was then determined that Hastelloy-type G-30 performed better than all of the other alloys and provided acceptable corrosion rates in the boiling acid solution. The investigations next focussed on the Hastelloy type G-30 weld materials and weld procedures. Various welding and bonding procedures were evaluated after it was determined that normal welding procedures exhibited excessive corrosion. Laboratory and pilot plant tests determined that standard welding of Hastelloy-type G-30 followed by post-weld heat treatment at 2150°F and water immersion quenching or welding with high nickel weld wire IN-72, manufactured by International Nickel Company, resulted in corrosion resistance equal to the base metal. The IN-72 weld procedure was used for those areas where heat treatment was not possible (e.g. field welds) or where water immersion quenching could cause warpage (e.g. heat exchange tube bundles).

Materials selection is based on the appropriate cost-effective design life. All piping and equipment exposed to process streams are constructed from either type 304L SS, Hastelloy type G-30, Alloy 20, or Carpenter 20 to mitigate corrosion. Low concentration, cold nitric acid is contained in type 304L SS. For example, the feed lines, head tank, and inlet lines to the fractionation columns are constructed from type 304L SS. The fractionation column and the process sides of the reboiler, condenser, separator, and superheater exposed to hot and/or concentrated nitric acid are fabricated from Hastelloy-type G-30. The associated piping is fabricated from Hastelloy-type G-30. The bottoms cooler, and the bottoms tank are also constructed from Hastelloy-type G-30. The HEPA filter housings, vapor blowers, and associated piping are constructed from type 304L SS based on very low nitric acid concentrations. These materials are suitable for the process services in which they will operate. The equipment and piping upstream of the superheater are designed for 50 psig and full vacuum at 300°F. The HEPA filters are designed for 4 psig and 4 psi vacuum at 300°F. Piping downstream of the HEPA filters is designed for 300°F and 50 psig.

4.6 Secondary Containment

The LET&D facility design uses a variety of secondary containment devices to ensure compliance with both DOE and EPA requirements. The majority of the process equipment is contained within the two cells. The cells contain the fractionators, condensers, separators, reboilers, bottoms coolers, bottoms tank and much of the ancillary equipment. Each cell floor is lined with a stainless steel liner which reaches a height of three feet above the cell floor. The cells are also equipped with a stainless steel-lined floor sump which can be steam-jetted to CPP-604 PEW Evaporator Cell #1. The remainder of the cell is constructed of epoxy-coated concrete. Other secondary containment features of the LET&D facility include a stainless steel-lined overhead pipe bridge, secondary pipe sleeves where process and waste pipes penetrate concrete walls, and piping troughs.

4.6.1 Design Standards

The LET&D secondary containment systems were designed in accordance with the following design criteria:

- DOE Order 6430.1, "General Design Criteria Manual", December 12, 1987.
- DOE-ID Architectural Engineering Standards, Revision 7, February, 1987.

These design criteria reference and incorporate the following industry standards applicable to the design of the LET&D secondary containments:

- ACI 318, "Building Code Requirements for Reinforced Concrete," 1983, including 1986 supplement.
- AWS D1.1, "Structural Welding Code – Steel," 1987.

4.6.2 Adequacy for Handling Potential Leaks

The quantity of liquid waste in a single-fractionator vessel during operating conditions is approximately 300 gallons. This volume is considered to be the worst case spill which could occur and is therefore used as the Cell containment basis for design.

Cell 1: Potential leaks from Cell 1 tank systems and components will drain to the Cell 1 stainless steel lined floor sump. Cell door and drain funnel containment dams are provided at the cell floor so that the worst case liquid waste spill will remain contained in the cell before sump jet transfer to CPP-604.

Cell 2: Potential leaks from Cell 2 tank system and components will drain to the Cell 2 stainless steel lined floor sump. A worst case liquid waste spill would overflow into the Cell 2 bottoms tank pit which is a fully contained, stainless steel-lined secondary containment device. The volume of the bottoms tank pit is approximately 320 cubic feet (2,394 gallons). Since the pit volume far exceeds the worst case spill volume, a Cell door containment dam is not required in Cell 2.

The enclosed pipe bridge provides secondary containment for the liquid waste transfer line from the LET&D facility to CPP-605. The pipe bridge is constructed with a stainless steel secondary containment liner and is equipped with an enclosed drain system and a Raychem Trace-Tek leak detection system. The enclosed drain system is routed to a containment bottle located in the buildings on each side of the pipe bridge.

All liquid waste pipe runs in and out of cell areas are provided with secondary containment troughs. These troughs are either visually inspectable, or have drain tubing attached at the trough low points. This drain tubing is routed to floor mounted containment bottles for visual inspection. All concrete wall penetrations from the cells are lined with an appropriate pipe sleeve which provides secondary containment and are sloped to drain either into the cells or to an exterior visually inspectable location.

It is Fluor Daniel's assessment that the LET&D secondary containment is adequate for handling potential leaks from the LET&D tank systems.

4.6.3 Structural Integrity

The liner plate serving as the secondary containment is designed to be leak-tight. Building operating conditions and building structural responses to external load conditions are not expected to impair the ability of the liner plate to remain leak-tight. The liner plate is sloped to drain to sumps. The sumps are sized to contain small leaks. All visually observed leaks into the secondary containment will be removed in a timely manner. Because the secondary containment is entirely within an enclosed building, infiltration of rainfall or stormwater drainage is precluded. In addition, the concrete walls and foundation of the building provide an additional barrier between the secondary containment and the soil and groundwater. It is Fluor Daniel's assessment that the secondary containment has sufficient structural features to preclude contamination of the soil and groundwater.

4.6.4 Materials Compatibility

Secondary containment of the process equipment and process lines is provided by the cells which are constructed from concrete. The entire floor area and a height of three feet up the walls are lined with type 304L SS plate metal. The cell doors are also fabricated from type 304L SS. The remaining wall surface and ceiling are epoxy-coated with an epoxy suitable for acid decontamination. These materials can withstand the corrosive behavior of the process fluids. Each cell floor is sloped to a collection sump within the cell which can be steam jetted to the product bottoms tank or back to the waste tanks in CPP-604.

4.6.5 Run-On Diversion/Moisture Barrier

The LET&D facility is located within a fully enclosed above-grade building with the surrounding terrain properly contoured for surface water management. Surface water run-on and soil moisture will not impact the operation of the LET&D facility.

4.6.6 Leak Detection

A floor sump is provided at the center of each of the two cells. Level transmitters with an alarm which actuates in the distributed control system (DCS) alerts the operator to the presence of any liquid that has spilled and drained to the low point sump in the cell. In addition, a bottoms tank sump with a conductivity-type probe alarms in the DCS whenever liquid is present in the bottom of the sump. The sumps in the cells are provided with steam jets to remove any spilled material from the sumps promptly. The bottoms tank sump can accommodate the full operating volume of acid from the fractionation column, and other failed process equipment in the cell.

A conductivity-type leak detector is provided in the secondary containment system enclosing the pipeline transporting the concentrated nitric acid product over the pipebridge. When a leak detector or level indicator indicates the presence of a liquid, the operators take the appropriate investigative steps to determine the source and nature of the leak. In the case of the acid line, the operators take actions to isolate the leaking line and shut down operations. The alarms may be activated by loss of primary containment or by spillage or leakage of nonhazardous materials such as cooling water.

The pipe bridge is designed to resist leakage and provide leak detection. The sides and bottom of the pipe bridge are seal welded to provide containment and the roof is designed to resist rain water in-leakage. All other aspects of the LET&D facility either have low point drains connected to a visually inspectable containment bottle or are directly visually inspectable.

4.7 Summary of the Design Assessment

Fluor Daniel has reviewed the LET&D facility design, drawings, specifications, and calculations, and performed a visual inspection of the facility. It is Fluor Daniel's assessment that the LET&D facility conforms with the requirements of 40 CFR 264.192 and 264.193.

5.0 INSTALLATION & INSPECTION ASSESSMENT

5.1 Introduction to the Installation and Inspection Assessment

A review and evaluation of the overall QA program, documentation recordkeeping and personnel qualifications was conducted to ensure that proper installations and inspections were performed.

The certification of the installation was conducted in the following manner:

A review was conducted of project requirements. QA programs, plans and procedures controlling the work were used to assess that the work was performed and verified in a controlled manner.

An inspection of the site and the facilities was performed, at which time project document controls, work history and inspection records were reviewed as well as personal interviews conducted to assess project compliance with established requirements. Personal interviews were also conducted with inspectors, constructors, and management personnel who were an integral part of the work performed.

The following is an example of the types of items reviewed:

- System Operations (S.O.) Test Programs
- S.O. Test Planning and Results
- Inspection Instructions
- Inspection Qualifications
- Project Files
- Component Check Test Procedures (C.C. Tests)
- Nondestructive Test Reports
- Project Documentation Controls
- Engineering Change Requests
- Drawing Change Notices
- Construction Interface Drawings
- Nonconformance Reports
- Planning and Inspection Record Controls

- Weld Maps
- Radiographs
- Worker Qualifications of the Construction Contractor
- Work Control Procedures of the Construction Contractor
- Supplier Documentation
- Procurement Activities Reports

In addition to the review described above, the site and facilities inspection included a review for structural damage, physical damage, cracks, scrapes, corrosion, punctures, weld breaks, settlement, vibration, expansion and contraction.

Based on the site and facilities inspection the review of the type of documents described above and the interviews conducted with responsible personnel at the job site, it is Fluor Daniel's assessment that the work was planned, performed and completed satisfactorily and was conducted so in a controlled manner.

5.2 Regulatory Requirements

The applicable regulatory requirements related to installation and inspection of tank systems or components are cited in 40 CFR 264.192(b) and (f) as follows:

> 40 CFR 264.192
> (b) The owner or operator of a new tank system must ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing, or placing a new tank system or component in use, an independent, qualified installation inspector or an independent, qualified, registered professional engineer, either of whom is trained and experienced in the proper installation of tank systems or components, must inspect the system for the presence of any of the following items:
>
> (1) Weld breaks;
> (2) Punctures;
> (3) Scrapes of protective coatings;
> (4) Cracks;
> (5) Corrosion;

(6) Other structural damage or inadequate construction/installation.

All discrepancies must be remedied before the tank system is covered, enclosed, or placed in use.

(f) The owner or operator must provide the type and degree of corrosion protection recommended by an independent corrosion expert, based on the information provided under paragraph (a)(3) of this section, or other corrosion protection if the Regional Administrator believes other corrosion protection is necessary to ensure the integrity of the tank system during use of the tank system. The installation of a corrosion protection system that is field fabricated must be supervised by an independent corrosion expert to ensure proper installation. The programs described and the operating instructions were well written and acceptable.

5.3 Installation and Inspection Standards, Criteria and Procedures

The four levels of documentation, procedures and records for the project are as follows: a) Overall Control Level; b) Design Controls; c) Construction Controls; and d) Start-up and Testing. The overall control level consists of the QA Program Plan, Special Conditions and Work Control Procedures.

The Quality Program Plan of WINCO states the overall project QA program requirements. The plan requires WINCO to properly manage and coordinate activities carried out by the Construction Manager, the Architect Engineer, the Title III agency and the DOE. This plan also includes the commitment for the Construction Manager to have QA procedures which ensure that work performed is completed in accordance with technical and quality requirements. The plan also requires that the Architect Engineer ensure that design services are provided and accomplished in accordance with established criteria.

5.3.1 Special Conditions

Special conditions are those documented activities that are described procedurally, and support the construction effort. A list of the Special Condition procedures used for this project is as follows:

SPECIAL CONDITIONS FOR THE ICPP

SECTION	TITLE
SC-1	LOCATION
SC-2	DEFINITIONS
SC-3	CONSTRUCTION RESTRAINTS
SC-4	ACCESS TO CONSTRUCTION SITE
SC-5	QUALITY ASSURANCE
SC-6	TELEPHONE SERVICE
SC-7	ELECTRICAL POWER FOR CONSTRUCTION
SC-8	TOILET AND WASHROOM FACILITIES
SC-9	TEMPORARY WATER FACILITIES
SC-10	TEMPORARY STORAGE OF CONSTRUCTION MATERIAL
SC-11	CONCRETE AND CONCRETE AGGREGATE
SC-12	PARKING FACILITIES
SC-13	EATING FACILITIES
SC-14	SUPERINTENDENCE BY SUBCONTRACTOR
SC-15	CLEANUP AND WASTE DISPOSAL
SC-16	DISPOSITION OF REMOVED EQUIPMENT, MATERIAL, AND SCRAP METAL
SC-17	CONSTRUCTION HEALTH AND SAFETY
SC-18	HEALTH PHYSICS
SC-19	SECURITY REQUIREMENTS

SC-20 SCHEDULE/SCHEDULE OF VALUES

SC-21 DISPOSITION OF EXCAVATED SOIL

SC-22 PIT-RUN AGGREGATE AND BORROW

SC-23 LOAD-TESTING CRANES AND RIGGING EQUIPMENT

SC-24 FACILITY OUTAGE AND EXCAVATION PERMITS

SC-25 PROJECT COMPLETION WALK THROUGH AND PUNCHLIST

SC-26 VENDOR DATA REQUIREMENTS

SC-27 GOVERNMENT FURNISHED EQUIPMENT (GFE)

ATTACHMENTS

A FORM ID F-5480.1H, CONSTRUCTION SAFE WORK PERMIT

B FORM WINCO-5442, FACILITY OUTAGE OR EXCAVATION PERMIT

C ICPP AREA MAP

E RADIOACTIVE MATERIAL SHIPPING CHECKLIST

F RADIOLOGICAL ZONE II/III WORK CONTROL PROCEDURES:

1. TIE-POINTS IN THE CPP-604 CONDENSATE COLLECTION CELL
2. TIE-POINTS IN CPP-605 FAN ROOM
3. TIE-POINTS #25 INTO 8: SWN-3001
4. TIE-POINTS ON DUCTING BETWEEN CPP-605 AND STACK
5. TIE-POINT #7 INTO PLANT STACK
6. TIE-POINT INTO THE PLANT OVERHEAD DUCT

G RADIOGRAPHY SAFETY REQUIREMENTS

H ACID PROTECTION PROCEDURE

I FORM WINCO-6119X, INSTRUMENT CALIBRATION DATA

J CONSTRUCTION AREA SKETCH

K LET&D TIE-IN OUTAGE SCHEDULE

L CONSTRUCTION MILESTONES

M CPM CONSTRUCTION SCHEDULE ORGANIZATIONAL FORMAT (EXAMPLE)

N SCHEDULE OF VALUES

O COST PLAN

P CRAFT MANPOWER PLAN

Q WEEKLY SUBCONTRACTOR REPORT

R MATERIAL STATUS REPORT

S LET&D PROJECT LINE LIST

T VENDOR DATA SCHEDULE FORMAT

U CONSTRUCTION VENDOR DATA TRANSMITTAL AND DISPOSITION FORM

V VENDOR DATA TRACKING REPORT

W HIGH CONSEQUENCE LIFT LIST

5.3.2 Work Control Procedures

In order to ensure compliance with the Technical Specifications, the QA Work Control Procedures listed below were made a part of this subcontract. The work control procedures were available to the craftsmen and inspection personnel at each work location.

LIST OF WORK CONTROL PROCEDURES

WCP A-1 CONTROL OF BATCH PLANT OPERATIONS

WCP A-2 PLACEMENT OF STRUCTURAL AND HIGH DENSITY CONCRETE

WCP E-1 CONTROL OF INSTRUMENTATION AND ELECTRICAL INSTALLATION

WCP G-2 CONTROL OF PURCHASE ORDERS AND REQUISITIONS

WCP G-3 RECEIVING AND STORAGE

WCP G-4 CONTROL AND CALIBRATION OF MEASURING AND TEST EQUIPMENT

WCP G-5 CONTROL OF NONCONFORMING ITEMS

WCP NDE-1 APPLICATION OF COLOR CONTRAST/SOLVENT REMOVABLE LIQUID PENETRANT

WCP	NDE-2	COLOR CONTRAST REMOVABLE LIQUID PENETRANT EXAMINATION METHODS AND ACCEPTABLE CRITERIA
WCP	P-1	CONTROL OF PIPING ERECTION
WCP	P-2	CLEANING AND FLUSHING OF PIPING
WCP	T-1	COMPONENT CERTIFICATION TESTING

5.3.3 Design Controls

Design Controls are described in both the Fluor Daniel QA Plan and the WINCO QA Program Plan. Design controls are implemented by Engineering Change Notices, Drawing Change Notices and Construction Interface Drawings. These documents describe the system used to ensure that the design is defined, controlled and verified, and that design changes, including field changes, are governed by control measures commensurate with those applied to the original design.

Construction Controls are described in Section 5.6 of this report.

5.3.4 Construction Component Test Procedures and Results

In addition to conducting S.O. tests to prove the entire systems, individual C.C. test procedures were developed and components were tested independent of the entire system check to ensure the integrity of individual components. Both the C.C. and S.O. tests were witnessed by quality inspectors who are qualified to analyze, review, inspect, test, audit or otherwise evaluate activities and work results. They are independent personnel who had no direct responsibility for, or involvement in, performing the activity or work. They also do not report directly to the immediate supervisors who are responsible for performing the activity or work being evaluated.

5.3.5 Start-up and Testing

The S.O. test procedures are very detailed and specific as to the areas, equipment and instrumentation to be tested, and the acceptance criteria to be used. The test data to be recorded and evaluation instructions are included and are presented clearly. The tests are performed by test engineers and witnessed by QA inspectors who have sign-off responsibilities through the test sequence. The S.O. tests are performed in addition to the tests required by purchase orders for individual components; i.e., vessels, tanks, pumps, etc. In addition, interim C.C. tests are performed to further enhance the quality checks of individual portions of the system. Leak repair procedures are incorporated into the S.O. test procedure. Supporting documentation is also included to demonstrate QA's acceptance of the leak repair and document the repair work.

The purpose of each of the S.O. tests is as follows:

System: Potable and Treated Water
S.O. Test Procedure: WHAS-LTD-50-U3

To prove that the Potable and Treated Water Systems distribute water to equipment and utility points of the LET&D facility at the pressures specified in the design criteria. To prove that nonhazardous liquid wastes drain properly and promptly into the pit of the facility's bottoms tank.

System: Air Distribution
S.O. Test Procedure: WHAS-LTD-50-U1

To prove that the pressurized air distribution system is capable of delivering plant air to all points of the LET&D facility at the pressures and flows established in the design criteria. To ensure that the air has been properly cleaned as it is distributed to air operating instruments.

System: Miscellaneous Equipment
S.O. Test Procedure: WHAS-LTD-SO-Q2

To prove the ability of the Aluminum Nitrate Nanohydrate (ANN) tank/mixer/pump to provide gravity flow of ANN to the PEW condensate tanks and controlled injection of ANN into the reflux lines of the fractionator trains of the LET&D facility at the ICPP. To demonstrate the capability to transport HEPA filters into the third floor of the LET&D facility, using an electro-mechanical hoist and a transport basket.

System: HVAC System
S.O. Test Procedure: WHAS-LTD-SO-H1

To prove that the HVAC system, as installed in the LET&D facility, is capable of controlling heating, ventilating, and air flow, and maintaining the balance of air and pressure detailed in the specifications for personnel comfort and to comply with requirements for using the system as secondary radiation containment of the facility.

System: Power Distribution
S.O. Test Procedure: WHAS-LTD-SO-E1

To demonstrate that the project has properly tied into existing plant power distribution systems and the new installations in CPP-1618 required to support the new LET&D systems have been installed and will function and operate within the requirements of the design drawings, specifications, vendor data and acceptance criteria.

System: Decontamination and Steam
S.O. Test Procedure: WHAS-LTD-SO-U2

To prove that the steam distribution system is capable of delivering steam to all points of the LET&D facility at the pressures and flows established in the design criteria. To prove that pipelines have been fabricated so that steam and other decontaminants reach the major pieces of equipment within the facility. To prove that condensate from the main steam distribution lines is properly removed and diverted to the waste lines.

System: Vessels
S.O. Test Procedure: WHAS-LTD-SO-Q1

To determine the capability of the vessels of the LET&D facility at the ICPP to operate on water feed. To prove that the equipment is operable as designed and, by operating the equipment under the limitations of a water run, to generate data to be used in integrated tests.

System: Distributed Control System Logic
S.O. Test Procedure: WHAS-LTD-SO-C1

A Bailey DCS is used to control the LET&D facility. S.O. test WHAS-LTD-SO-C1 will verify that the logic interlocks defined on the DCS will work as designed. Project drawings representing this logic will be compared to the logic residing on the control system. A series of control inputs will be fed into the configuration to provide a desired control output. It is not the purpose of this test to establish values for alarms and switch points, as these will be set on the calibration database during integrated tests of the facility.

System: Atmospheric Disposal Systems
S.O. Test Procedure: WHAS-LTD-SO-H2

To prove that the components of the Atmospheric Disposal System of the LET&D facility can be operated and controlled in air service and that air extracted from the HVAC systems can be used to heat and condition those components in preparation for their use in cleaning and evacuating water vapor. Tests (WHAS-LTD-SO-Q1) on the superheaters/reboilers of the LET&D facility generated water vapor to be discharged into the stack of the ICPP through the atmospheric disposal system. WHAS-LTD-SO-H2 will also prove that the humidity control for the Atmospheric Protection System (APS) of the ICPP recirculates ventilation air at the required temperature and flow rate so that the total air and vapor exiting to the main stack of the ICPP will have the relative humidity necessary to prevent condensation in the stack.

The successful completion of the above tests and their analysis resulted in the final confirmation that the system meets its design intent and is leak-tight.

5.4 Tank and Vessel Construction

All pressure vessels in the LET&D facility were designed, fabricated, inspected, and stamped in accordance with the requirements of ASME Section VIII. Shop fabrication and inspection of tanks and vessels were performed under the control of ASME NQA-1 requirements. Fluor Daniel visually inspected the installed tanks and vessels and observed the proper ASME vessel stamping and nameplate requirements. Fluor Daniel also performed a review of the Procurement Activity Reports (PARs) and noted proper inspections and documentation by qualified personnel.

5.5 Qualifications of the Constructors

Construction management for all installations was provided by Morrison Knudsen - Ferguson (MK) of Idaho, a construction management company contracted by the DOE. MK awarded a fixed price contract to Ovard Construction for construction of the LET&D facility with the exception of several GFE items discussed later in this section. Ovard self-performed the civil work and concrete construction and subcontracted all other work as follows:

- Steel West of Pocatello, Idaho was the subcontractor for all structural steel work.
- Atlas Mechanical, Inc. was the subcontractor for all mechanical work (piping, equipment installation, ducting, etc.). AC&S was under contract to Atlas Mechanical for installation of insulation. Atlas Mechanical, Inc. was under contract to MK for installation of certain GFE items including the Vapor Blowers and Sample Jets.
- Wheeler Electric was the subcontractor for electrical and instrumentation work. Sea-Tronics was under contract to Wheeler Electric for Fire Alarm System Design and Installation.
- 3-D was the subcontractor for detailed design and installation of the fire protection system.
- A-Cor performed all concrete sawing and drilling.

Welding was performed by welders who were trained and certified to perform specific welds in accordance with specific procedures approved for this project. In addition, the welds and weld techniques were inspected by inspectors qualified to analyze, review, inspect, test, audit or otherwise evaluate activities and work results. These inspectors were independent personnel who had no direct responsibility for, or involvement in, performing the activity or work. They also did not report directly to immediate supervisors responsible for performing the activity or work being evaluated. Specific welding codes and nondestructive examinations used for the project are described in Section 4 of this report.

5.6 Construction Inspections

Construction quality controls are separated into two categories: operating contractor's controls administered by WINCO, and the construction manager's (MK) work controls. WINCO's controls include items such as; Inspection Constructions, Inspection Plans, Inspection Control of Inspections, Nonconformances, etc. MK work controls include items such as controls for Worker Qualification.

WINCO inspectors are trained and qualified to perform inspections for specific field construction disciplines such as welding, piping installation, electrical, civil, and mechanical. The inspector's certification provides written documentation of qualification attested to by the QA Manager. The specific inspector categories are established to certify that an individual has skills pertaining to a specific test or an entire discipline of activity.

Inspections are performed using detailed inspection plans which provide descriptions of the work activity to be inspected. These Inspection Plans can also be supplemented with specific inspection instructions to ensure that the work effort performed is adequately documented by continual inspection acceptance steps throughout the work control procedure. The use of these Inspection Plans, Inspection Control of Inspection and inspection reports result in a documented inspection program to ensure that the work was accomplished in a controlled manner.

Worker qualifications are similar to the inspection qualifications described above but apply to the Construction Manager and Subcontractors. As with the inspectors, the work being performed for this project was conducted by workers qualified in the various project field disciplines. This qualification program, combined with the inspection program, ensured that the work effort was adequately planned, described, and completed under a formally controlled approach.

The construction inspections conducted were performed in accordance with inspection planning documents that described the tasks to be inspected and provided acceptance criteria to ensure that the work was performed in compliance with specification requirements. As stated previously, the inspections were performed by personnel who were qualified to conduct the work and also had independent reporting paths from the personnel who performed the work. Records of the inspections performed were kept and proper recordkeeping practices were followed.

QA has the authority and responsibility to verify that the project is performing quality-related activities in accordance with the requirements of the QA Program description and related project procedures approved for use on this project. In addition, should the need arise for resolving quality-related conflicts at successively higher levels of management, QA has an independent reporting path outside the project organization to obtain such resolution. Along with this independent reporting relationship, QA has Stop Work Authority. QA personnel assigned to the project were qualified to analyze, review, inspect, test, audit or otherwise evaluate activities and work results because they are independent personnel who had no direct responsibility for, or involvement in, performing the activity or work. Additionally, they do not report directly to the immediate supervisors responsible for performing the activity or work being evaluated.

5.7 Facility Inspection

During the week of October 21, 1991, a facility surveillance inspection was conducted by Fluor Daniel representatives Messrs. D. Walker and W. Holub. During the week of November 20, 1991, a second facility surveillance inspection was conducted by Messrs. D. Walker, R. Bromm and M. Hickey.

The surveillance inspections began with a walkdown of the complete LET&D facility to visually inspect the work performed. During the facility walkdown, a review for structural damage, physical damage, cracks, scrapes, corrosion, punctures, weld breaks, settlement, vibration, and expansion and contraction was conducted to ensure compliance with the regulatory requirements of 40 CFR 264.192 b, d & e. No deficiencies were noted as a result of these walkdowns. The welding performed showed good quality and proper identification practices were followed to identify the welds and the welders who performed the work. This practice allowed for proper traceability of the weld records. Tanks, equipment and supports were properly identified and located and cleanliness of the area was well maintained.

During the first walkdown, interviews were conducted with WINCO Project Engineering and QA personnel, and MK QA personnel to assess knowledge of project requirements. Interviews with project personnel throughout the facility showed that they were very knowledgeable of project requirements and compliance thereto.

After the first facility walkdown, reviews of quality records were performed to ensure that the work was planned, performed, and completed satisfactorily and was conducted in a controlled and professional manner. In addition, the review allowed the records of the work performed to be checked for traceability for audit purposes. The records of the work performed were indeed found to be traceable. Reviews were performed of System Operation test procedures, specifically: S.O. test procedures - 1) Compressed Air, 2) Drains, 3) Decon and Steam, 4) DCS Logic, 5) Electrical, 6) HVAC, 7) Off Gas, 8) Miscellaneous Equipment, and 9) Vessels. The reviews were performed to assess clarity of the procedures for the intended purpose as well as inclusion of inspection witness points and for proper data reporting. The procedures were found to be satisfactory in all instances.

A review of weld maps was performed. Mapping of welds was performed to provide the tracking necessary to assess that all welds were completed as planned. The mapping provided documented objective evidence that identified the welder, the procedures used, the inspector, and the nondestructive methods used (e.g., radiographic testing, dye-penetrant testing, and ultrasonic testing). The weld maps became part of the Quality Records system and are subject to audit. The weld maps were found to be acceptable. The following weld map drawings were reviewed:

DRAWING NO.	REVISION
1618-TW-AR-152137-1	REV. 0
1618-WR-AR-152138-1	REV. 0
1618-DC-HG-152139-1	REV. 0
1618-DC-HG-152141-2	REV. 0
1618-TW-AR-152143-1	REV. 0
1618-WR-AR-152144-1	REV. 0
1618-DC-HG-152146-1	REV. 0
1618-LAZ-AR-152148-1	REV. 0
1618-PSL-AR-152156-1	REV. 1
1618-PSL-AR-152158-1	REV. 0
1618-DC-AR-152164-2	REV. 0
1618-LAZ-AR-152167-1	REV. 0
1618-LAZ-AR-152168-1	REV. 0
1618-LAZ-AR-152169-1	REV. 0
1618-HA-AR-152170-1	REV. 0
1618-PL-HG-152171-1	REV. 2
1618-PL-AR-152172-1	REV. 1
1618-DC-AR-152183-1	REV. 1
1618-DC-AR-152191-1	REV. 0
1618-DC-AR-152192-1	REV. 0
1618-WR-AR-152204-1	REV. 0

1618-VG-AR-152205-1	REV. 0
1618-VG-AR-152205-3	REV. 0
1618-VG-AR-152217-1	REV. 1
1618-VG-AR-152218-1	REV. 1
1618-DC-AR-152230-1	REV. 1
1618-DC-AR-152231-1	REV. 1
1618-DC-AR-152242-1	REV. 1
1618-POG-HG-152249-1	REV. 1
1618-POG-HG-152256-1	REV. 1
1618-PL-AR-152264-1	REV. 1
1618-PL-AR-152265-1	REV. 1
1618-HS-AR-152267-1	REV. 1
1618-LAZ-AR-152271-1	REV. 0
605-PL-AR-152278-1	REV. 0
1618-PSL-AR-152287-1	REV. 0
1618-VG-AR-152301-1	REV. 0
1618-DC-AR-152309-1	REV. 1
1618-PL-AR-152310-1	REV. 0
604-PSL-AR-152342-1	REV. 1
1618-TW-AR-152345-1	REV. 0
VES-WLL-198 & VES-WLK-199	REV. 0

A representative sample of Engineering Change Requests was reviewed to assess that these changes to design were properly reviewed and approved in the same manner as those systems applied to the original design. The Change Requests reviewed were identified as: 13-161, 162, 163, 176, 185, 186, 193, 194, 158-1, 121-1, 123-1, 130-1, 135-1, 136-1, 147-1. It was determined that the Change Requests were performed satisfactorily.

C.C. test procedures were reviewed to ensure that the procedures were clear and adequate for the testing required and their stated purpose, including inspection witness points and proper data gathering and reporting. The following representative sample of test procedures was reviewed and found to be acceptable. CC test procedures - (through the construction vendor data transmittal and disposition form) 1146, 1144, 1145, 1124, 1103, 1104, 1137 and 975.

Nonconformance reports were reviewed to ensure that nonconforming conditions were documented by field personnel and resolved with engineering input in an acceptably controlled manner. The following representative sample of nonconformance reports was reviewed and found to be acceptable - 890171, 184, 187, 195, 197, 199, 203, 218, 235, 900003, 04, 05, 08, 10, 17, 55, 62, 91, 150 and 151.

Quality Program Manuals and Quality Procedures of the Operating Contractor and the Construction Manager were also reviewed to ensure completeness and to assess that the Quality organizations were independent of cost and schedule pressures and maintained their independence through separate organizational reporting paths. The review of these documents showed that the Quality personnel, which include inspection personnel, are independent and our review showed adequacy and completeness. Based on the site and facilities inspection, the review of the type of documents described above, and the interviews of responsible personnel at the job site, it is Fluor Daniel's assessment that the work was planned, performed and completed satisfactorily and was conducted in a controlled and professional manner.

Quality Engineering inspection planning documents were reviewed to assess that the procedures were clear, adequate for the intended purpose, inclusive of inspection witness points and acceptable for proper data reporting. The planning documents were found to be satisfactory in all instances. The specific documents reviewed were:

- Q.E. Inspection Plans 5820Q1, Q3, Q43, Q45, Q47, Q48, Q60, Q61, Q64, Q74, Q75-2, Q75-5, Q100 and Q113-3. The planning documents are in use for both in-process work activities and for testing.

- Concrete Placement Reports contained in File No. 9.2.6 were reviewed to assess that concrete placements were planned, completed, inspected and documented in a controlled manner. The placement reports in this file were found to be acceptable.

- The following Quality Assurance Inspection Reports (reports of in-process work activities accomplished) were reviewed to ensure that the inspections planned were performed and signed off by the appropriate inspection personnel: IR038, 039, 065, 072, 073, 077, 085, 086, 093, 095, 096, 097, 100, 102, and 108. The inspection reports listed were found to be completed satisfactorily.

The following radiographs obtained from the nondestructive test files were reviewed. Nondestructive Test Records – 96550, 549, 552, 553, 554, 556, 557, 558, from Log No. 9100199, 96549 and 96550 from Log No. 9100200, and 96551 from Log No. 9100194. Radiographs of completed welds performed at the job site as well as the radiographs completed by vendors on supplied equipment were reviewed and accepted by qualified film interpreters. These radiographs are stored in project quality record files and are subject to audit. The control of the radiographs and other nondestructive test records was found to be acceptable.

Procurement Activity Reports (PARs) were reviewed to determine the involvement of shop inspection personnel including inspection sign-offs for procured equipment and hardware. The activity reports listed below were reviewed and inspection involvement was verified. PARs reviewed included: P-063-0, 095-0, 103-9, 109-9, 118-9, 120-9, 121-9, 135-9, 211-0, 150-1, 028-1, 017-1.

Construction Interface Documents (CIDs) and Design Change Notices (DCNs) were reviewed to ensure that the proper reviews and design resolutions were taking place to resolve the comments made on these two design-related inputs. The following representative sample of documents was reviewed and found to be acceptable: CIDs – 361, 362, 363, 364, 680, 681, 682, 683, 685, 3F, 6F, 8F, 11F, 13F, 14F, 17F, 18F, 19F, and 224F through 231F. DCNs – 13-103-1, 13-100-11, 13-101-1, 13-102, 13-103-1, 13-120, 13-120-1.

The following civil/structural construction Quality Control records were reviewed:

- Concrete cylinder test records were reviewed to verify that structural concrete meets the 3000 psi requirement. Inspection records IP-Q44, Q46, Q80, Q82, Q83, Q88, Q95, Q98, Q99, Q100, Q103, Q104, Q105, Q106, Q107, Q112 and Q115 were found to be satisfactory in verifying this requirement.

- Material certifications for High Strength Steel Bolts were reviewed and found satisfactory. Inspection records IP-Q170 and IR-080 were reviewed.

- Backfill and Compaction records identified on Inspection Plan 5820 Q1 were reviewed and found satisfactory.

- Liner Plate Field Welding Records were reviewed to assure that 100% liquid penetrant inspections were performed. Inspection Plan Q131 was reviewed and found acceptable.

- The proper installation of anchor bolts was verified by the review of Inspection Record O13.
- Material certifications for ASTM A240 type 304L steel were found to be acceptable.
- Pipe enclosure Drain Plate welding was reviewed and found acceptable by the review of Inspection Plan Q152.

In summary, all of the Civil/Structural Construction Quality Control records that were reviewed were found to be acceptable and contained traceability to quality acceptance documentation.

5.8 Summary of the Installation and Inspection Assessment

Fluor Daniel has reviewed the QA programs for the design and construction of the LET&D facility. Our review included a visual inspection of the on-site facilities, a detailed review of quality records and procedures and interviews with on-site personnel. Fluor Daniel's evaluation of the LET&D installation, inspection program and results shows that the facility was properly constructed and meets the requirements of 40 CFR 264.192.

6.0 LEAK TESTING ASSESSMENT

6.1 Introduction to the Leak Testing Assessment

The LET&D facility consists of a variety of process vessels, tanks, heat exchangers, and ancillary equipment. Since all of the major vessels are ASME Code-stamped vessels, the initial leak testing occurred at the vessel fabrication shop. After the vessels and equipment were installed, and the interconnecting piping properly attached, small sections of the LET&D facility were individually leak-tested through the use of C.C. tests. The final tier of the leak testing program is the S.O. tests, which check the major process systems for leakage and operability prior to initial start-up.

Fluor Daniel reviewed the C.C. test and S.O. test results, along with their respective repair and documentation procedures, in order to establish the leak-tightness of the LET&D facility.

6.2 Regulatory Requirements

All tank systems and ancillary equipment must be leak-tested prior to being placed in service and any required repairs must be performed prior to use. The specific requirements for leak testing are contained within 40 CFR 264.192(d) and are as follows:

> (d) All new tanks and ancillary equipment must be tested for tightness prior to being covered, enclosed, or placed in use. If a tank system is found not to be tight, all repairs necessary to remedy the leak(s) in the system must be performed prior to the tank system being covered, enclosed, or placed into use.

6.3 Leak Testing Requirements

6.3.1 Vendor Requirements for Tanks and Vessels

Pressure vessels were hydrostatically tested for leaks in accordance with the requirements of ASME Section VIII.

6.4 Leak Integrity Assessment

The system was designed to be leak-tight by the choice of materials used, the Codes and Standards chosen (i.e., ASME, ANSI, ASNT, etc., that are the recognized highest standards of the industry), the individual component tests conducted and the system operations tests performed and successfully completed. Based on the use of qualified construction personnel to perform the work, qualified inspection personnel to check the work, nondestructive test results to approve the work and the visual checks for leakage during testing, combined with the visual checks for structural damage, physical damage, cracks, scrapes, corrosion, punctures, weld breaks, settlement, vibration, and expansion and contraction, it is Fluor Daniel's assessment that the systems will be free of leaks.

The S.O. tests described in Section 5.3.4 of this report were successfully planned, conducted, verified by QA and Test Engineering personnel, and completed in a controlled manner. During the testing process, the inspection for leakage was a continuously monitored activity. Test engineers and QA inspectors inspected the system for any evidence of leakage. No evidence of leakage was present during the system operation tests performed.

The first requirement for each of the S.O. tests is to review the overall system for leaks. If a leak is identified during the S.O. test, the procedure calls for generation of a discrepancy report, repair of the leak, retest and then a QA Sign-off to ensure that the repair and retest were satisfactorily completed. This procedure ensures that, in every instance, all repairs necessary to remedy the leak(s) in the system are performed prior to the system being placed in use. Each of the SO tests procedures is very detailed and the acceptance criteria and test data instructions are very clear as to the requirements for each test. The acceptance criteria contain both measurable criteria and observable criteria to be witnessed and recorded by both Test Engineering and QA personnel. Measurable criteria are specific items that require the recording of results such as: maximum and minimum feed rates, high and low steam pressures, etc. Observable criteria are typically items such as: flow through pipe lines is unrestricted and steady; fluids are clean and free of debris; no water hammer or other abnormal conditions exist; control valves open, close and adjust freely without binding; etc. Only authorized personnel record observed and/or measured data. A section of the test data and evaluation portion of the S.O. test procedure is used to document test exceptions and discrepancies. This is used to identify and control failed hardware and components and to reference nonconformance reports that are "loop closing" documents to ensure that all repairs necessary to remedy leaks or other conditions are corrected prior to the tank system being placed in use.

7.0 CONDITIONS OF ATTESTATION

In the performance of this facility certification, Fluor Daniel reviewed and evaluated records, procedures, criteria as well as design and construction documents. Fluor Daniel did not review every QA/QC record for the LET&D facility. However, Fluor Daniel reviewed a representative sample of the QA/QC records. In the professional judgement of our QA representative the proper procedures were followed. Fluor Daniel did not witness the facility construction (installation) and the leak testing of the facility since these activities occurred over a period of more than two years. Fluor Daniel reviewed the installation plans and procedures, inspected QA/QC records, checked the training records of QA inspectors and visually inspected the facility. Fluor Daniel also reviewed the leak testing plans and procedures, witnessed a sample of the tests and reviewed all leak test records. Based on the review of these records, plans and procedures, interviews with site personnel, and visual inspection of the facilities, it is Fluor Daniel's assessment that the facility has been properly designed, installed and leak-tested.

C-40 VALVE BOX

CERTIFICATION DOCUMENT

FOR

INTEC Tank Farm Valve Box C-40 Project

Idaho Nuclear Technology and Engineering Center
Idaho National Engineering and Environmental Laboratory
Idaho Falls, ID

Prepared for:

Bechtel BWXT Idaho, LLC
P.O. Box 1625, Idaho Falls, ID 83415

September 10, 2001

JETSEAL

Engineering and Technical Services, LLC

RCRA CERTIFICATION OF

C-40 Valve Box

Idaho Nuclear Technology and Engineering Center
Idaho National Engineering and Environmental Laboratory

Idaho Falls, ID

The attached report entitled, "CERTIFICATION DOCUMENT FOR INTEC Tank Farm Valve Box C-40 Project , Idaho Nuclear Technology and Engineering Center, Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID", dated September 10, 2001, serves as the basis for this certification, which follows the guidance provided under both Federal regulation 40 CFR 264.192, 264.193, 265.192, 265.193, and the Idaho rules, regulations and standards for hazardous waste. We attest that the system has sufficient structural strength, compatibility with the wastes and corrosion protection to ensure it will not collapse, rupture or fail. The certification provided herein by Jetseal, Inc., is limited to the work set forth in the certification document.

We certify under penalty of law that this document and all attachments were prepared under our direction or supervision and in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on our inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of our knowledge and belief, true, accurate, and complete. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Craig L. Porter, P.E., Idaho Professional Engineer — Date: Sept 10, 2001
Jetseal, LLC

PROFESSIONAL ENGINEER — REGISTERED 9/10/01 — 10013 — STATE OF IDAHO — CRAIG L. PORTER

Lloyd R. Hardy, Corrosion Protection Specialist — Date: 9-10-01
Jetseal, LLC

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1.0 Introduction

In order to support the waste management mission of INTEC, the continued use of vessels VES-WM-100, 101, and 102 as waste vessels for the PEW evaporator is necessary. The addition of a new valve box to the Tank Farm was needed to accommodate such usage. Additionally, it would allow INTEC personnel to cease use of the pillar and panel tanks as well as allowing the isolation of valve boxes A5 and A6. To that end the "INTEC Tank Farm Valve Box C40 Project" was subsequently initiated in 1997 with intermittent periods of construction continuing through 2001. Final acceptance testing was completed in May of 2001. In accordance with 40 CFR 264.192/193 and 40 CFR 265.192/193, the owner/operator is required to obtain a certification by an independent, qualified, registered professional engineer that the system has sufficient structural integrity and is acceptable for handling hazardous waste. Jetseal, LLC., through a contract with BBWI, operator for the Department of Energy (DOE) of the INTEC, was retained to provide the independent certification for the "INTEC Tank Farm Valve Box C40 Project".

This assurance document defines the system boundary to which the certification applies. It delineates the applicable regulatory requirements, how each requirement was assessed, and attests to the integrity of the newly installed system. Although an assessment of other systems are required for the total regulatory assessment, this certification is limited to the newly installed components of the system.

2.0 Certification Team

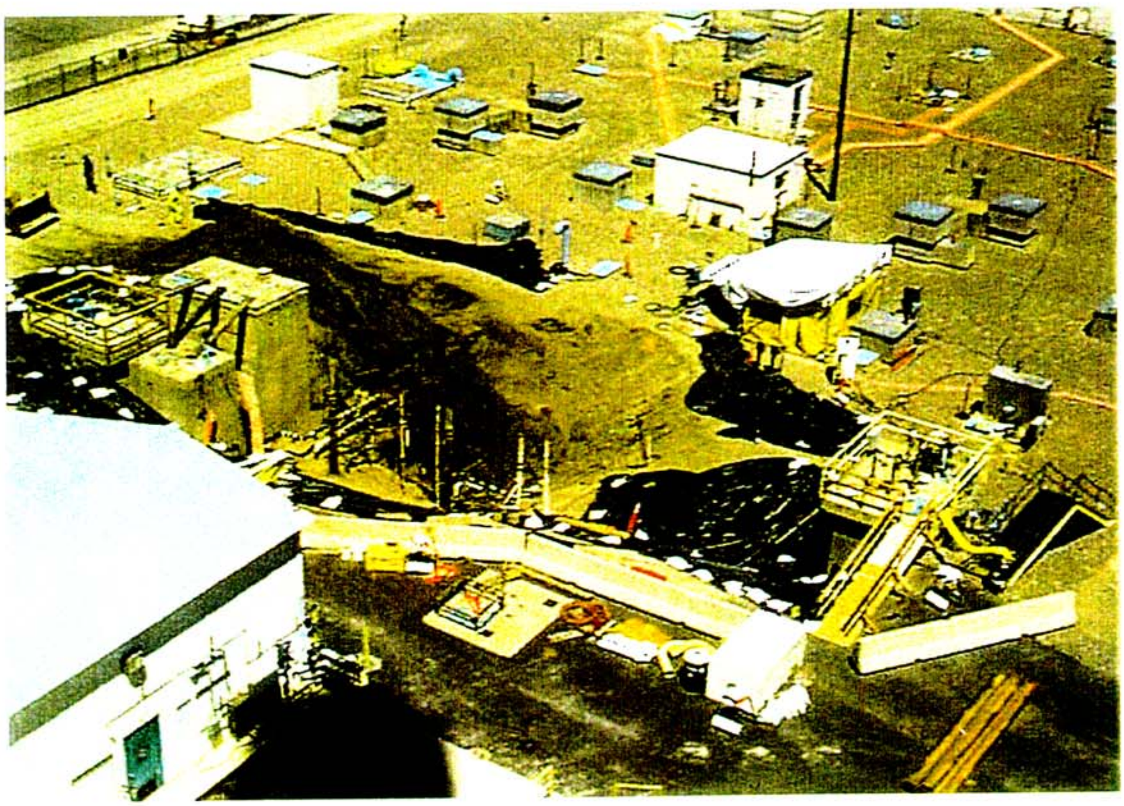
The key personnel of the Jetseal certification team are Craig L. Porter, Project Manager and certifying professional engineer, Michael J. Shannon, professional structural engineer, and Lloyd R. Hardy, Corrosion Specialist. Mr. Porter has a Bachelors Degree in Chemical Engineering and a Masters Degree in Environmental Remediation and Waste Management. He is a professional engineer registered in the State of Idaho. He has over twenty years of experience in piping system design and testing within the chemical and nuclear industries. He is familiar with INTEC and his experience includes eight years supporting environmental compliance work similar to that being accomplished via the subject project. Mr. Shannon has a Bachelors Degree in Civil Engineering and a Masters Degree in Structural Engineering. He is a professional engineer registered in the State of Idaho. His sixteen years of engineering experience include over ten years of design and analysis work at various facilities within the Idaho National Engineering and Environmental Laboratory (INEEL). Mr. Hardy has 26 years of experience in the nuclear and waste management arena. The majority of his experience (21 years) has been in designing, constructing and monitoring cathodic protection systems for underground tanks and piping. He was formerly a T10 Committee member (Underground Corrosion Control) for the National Association of Corrosion Engineers (NACE). He is very familiar with the cathodic protection systems at the INEEL.

3.0 Design and Installation Assessment

3.1 System Description

Facility Overview - The fuel processing complex at INTEC was designed to provide fuel reprocessing capability for a variety of government owned and research nuclear reactor fuels. Liquid and gaseous waste generation was concomitant to the fuel reprocessing activities. The CPP-604/605 facility and the associated Tank Farm were designed to reduce the volume of and store/treat the liquid and gaseous waste generated during the course of reprocessing nuclear fuel. The CPP-604 building contains the Process Equipment Waste (PEW) system. This system processes acidic intermediate level radioactive waste streams resulting from the activities of INTEC. These initial facilities were designed and constructed in the early 1950's to the building, steel, concrete, and piping codes that existed at that time. The industry codes and standards were supplemented by the Atomic Energy Commission specifications.[1] The 604 portion of the CPP-604/605 facility is a reinforced concrete structure, approximately 130 feet long by 75 feet wide and extends 42 feet below grade at its lowest point. The interior cells are situated on either side of a central corridor running the full length of the 604 portion of the building. The cell floors and part way up the walls are lined with stainless steel (liquid treatment cells). The liquid treatment cells, along the east side of the building, contain the evaporation equipment used to achieve a volume reduction of the low/intermediate level liquid waste. The PEW Evaporator system and its associated condensate system are located in the respective cells. The gaseous waste treatment cells are located along the west side of the building. At the north end of the building are three liquid waste storage vaults. Two of the vaults are lined with stainless steel while the third vault was backfit with a Hypalon liner. Two of the vaults contain tanks which receive high-level liquid wastes prior to transfer to any of the 300,000 gallon tanks in the Tank Farm. The tanks in the third vault receive the evaporator bottoms waste. The addition of Valve Box C40 will allow the continued use of vessels VES-WM-100, 101, and 102 as waste vessels for the PEW Evaporator. Its addition will also allow INTEC personnel to cease the use of the pillar and panel tanks and allow the isolation of valve boxes A5 and A6.

Project Description - This specific project, "INTEC Tank Farm Valve Box C40" provides a new diversion valve box (C40) and modified piping within valve box C37 to aid in transfers within the Tank Farm area.[2] The new valve box is located between existing valve boxes C30 and C37, just north of the asphalt apron north of building CPP-604.



Associated with the new valve box installation are new valves, piping (process and utility), wall penetrations, instrumentation, and repairs to the cathodic protection system which protects the exterior surfaces of the underground portions of the tank farm.

3.1.1 Tankage

No new RCRA tanks are part of the C40 valve box project. From a regulatory standpoint the components of the C40 valve box are considered ancillary equipment to existing RCRA tanks.

3.1.2 Piping and Valves

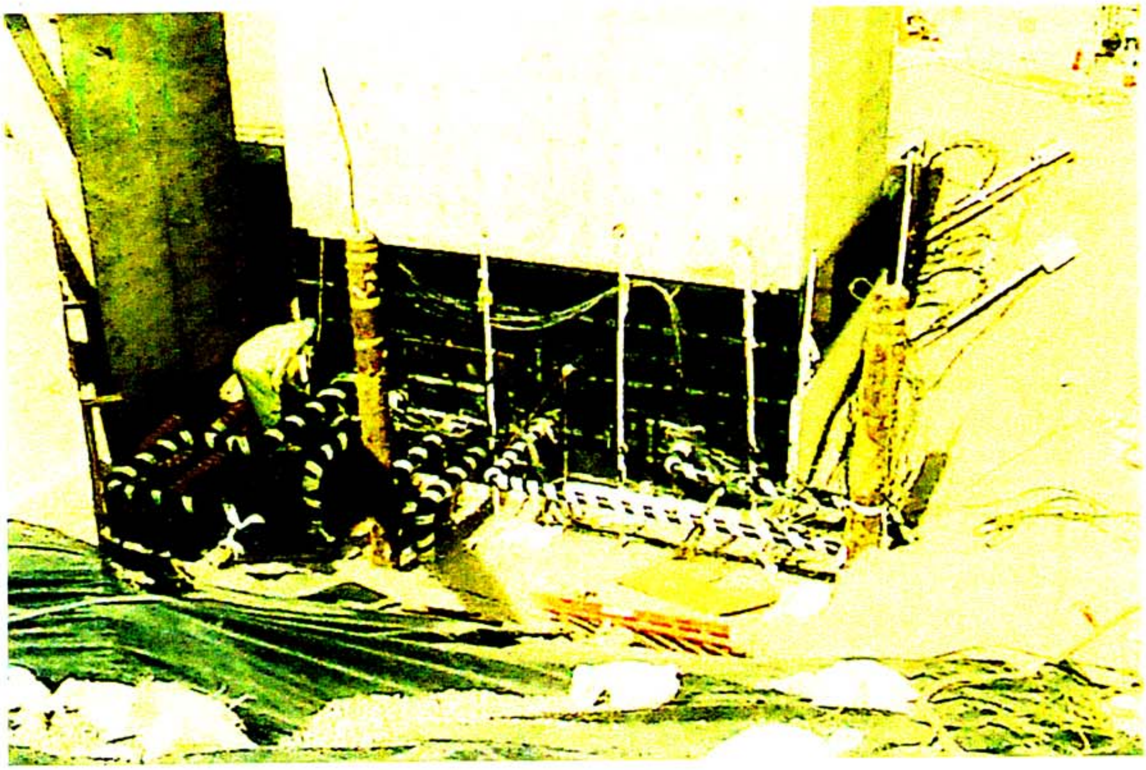
The installation of Valve Box C40 included the installation of new transfer lines, influent and effluent, as well as utility connections, and lines for bypass flow, sampling, decontamination and instrumentation. The modifications associated with valve box C37 included a new valve in line 3" PW-AR-151009 and a new process transfer line, 1 ½" PW-AR-156549 (with valve PUV-WM-229). Table 1 identifies the new lines and associated valves which are covered by the scope of this certification.

Table 1 New or Modified Lines Associated with Valve Box C40 Project

Type	Line No.	Valves/ Jet
Process (C37)	3" PW-AR-151009 1 1/2" PW-AR-156549	PUV-WM-230 PUV-WM-229
Process (C40)	3" PL-AR-156151 3" PW-AR-1005 3" PW-AR-10018 3" PW-AR-2016 3" PW-AR-1030 1½" PMW-20028Y 1½" PW-AR-20028 1½" PL-AR-156550	PUV-WM-236 PUV-WM-237 PUV-WM-238 PUV-WM-239 PLV-WM-251 PUV-WM-240 PLV-WM-250 Jet-WL-591
Utility	1" HS-AR-154995 1" HS-AR-151014	HSV-WM-728
Decon	2" DC-AR-156577,78 2" DC-AR-156547,48 1" DC-AR-156546	DCV-WM-386 DCV-WM-424

3.1.2.1 Underground Piping

Portions of existing underground transfer lines were modified and a new steam line was installed as part of this project. All lines are constructed of Schedule 40 stainless steel (304L). Process lines are provided with secondary containment (4 in. or 6 in. schedule 40, 304L SS). Additionally, the secondary containment is wrapped with a corrosion resistant coating and connected to the cathodic protection system.



3.2 Regulatory Requirements

The regulatory requirements applicable to the design and installation of new hazardous waste tank systems, including ancillary equipment, are 40 CFR 264.192, 264.193, 265.192, and 265.193. In general, the regulations set forth two sets of design requirements. One set pertains to the integrity of the systems and the other set pertains to secondary containment and leak detection.

System Integrity - In order to ensure that hazardous waste tank systems are designed and built in a manner that is protective of human health and the environment, RCRA specifies, in 40 CFR 264.192 and 265.192, a set of criteria against which the system must be assessed. The criteria are used by an independent professional engineer to determine that the "system has sufficient structural strength, compatibility with the wastes and corrosion protection to ensure that it will not collapse, rupture, or fail." The specific criteria include:

- Design standards
- Hazardous characteristics of the waste(s)
- Corrosion protection (if external portions are in contact with soil or water)[a]
- Vehicular traffic, frost heaves, backfill, and floatation (if tank system is located underground)a
- Tank foundation
- Installation procedures
- Leak testing for tightness
- Ancillary equipment support

Secondary containment - Specifically dealing with hazardous waste tank systems (including ancillary piping), 40 CFR 264.193 (a) and 265.193(a) state:

> In order to prevent the release of hazardous waste, or hazardous constituents to the environment, secondary containment that meets the requirements of this section must be provided...

Two general requirements are outlined in paragraph (b) of the 193 section:

Secondary containment must be:

1. Designed, installed, and operated to prevent any migration of wastes, or accumulated liquid out of the system to the soil, groundwater, or surface water at any time during the use of the tank system; and
2. Capable of detecting and collecting releases and accumulated liquids until the collected material is removed.

[a] This criteria is relevant only for the underground portiond of the system

To meet the requirements of paragraph (b), specific minimum criteria for secondary containment systems are given in paragraph (c). These can be summarized as follows:

1. Constructed of or lined with materials that are compatible with the wastes such that the structural integrity will not be impaired due to contact with the waste.
2. Placed on a foundation or base capable of providing support to the secondary containment system.
3. Provided with a leak detection system that is designed and operated to detect the failure of the primary or secondary containment.
4. Sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills, or precipitation.

3.3 System Assessment

3.3.1 Design Standards

Existing systems - CPP-604 and the PEW system were constructed in the early 1950s to the building, steel, concrete, and piping codes that existed at that time. The industry codes and standards were supplemented by the Atomic Energy Commission specifications (Reference 1). Jetseal is familiar with the design standards applicable to the existing system as well as the performance history of waste management at INTEC.

New systems - The various design documents (see Appendix A) governing the subject Project reference DOE Order 6430.1A and the DOE-ID Architectural Engineering Standards for the applicable codes and standards. These include other DOE, federal, state, local, and national consensus standards and codes (as developed by such organizations as the American Concrete Institute, American National Standards, American Society of Mechanical Engineers, American Welding Society, etc.) as well as approved Management Control Procedures. The project specifications[3, 4] and drawings (see Appendix A) required the material, workmanship, and testing of the process piping to conform to ANSI/ASME B31.3 "Normal Service" requirements.

Jetseal reviewed the design drawings and governing project documents listed in Appendix A and concludes that the design of the C40 Valve Box Project correctly implements the applicable design standards and that the implemented design standards are adequate to meet the regulatory requirements.

3.3.2 Hazardous Characteristics of the Wastes

Existing systems - When originally designed and built in the 1950's a variety of processing scenarios were anticipated for the INTEC. Consequently the Process Equipment Waste (PEW) system was designed to handle corrosive waste including 3 molar HNO_3, solvent wash streams (caustic), decon solutions, and organics (hexone). This was accomplished by specifying the use of 304L stainless steel for the piping. The system has successfully handled the anticipated wastes over the last forty plus years.

New system - The low/intermediate level waste to which the subject system is exposed is generally described as moderate concentrations of nitric acid with over-complexed fluorides and low levels of chlorides. Table 2 provides a detailed listing of the nominal solutions expected to be present in the liquid waste:

Table 2 Nominal Solutions in Liquid Waste[5]

Compound	Amount	Compound	Amount
H^+	1.62 (N)	B	0.076 (g/l)
NO_3^-	2.93 (M)	Cd	trace
Al	0.21 (M)	Ca	trace
Na	0.78 (M)	Cl^-	1.52 (g/l)
K	0.10 (M)	Cr	0.68 (g/l)
F^-	0.17 (M)	Fe	3.02 (g/l)
Zr	trace	SO_4^{-2}	6.82 (g/l)

The selected material of construction for the valve box liner and piping was 304L stainless steel. This selection is consistent with previous laboratory corrosion tests, field corrosion tests, and over 40 years of satisfactory performance of 300 series stainless steel in equivalent waste solutions at the INTEC (see Reference 5).

Jetseal concludes that the material of construction (304L stainless steel) is compatible with both the existing system and the hazardous waste.

3.3.3 Corrosion Protection

From a regulatory standpoint the purpose of corrosion protection is to minimize the deterioration of the tank system components by the *external* environment such as soil and water. The underground lines are the only portions of the system to which this discussion applies. Four design features contribute to the protection afforded the underground lines from the corrosive effects of the external environment:

1. Corrosion resistant materials of construction (304L SS)
2. Increased wall thickness of the double containment piping
3. Corrosion resistant wrapping
4. Cathodic protection system

The selection of 304L steel was based on laboratory corrosion tests, field corrosion tests and over 40 years of satisfactory service of 300 series stainless steel in systems handling the subject waste. (see Reference 5) The underground process lines which transfer the waste are not in direct contact with soil and water. They are separated from the external environment by their respective secondary containment. During an earlier project at INTEC dealing with waste transfer lines equivalent to those of the subject project the designed thickness of the secondary containment (Schedule 10) was based upon a conservative corrosion allowance (double that which was recommended in the materials of construction study).[6] For this project the installed secondary containment was actually Schedule 40 (double the wall thickness of Schedule 10). As mentioned earlier, the secondary containment piping which is in direct contact with the soil was wrapped with a corrosion resistant coating. The coating was holiday tested in accordance with NACE Standard RP-02-74, "Recommended Practice for High Voltage Electrical Inspection of Pipeline Coatings Prior to Installation". No defects in the coating were detected by the holiday testing.

3.3.3.1 Cathodic Protection

The objective of using cathodic protection is to control the corrosion of metallic surfaces in contact with electrolytes.[7] There are two basic mechanisms by which metals in contact with soil corrodes. One mechanism is called electrolytic corrosion. This corrosion results from stray direct current (DC) from an outside source picked up by metals in the soil. At the point where the current leaves the metal, corrosion occurs. The second mechanism is called galvanic corrosion. It arises from differences in the electrical potential when metal is placed in the soil. The potential differences can develop from various nonuniformities. Examples of such nonuniformities are variations in soil moisture, oxygen concentration, or soil resistivity. When an electrical potential develops, it provides a driving force for the flow of current. A flow of current from one structure to another will corrode the structure that acts as the anode.

The most effective method of protecting metallic surfaces in contact with electrolytes is called active or impressed current cathodic protection. It operates by passing direct current from impressed current anodes installed in the soil adjacent to the underground metallic surfaces to be protected (the cathodes). An external source of power is used to make the protected metal structures cathodic. Corrosion is halted and directed to the anodes which can be designed for a long life and are replaceable. It is possible to prevent the electrolytic corrosion of underground metallic structures indefinitely by this method with proper maintenance and periodic anode replacement. However, if a cathodic system is improperly designed, operated, or maintained corrosion of the "protected" system can be accelerated.

Most of the underground utility piping at INTEC is carbon steel and thus needs cathodic protection in order to have a significant life within the INTEC environment. Stray current from the cathodic protection system will cause any isolated metal conductor (including stainless steel) to corrode. Consequently, the underground stainless steel components must be connected to the cathodic protection system.

Several factors complicate the operation of the INTEC cathodic protection system. These include a highly congested underground of both carbon steel and stainless steel components and piping, a grounding grid over two-thirds of the tank farm, and the fact that the National Association of Corrosion Engineers (NACE) criteria for cathodic protection was developed for carbon steel and cast iron. As part of an ongoing effort to upgrade and properly operate the INTEC cathodic protection system the INEEL investigated the effect of NACE carbon steel criteria on stainless steel.[8] Based primarily on a study done by B. Linder of the Swedish Corrosion Institute[9] it was concluded by the INEEL that "any negative potential impressed on austenitic stainless steel from a cathodic protection system is considered beneficial". The Linder study also determined that austenitic stainless steels have no negative potential limit, thus the INEEL concluded that "a potential more than –850mVolts... is not detrimental to austenitic stainless steel..."

Regarding the underground portion of the C40 project, INEEL personnel provided Jetseal with test data from the cathodic protection system that included the subject piping/components. Based on its review of the data, Jetseal concludes that the underground portions of the C40 Valve Box Project that are the subject of this certification are receiving cathodic protection. Based on this and the foregoing dicsussion of the other elements of corrosion protection Jetseal concludes that the corrosion protection of the subject system is sufficient to support the overall certification of the system.

3.3.4 Vehicular Traffic, Frost Heaves, Backfill and Floatation

The original design drawings and construction specification as modified by the subsequent CID's contained provisions affecting the structural integrity of the underground piping installation. Depth of installation, type and placement of backfill, compaction requirements, and tie-point details were included in the design. Based on its review of these design requirements and considering the environs (unsaturated zone) in which the underground piping is placed, Jetseal concludes that the subject piping is adequately protected from the affects of vehicular traffic, will withstand the effects of frost heave, and will not be subject to floatation concerns.

3.3.5 Tank Foundation – N/A

3.3.6 Installation Procedures, Leak Testing, and Ancillary Equipment Support

Existing system - Based on the satisfactory performance history of the CPP-604 facility and the foregoing discussion of design and construction standards no supplementary description is warranted for these topics.

New system - Jetseal reviewed the protocols for welding, leak testing, and inspection as set forth in the specifications (References 3 and 4) and implementing project documents (Appendix A). The specified procedures and methods for installation, inspection, and leak testing are adequate to ensure proper seams and connections and leak tightness of the system.

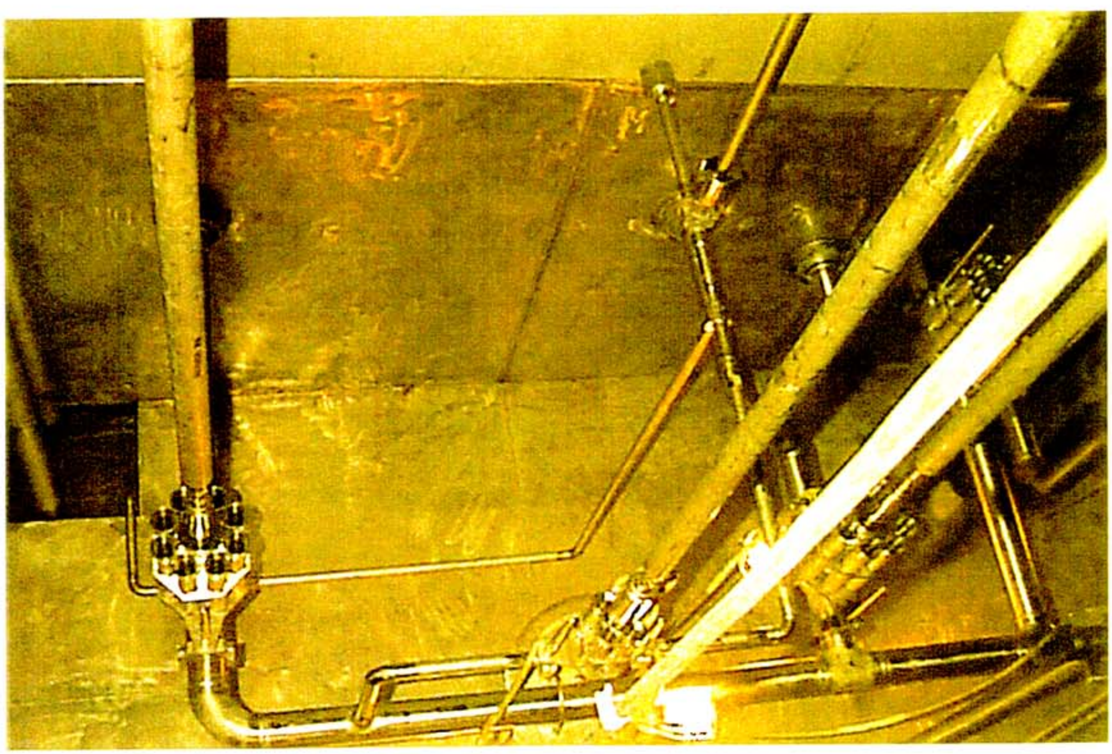
Regarding ancillary equipment support, the potential seismic effect was taken into consideration in designing the valve box. Valve Box C40 was based on an earlier design of a larger version designed by ICF Kaiser Engineers (see Reference 2).

Based on Jetseal's review of the applicable design documents and the satisfactory performance of the existing structure to date, Jetseal concludes that the ancillary equipment is supported such that it will not collapse, rupture or fail during normal operation.

3.4 Secondary Containment Assessment

Secondary containment for all components of this project, except the underground lines, is provided via the valve box structure. This summary description is provided to support the ultimate conclusion that the new system is capable of handling hazardous waste without release to the environment for the intended life of the system.

Within Valve Box Structure - The concrete valve box was lined with stainless steel liners over the entire floor and extending from the floor up the surrounding walls about 5 ½ feet.



The valve box floor slopes towards a stainless steel sump. The sump is instrumented for level detection and includes a jet for evacuating the contents of the sump. The overall design of the valve box includes provisions to prevent infiltration from precipitation or runoff.

Secondary containment for the subject underground transfer lines is of the "double-walled piping" variety. The outer pipe provides secondary containment for the inner waste transfer piping. For this installation the secondary containment (4 in. or 6 in. Schedule 40, 304L stainless steel) is constructed of the same material as the interior process piping. It is designed with the capacity to contain all the potentially released liquid should the interior pipe fail. The secondary containment pipe is welded to stainless steel sleeves that penetrate the valve box walls and extends 2-6 inches into the interior of the structure. Thus a continual secondary containment barrier is formed which prevents run-on or infiltration of precipitation into the secondary containment. Since the slope is towards a valve box this continuous barrier allows leak detection and accumulated liquid transfers via the secondary containment for the valve box. As discussed in Section 3.3.4, the design requirements resulted in a solid base and cover that is capable of providing support to the secondary containment system.

Based on the above considerations Jetseal concludes that the new secondary containment installed as part of the C40 Valve Box Project as designed and installed will prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater or surface water. By virtue of the designed slope to the valve box, any accumulated liquid in the secondary containment would flow directly to the secondary containment in the valve box where it would be detected and dealt with in accordance with established plant operating procedures.

3.5 Installation and Inspection

Relative to proper installation and inspection, Jetseal reviewed and evaluated the following:

1. Installation and inspection protocols and procedures,
2. Qualifications of the constructors,
3. Installation and inspection records, and
4. Personally observed the completed work.

3.5.1 Protocols and Procedures

This project was initiated while Lockheed-Martin Idaho Technologies Company (LMITCO) was the operating contractor of the INTEC and continued under BBWI. As required and outlined in LMITCO and BBWI procedures, management of the project and performance of the construction activity are governed by overall Quality Program Plans and specific QI procedures. These procedures cover such activities as receipt and control of material, welding, installation control, leak testing, instrument calibration, maintaining personnel qualifications, etc. Based on a review of selected procedures and an overall familiarity with the established procedures and protocols in effect at the INTEC, Jetseal concludes that LMITCO's and BBWI's installation and inspection protocols were adequate to ensure that the completed installation is in accordance with the approved design documents.

3.5.2 Constructor Qualifications

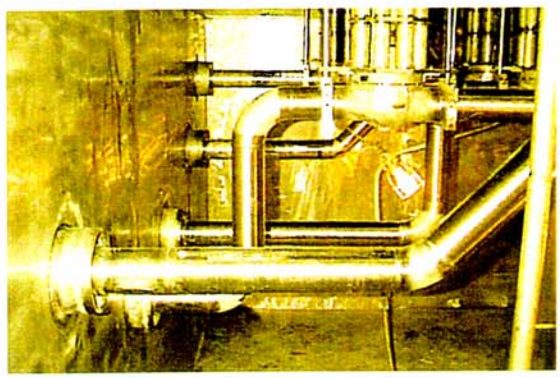
The construction was performed by BBWI Construction Force. Jetseal reviewed the relevant documents referred to in Section 3.5.1 to confirm the overall qualification of the "Force Account" pool of craftsmen. Jetseal confirmed through review of the Vender Data submittals and installation records that all welds were performed by qualified welders.

3.5.3 Installation and Inspection Records

Concurrent with the final inspection documentation review by BBWI QA and Project personnel, Jetseal reviewed the Weld History Record Packages, Leak Testing Examination Reports, Test Data Sheets and other applicable installation and inspection records. The Weld History Record Packages included both the weld records and inspection records for the applicable work. Based on these reviews Jetseal concludes that the work was satisfactorily performed.

3.5.4 Personal Observations

Due to the restricted access to the work areas and to minimize personnel exposure to radiation, the BBWI project manager kept Jetseal informed of the progress via digital photographs of the construction effort. Jetseal personnel personally viewed the completed construction in conjunction with the reviews described in Section 3.5.3. This review was in lieu of on-site surveillance of the work and provided independent verification of satisfactory completion of the subject work.



4.0 Conclusions and Attestation

Jetseal reviewed the applicable portions of the documents listed in Appendix A, the References Section and described throughout Section 3.0 which pertain to the design and installation of the "INTEC Tank Farm Valve BOX C-40" Project. Based on this assessment, Jetseal concludes that Valve Box C40 was designed and installed properly and meets the regulatory requirements of Federal regulation 40 CFR 264.192, 264.193, 265.192, and 265.193, and the Idaho rules, regulations and standards for hazardous waste.

5.0 Conditions of Attestation

Although an assessment of other systems was included in this document, this certification is limited to the actual "new systems" as described in Section 3.0. Jetseal's assessments and conclusions regarding the adequacy of the design and installation were strictly based on environmental regulatory requirements and this certification should not be construed as a warranty of the subject work.

References

1. Phillips Petroleum Company, Chemical Processing Plant, Engineering Standards, CPP Development and History, CPP-ES 01.04 (1958).

2. Technical Input for Design and Construction of a New Valve Box (C40) in the INTEC HLW Tank Farm, LMITCO Document 412.14, Rev.2 dated 3/97.

3. A-E Construction Specification for INTEC Tank Farm: DVB-WM-PW-C40 Site Work, Project No. 96446, LMITCO, SPC-159, June 2, 1999, Rev. 0.

4. A-E Construction Specification for INTEC Tank Farm: DVB-WM-PW-C40 Structural Work, Project No. 96446, LMITCO, SPC-160, August 19, 1999, Rev. 0.

5. Letter from B.C. Norby to R.L. Jones, "Recommended Materials of Construction for VES-WL-101 Replacement", BCN-8-93, dated August 19, 1993.

6. ECR No. 99428-10, CID 38, "4" Secondary Containment Piping from 604 to C-37, Various Modifications", dated 1/3/96.

7. NACE Standard RP-01-69 (1983 Revision), "Control of External Corrosion on Underground or Submerged Metallic Piping Systems", National Association of Corrosion Engineers, Houston, Texas.

8. Engineering Design File for INTEC Cathodic Protection Upgrades, *Effect of NACE Carbon Steel Criteria on Stainless Steel*, Kenneth E. Graff, PE, EDF-2702, 8/6/01.

9. Linder, B. *Cathodic Protection Criteria for Passivated Metals*, Corrosion Australasia V20, N1, February 1995, pp. 6-10.

APPENDIX A

PROJECT DOCUMENTS

1. Technical Input for Design and Construction of a New Valve Box (C40) in the INTEC HLW Tank Farm, LMITCO Document 412.14, Rev.2 dated 3/97.

2. A-E Construction Specification for INTEC Tank Farm: DVB-WM-PW-C40 Site Work, Project No. 96446, LMITCO, SPC-159, June 2, 1999, Rev. 0.

3. A-E Construction Specification for INTEC Tank Farm: DVB-WM-PW-C40 Structural Work, Project No. 96446, LMITCO, SPC-160, August 19, 1999, Rev. 0.

4. Engineering Design File for INTEC Cathodic Protection Upgrades, *Effect of NACE Carbon Steel Criteria on Stainless Steel*, Kenneth E. Graff, PE, EDF-2702, 8/6/01.

5. HLWTFR Project RCRA Cathodic Test Procedure, WHAS-I-SO-07-RCRA, Rev. 0, February 7, 1996.

6. Various Liquid Transfer Sheets dated May 17 and 18, 2001.

7. Checkout Component Test Report- INTEC Tank Farm Valve Box C40, INEEL No. C40V 8.3, Rev. 0, April 2001.

8. Various Quality Inspection Reports

9. Construction Weld History Records

10. Welder Qualification Records

11. Numerous Test Data Sheets

12. Inspector Certification Status List

13. Letter from E.C. Hales to J.K. Winterholler, *The State of the Cathodic Protection System Post-Construction Completion in the C-40 Area of the Tank Farm*, ECH-01-01, June 12, 2001.

14. Letter from E.C. Hales to J.K. Winterholler, Native Potentials and the State of the Cathodic Protection System Post-Construction Completion in the C-40 Area of the Tank Farm, ECH-03-01, June 12, 2001.

15. C40 CID Log

Drawing No.	Type	Drawing Title
509676	Civil	Tank Farm DVB-WM-PW-C40 Vicinity /Location Map General notes & Drawing Index
509677	Civil	Tank Farm DVB-WM-PW-C40 Site and Stockpile plan
509678	Civil	Tank Farm DVB-WM-PW-C40 Demolition and Excavation Plan
509678 Sheet 2	Civil	Tank Farm DVB-WM-PW-C40 Excavation Sections
509680	Civil	Tank Farm DVB-WM-PW-C40 Miscellaneous Details
509681	Civil	Tank Farm DVB-WM-PW-C40 Finish Grading Plan
509352	Piping	New Valve Box DVB-WM-PW-C40 P & I D
509353	Piping	New Valve Box DVB-WM-PW-C40 and DVB-WL-PL-C37 Modifications: Yard Piping Demolition
509354 Sheet 1	Structural	CPP Tank Farm DVB-WM-PW-C40 Structural Concrete Plan
509354 Sheet 2	Structural	CPP Tank Farm DVB-WM-PW-C40– Sections and Details
509354 Sheet 3	Structural	CPP Tank Farm DVB-WM-PW-C40– Liner & Embedments
509354 Sheet 4	Structural	CPP Tank Farm DVB-WM-PW-C40– Embedment Details
509355 Sheet 1	Piping	INTEC Tank Farm New DVB-WM-PW-C40 – Piping Installation
509355 Sheet 2	Piping	INTEC Tank Farm New DVB-WM-PW-C40 – List of Materials
509355 Sheet 3	Piping	INTEC Tank Farm New DVB-WM-PW-C40 – Piping Plan
509355 Sheet 4	Piping	INTEC Tank Farm New DVB-WM-PW-C40 – Piping Sections
509355 Sheet 5	Piping	INTEC Tank Farm New DVB-WM-PW-C40 – Piping Sections
509355 Sheet 6	Piping	INTEC Tank Farm New DVB-WM-PW-C40 – Piping Sections
509355 Sheet 7	Piping	INTEC Tank Farm New DVB-WM-PW-C40 – Piping Sections & Details
509356 Sheet 1	Piping	Tank Farm DVB-WM-PW-C40 Valve Box – 1" Valve Reach Rod Assembly
509356 Sheet 2	Piping	Tank Farm DVB-WM-PW-C40 Valve Box – 1" Valve Reach Rod Details
509357 Sheet 1	Mechanical	INTEC Tank Farm DVB-WM-PW-C40 Valve Box and DVB-WL-PL-C37 Valve Box – Remotely Removable Valve Reach Rod & Valve Details & Installation
509357 Sheet 2	Mechanical	INTEC Tank Farm DVB-WM-PW-C40 Valve Box and DVB-WL-PL-C37 Valve Box – Remotely Removable Valve Reach Rod & Valve Details & Installation
509357 Sheet 3	Mechanical	INTEC Tank Farm DVB-WM-PW-C40 Valve Box and DVB-WL-PL-C37 Valve Box – Remotely Removable Valve Reach Rod & Valve Details & Installation
509357 Sheet 4	Mechanical	INTEC Tank Farm DVB-WM-PW-C40 Valve Box and DVB-WL-PL-C37 Valve Box – Remotely Removable Valve Reach Rod & Valve Details & Installation
509358	Piping	Valve Box Modifcations DVB-WL-PL-C37 – P & I D
509359	Piping	INTEC Tank Farm DVB-WL-PL-C37 - Demolition
509360 Sheet 1	Piping	INTEC Tank Farm DVB-WL-PL-C37 Valve Box – Piping Installation
509360 Sheet 2	Piping	INTEC Tank Farm DVB-WL-PL-C37 Valve Box – Piping Plan and Section
509360 Sheet 3	Piping	INTEC Tank Farm DVB-WL-PL-C37 Valve Box – Piping Details
509362 Sheet 1	Electrical	DVB-WL-PL-C37 Modifcations - Electrical Demolition
509362 Sheet 2	Electrical	DVB-WL-PL-C37 Modifcations - Electrical Installation
509363 7 Sheets	Electrical	New Valve Box DVB-WM-PW-C40 and DVB-WL-PL-C37 Modifications – Electrical Installation
509364	Electrical	New Valve Box DVB-WM-PW-C40 – Loop L-WM-C40 Installation
509365	Electrical	Valve Box Modifcations Valve Box DVB-WL-PL-C37 – Loop L-WM-C37 Installation

Drawing No.	Type	Drawing Title
509366	Architectural	Tank Farm DVB-WM-PW-C40 Valve Box -Ladder Details
509367 Sheet 1	Structural	CPP Tank Farm DVB-WM-PW-C40 - Valve Box Precast Roof
509367 Sheet 2	Structural	CPP Tank Farm DVB-WM-PW-C40 - Valve Box Precast Roof Sections and Details
509368	Architectural	Tank Farm DVB-WM-PW-C40 –Roof Handrail Details & Installation

Change Requests

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2	CMTRs for Rebar	32	Liner Plate Gap
3	CMTRs	33	Hydro Test
4	Weld Wire Flagging	34	Rad Monitor Stop Ring
5	Camtite valve torque values	35	Steam Line Tie-in
6	Alternate soil compaction plan	36	Nelson Stud Welds
7	Remove Abandoned Fire Alarm Cable	37	Steam Line Insulation
8	Downtime Impacts (4/27/00)	38	Minor Roof Changes
9	Changing Bioassay Requirements (4/26/00)	39	Cathodic Repairs
10	Wind Downtime (5/2/00)	40	Rain/Evac Downtimes
11	All Hands Downtime (5/3/00)	41	Delete Weight Nameplate Stud
12	Wind Downtime (5/3/00)	42	Ladder Supports
13	Remove Decon Lines	43	C37 Conduit
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26	Bituthene Waterproofing	56	Plant IH Downtime
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CPP-659 ANNEX

CERTIFICATION DOCUMENT

FOR

THE DESIGN AND INSTALLATION OF THE LIQUID EFFLUENT TREATMENT AND DISPOSAL FACILITY ACID RECYCLE SYSTEM

CERTIFICATION DOCUMENT

FOR THE DESIGN AND INSTALLATION OF

THE LIQUID EFFLUENT TREATMENT AND DISPOSAL FACILITY

ACID RECYCLE SYSTEM

Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

Prepared For:

Lockheed Idaho Technologies Company
Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

June 1995

Fluor Daniel, Inc.
Irvine, California

CERTIFICATION FOR THE DESIGN AND INSTALLATION OF THE LIQUID EFFLUENT TREATMENT AND DISPOSAL FACILITY ACID RECYCLE SYSTEM

Idaho Chemical Processing Plant
Idaho National Engineering Laboratory
Idaho Falls, Idaho

The attached report entitled "Certification Document for the Design and Installation of the Liquid Effluent Treatment and Disposal (LET&D) Facility Acid Recycle System, Idaho Chemical Processing Plant, Idaho Falls, Idaho" dated June 1995 serves as the basis for this certification which is required under Idaho Hazardous Waste Management Regulations - Title I, Chapter 5.

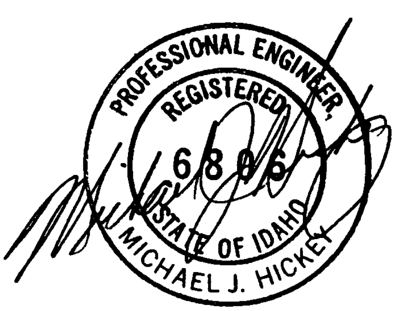
The certification provided herein by Fluor Daniel, Inc. is limited to the installation and inspection of the Acid Recycle System for the Liquid Effluent Treatment and Disposal Facility. This certification does not include the existing facilities which provide the acid, nor the existing facilities which accept the acid.

Based on our review of the LET&D Acid Recycle System, our opinion is that the storage and recycle system has been properly installed and is acceptable for the storage and transfer of hazardous chemicals. In our opinion, field inspections of the foundations, structural supports, seams, connections, pressure controls, and related construction and inspection documentation show that the system has sufficient structural strength and corrosion protection to ensure that the system will not collapse, rupture, or fail.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

FLUOR DANIEL INC.

Michael J. Hickey, P.E., Environmental Director — 06/28/95 Date



Document Preparation and Peer Review

This RCRA Certification Installation and Inspection Assessment Document for the LET&D Acid Recycle System was prepared under the supervision of Mr. Michael J. Hickey, P.E. This document was prepared by a team of professionals from Fluor Daniel's Irvine, California and Denver, Colorado offices. The following individuals participated in the preparation and peer review of this certification document:

Michael J. Hickey — 06/28/95

Michael J. Hickey, P.E., Environmental Director — Date

James A. McClellan — 6/28/95

James A. McClellan, P.E., Lead Mechanical Engineer — Date

M S Brown — 27 June '95

Marcia S. Brown, P.E., Lead Civil/Structural Engineer — Date

Christopher J. Inano — 6/27/95

Christopher J. Inano, P.E., Corrosion Protection Engineer — Date

Daniel R. Nerison — 6-27-95

Daniel R. Nerison, Lead Piping Engineer and Project Coordinator — Date

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ACRONYMS/ABBREVIATIONS

ACI	-	American Concrete Institute
AISC	-	American Institute of Steel Construction
ANSI	-	American National Standards Institute
API	-	American Petroleum Institute
ASME	-	American Society of Mechanical Engineers
ASNT	-	American Society of Nondestructive Testing
ASTM	-	American Society of Testing and Materials
AWS	-	American Welding Society
A-E	-	Architect - Engineer
BS	-	Bachelor of Science
CC	-	Construction Component (Test)
CFR	-	Code of Federal Regulations
CID	-	Construction Interface Document
CPP	-	Chemical Processing Plant
DCS	-	Distributed Control System
DOE	-	U.S.Department of Energy
DOE-ID	-	U.S.Department of Energy - Idaho Operations
EPA	-	U.S.Environmental Protection Agency
f'c	-	Specified Compressive Strength at 28 Days
Fy	-	Yield Strength of Bar Steel
g	-	Acceleration Due to Gravity
GFE	-	Government Furnished Equipment
ICBO	-	International Conference of Building Officials
ICPP	-	Idaho Chemical Processing Plant
INEL	-	Idaho National Engineering Laboratory
LET&D	-	Liquid Effluent Treatment and Disposal Facility
LITCo	-	Lockheed Idaho Technologies Company
M&O	-	Maintenance and Operations
mph	-	Miles Per Hour
NACE	-	National Association of Corrosion Engineers
NWCF	-	New Waste Calciner Facility
OBE	-	Operating Base Earthquake
ppm	-	Part Per Million
psf	-	Pounds Per Square Foot
psi	-	Pounds Per Square Inch
psig	-	Pound Per Square Inch Gauge
PT	-	(Liquid) Penetration Test
QA	-	Quality Assurance
QC	-	Quality Control
RCRA	-	Resource Conservation and Recovery Act
RT	-	Radiograph Test
SO	-	System Operation (Test)
SS	-	Stainless Steel
WINCO	-	Westinghouse Idaho Nuclear Company

1.0 INTRODUCTION

The U.S. Department of Energy (DOE) is the owner of the Idaho National Engineering Laboratory (INEL), and Lockheed Idaho Technologies Company (LITCo) is the operator of the Liquid Effluent Treatment and Disposal (LET&D) Acid Recycle System. Westinghouse Idaho Nuclear Company (WINCO) was the Maintenance and Operations (M & O) contractor for the Idaho Chemical Processing Plant (ICPP) until October 1, 1994. Fluor Daniel Inc. (Fluor Daniel) was retained by WINCO under WINCO P.O. 222742 on March 18, 1992, to provide "Engineering Services for Certification of the Design, Installation and Testing of the LET&D Acid Recycle System" in accordance with the Idaho Hazardous Waste Management Regulations - Title I, Chapter 5. These regulations incorporate by reference the 40 CFR series with exceptions. All further regulatory citations will reference the applicable 40 CFR parts. This in no way implies that the State of Idaho does not have primacy; rather it allows the reader to easily access the exact wording of the regulation.

This work was awarded to Fluor Daniel in June of 1992. Fluor Daniel assembled an independent team of engineering professionals under the direction of a registered professional engineer, Mr. Michael J. Hickey, P.E., to perform certification activities. Fluor Daniel prepared a project execution plan and schedule, conducted planning discussions with WINCO and held a project kick-off meeting with the project technical staff. Design A-E drawings, specifications, procedures, calculations and reports were assembled and reviewed. During the early stages of the design assessment, the design conditions of the acid transfer lines were revised to match the worst case transfer conditions which could occur in the LET&D Facility. This resulted in modifications to the LET&D transfer system including replacement of a steam transfer jet with a spare diaphragm pump.

Fluor Daniel performed all design modifications associated with replacement of the steam transfer jet. The Acid Recycle System design also went through a series of modifications which were documented as Construction Interface Documents (CID's). The CID's were periodically sent to Fluor Daniel where they were grouped by engineering discipline for review. Fluor Daniel also performed reviews of all pipe stress analysis calculation packages sent from the double contained pipe fabricator and the design A-E.

Interviews were conducted with on-site personnel. Registered professional engineers from various engineering disciplines visually inspected the Acid Recycle System in both the new and existing facilities. The work activities were checked against the requirements of 40 CFR 264.192 in order to develop this RCRA Certification document.

Technical direction was provided in the Project Design Criteria prepared on Feb. 10, 1989, by WINCO Project Manager C.W. Olsen and approved on June 1, 1989, by DOE Manager of Projects B.G. Edgerton. The detailed engineering design packages and construction interface document sketches were prepared by EG&G Idaho, Inc. EG&G Idaho, Inc. was a direct contractor to DOE Idaho and had no contractual relationship with Fluor Daniel, Inc. on this project. The original EG&G design and construction packages were approved by WINCO Project Manager K.W. Richardson on Nov. 20, 1991. All WINCO approved, RCRA related CID's were reviewed by Fluor Daniel, Inc. The design of the double contained acid transfer lines was subcontracted to PermAlert ESP and approved by WINCO Project Manager K.W. Richardson on Nov. 29, 1993. The DOE Project Manager responsible for the LET&D Acid Recycle Project during detailed design and construction was J.L. McNew.

2.0 CERTIFICATION TEAM

The LET&D Acid Recycle System RCRA Certification has been prepared under the direction and supervision of Mr. Michael J. Hickey, P.E. Mr. Hickey holds a bachelor's degree in civil engineering, is a registered professional engineer in the State of Idaho and has 19 years of environmental and engineering management experience. Mr. Hickey has been involved in numerous RCRA and CERCLA projects and is knowledgeable of the RCRA regulatory requirements. Technical specialists assisting Mr. Hickey in the RCRA certification activities were Messrs. James A. McClellan, P.E., Marcia S. Brown, P.E., Christopher J. Inano, P.E., and Daniel R. Nerison. Mr. McClellan is a mechanical engineer with over 19 years experience; Mrs. Brown is a civil/structural engineer with RCRA experience at the Rocky Flats Facility in Colorado; and Mr. Inano is a corrosion protection engineer with over 15 years experience. Project coordination was provided by Mr. Daniel R. Nerison, a piping and plant design engineer with over 10 years experience in nuclear and RCRA related design at the Idaho Chemical Processing Plant.

3.0 DESCRIPTION OF THE LET&D ACID RECYCLE SYSTEM

The LET&D Acid Recycle System will store and transfer 6 to 12 molar nitric acid for use in the existing New Waste Calciner Facility (NWCF). The system includes transfer lines which are the containment systems for moving the acid from the LET&D facility to the Acid Storage Tank VES-NCR-171, and then to the NWCF to be used as acid feed for the Calciner Scrub and Filter Leach Systems. Since the feedstock to the Acid Recycle System is a process waste stream and meets the definition of a corrosive waste under 40 CFR 261.22, the Acid Recycle System engages in the storage and transfer of hazardous wastes under RCRA. Therefore, the Acid Recycle System is regulated under 40 CFR Part 264 - Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities and 40 CFR Part 270 - EPA Administered Permit Programs: The Hazardous Waste Permit Program. The LET&D Acid Recycle System uses a storage tank, a head tank, transfer piping, valves and pumps (diaphragm and steam jet) to transfer and store hazardous waste, therefore the system is specifically regulated under 40 CFR 264 Subpart J - Tank Systems. Subpart J regulates the design, installation, testing, inspection, operation, leak response and closure of hazardous waste tank systems. Section 264.192(a) of Subpart J requires a Professional Engineer's certification of the LET&D Acid Recycle System which is the purpose of this document.

Other sections of 40 CFR 264 contain regulations applicable to the LET&D Acid Recycle System under RCRA. These regulations include items such as waste analyses, security, facility inspections, personnel training, preparedness and prevention, contingency plan and emergency procedures, and closure requirements. Regulations relating to the Part A and Part B Permit Applications are contained in 40 CFR 270. This RCRA certification becomes part of the system RCRA Permit and must be retained on file at the facility and be available for inspection by the cognizant regulatory agency.

The LET&D Acid Recycle System is a self-contained system that stores and recycles a radiologically tainted nitric acid liquid bottoms stream from the LET&D acid fractionators located in CPP-1618. The recycle system is housed primarily in the acid storage tank enclosure Room 443 located on the south side of the New Waste Calciner Facility (NWCF), CPP-659.

The LET&D bottoms stream is pumped via double contained transfer line 1"-PL-AD-152039 to Acid Storage Tank VES-NCR-171 where it is stored for future use as calciner scrubber solution in the NWCF, or transferred to NWCF vessel VES-NCC-119 for use as decontamination solution, or transferred to the tank farm. The acid is air lifted to Acid Storage Tank VES-NCR-

171 to Head Tank VES-NCR-173 and then gravity transferred to the NWCF via double contained transfer line 1"-NA-AD-151674. Once inside the NWCF, the double containment consists of valve splash boxes which protect personnel from the potential of leaky valve stems and flanged connections, and the existing epoxy coated concrete walls and floors which would prevent any leak migration into soil areas outside. All double contained pipe routings are equipped with liquid sensing cables and the valve splash boxes are equipped with acid specific sensing cables with alarms and locator modules. The radiologically tainted acid is contained within the stainless steel lined reinforced concrete floor and walls which make up the Acid Storage Tank Enclosure Building, Room 443. Room 443 is equipped with a stainless steel lined low point Sump, SU-NCR-174. The sump is equipped with a differential pressure level transmitter which sends level indication and a high level alarm to the NWCF DCS. Should a leak be detected in Sump SU-NCR-174, evacuation of the sump is by Steam Jet JET-NCR-506 to the NWCF via double contained transfer line 1"-NA-AD-156174. The balance of the containment is either within the stainless steel double contained transfer lines, the stainless steel valve splash boxes, or the existing epoxy coated walls and floors within the NWCF. Should any leakage occur in these areas, the leakage will be detected by either the sensing cables, the sump liquid level probe, or by visual inspection. Once a leak is discovered, the system will be promptly shut down.

4.0 DESIGN ASSESSMENT

4.1 Design Assessment Approach

This design assessment covers the new LET&D Acid Recycle System located at the INEL near Idaho Falls, Idaho. In order to conduct this design assessment, Fluor Daniel assembled and reviewed drawings, calculations, specifications and construction interface documents related to the system. Primary containment features of the system include double contained transfer piping 1"-PL-AD-152039 and 1"-NA-AD-156174, Acid Storage Tank VES-NCR-171 and Head Tank
VES-NCR-173. Secondary containment features include an overhead pipe bridge with stainless steel enclosure, stainless steel double contained piping for exterior aboveground and underground transfer lines, the stainless steel lined Storage Tank Enclosure Room 443, the stainless steel lined Sump SU-NCR-174, and existing corridors, cells and valve box enclosures within the NWCF.

4.2 Regulatory Requirements

Regulatory requirements to ensure the proper design of hazardous waste tank systems are contained within 40 CFR 264.192 Design and Installation of New Tank Systems or Components and 40 CFR 264.193 Containment and Detection of Releases. 40 CFR 264.192 regulates the design and integrity of tank systems and 40 CFR 264.193 regulates the design and integrity of secondary containment and leak detection systems. The design certification requirements are contained within 40 CFR 264.192(a) and 40 CFR 264.192(g). These citations are as follows:

> (a) Owners or operators of new tank systems or components must obtain and submit to the Regional Administrator, at time of submittal of Part B information, a written assessment, reviewed and certified by an independent, qualified registered professional engineer, in accordance with § 270.11(d), attesting that the tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. The assessment must show that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail.

(g) The owner or operator must obtain and keep on file at the facility written statements by those persons required to certify the design of the tank system and supervise the installation of the tank system in accordance with the requirements of paragraphs (b) through (f) of this section, that attest that the tank system was properly designed and installed and that repairs, pursuant to paragraphs (b) and
(d) of this section, were performed. These written statements must also include the certification statement as required in § 270.11(d) of this chapter.

The design assessment must include the following information, as applicable:

Design Standards: Design standards according to which the tanks and the ancillary equipment are constructed [40 CFR 264.192(a)(1)]

Waste Characteristics: Hazardous characteristics of the wastes to be handled [40 CFR 264.192(a)(2)]

Corrosion Protection: For tank systems or components where external components or shells are in contact with soils or water, a corrosion expert must evaluate and certify the corrosion protection system [40 CFR 264.192(a)(3) and 40 CFR 264.192(f)]

Vehicular Traffic Protection: Design measures that will protect the tank system against potential damage [40 CFR 264.192(a)(4)]

Tank Foundation: Must be designed to maintain the load of a full tank [40 CFR 264.192(a)(5)(i)]

Structural Support: Tank systems must be anchored to prevent floatation or dislodgement from groundwater, seismic events or frost heave [40 CFR 264.192(a)(5)(ii) and (iii)]

Backfill: Tank systems and components that are placed underground must be provided with properly prepared and compacted backfill materials [40 CFR 264.192(c)]

Ancillary Equipment Support and Protection: Ancillary equipment includes the head tank, diaphragm and jet pumps, connecting piping and valves. All items must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction [40 CFR 264.192(e)]

The design and installation of secondary containment systems and leak detection systems are regulated under 40 CFR 264.193. The secondary containment systems must be designed, installed and operated to prevent any migration of wastes or accumulated liquids out of the system to the soil, groundwater, or surface water during the use of the tank system and be capable of detecting and accumulating released liquids [40 CFR 264.193(b)(1) and (2)]. In order to meet these requirements, the design assessment for the secondary containment systems must include the following information.

Type of Secondary Containment for Tanks: Secondary containment for tanks must consist of a liner, vault, double-walled tank or an equivalent device [40 CFR 264.193(d)]

Types of Secondary Containment for Ancillary Equipment: Ancillary equipment must be provided with secondary containment; examples of which include trenches, jacketing and double-walled piping; except for (1) aboveground piping, (2) welded flanges, joints and connections, (3) sealless or magnetic coupling pumps and sealless values and (4) pressurized aboveground piping systems with automatic shut-off devices (e.g. excess flow check values, flow metering shutdown devices, or loss of pressure actuated shut-off devices) that are visually inspected for leaks on a daily basis [40 CFR 264.193(f)]

Design Capacity: The secondary containment system must be capable of containing 100 percent of the capacity of the largest tank within the containment boundary [40 CFR 264.193(e)(1)(i), (e)(2)(i) and (e)(3)(i)]

Liner Materials: Materials used to construct secondary containment must be compatible with the wastes to be placed within the tanks [40 CFR 264.193(c)(1)], must be free of gaps and cracks [40 CFR 264.193(e)(1)(iii)] and must prevent waste migration out of the liner and into the concrete [40 CFR 264.193(e)(2)(iii) and (iv)]

Secondary Containment Failure Prevention: Secondary containment systems must have sufficient strength and thickness to prevent failure owing to pressure gradients, waste contact, climatic conditions and the stress of daily operations [40 CFR 264.193(c)(1)]

Foundations: Secondary containment must be placed on a foundation or base capable of providing support to the secondary containment system, resistant to pressure gradients and capable of preventing failure due to settlement, compression or uplift [40 CFR 264.193(c)(2)]

Leak Detection: Secondary containment systems must be provided with leak detection designed to detect a release within 24-hours of a release [40 CFR 264.193(b)(2) and 40 CFR 264.193(c)(3)]

Release Containment and Removal: Secondary containment systems must be sloped or otherwise designed or operated to drain and remove liquids from leaks, spills or precipitation. Spilled or leaked waste must be removed from the secondary containment within 24 hours, or in a timely manner [40 CFR 264.193(c)(4)], and must be designed to completely surround the tank [40 CFR 264.193(e)(1)(iv)]

Run-On Diversion/Moisture Barrier: Secondary containment systems must be designed or operated to prevent run-on or infiltration of precipitation and be provided with an exterior moisture barrier or be otherwise designed or operated to prevent moisture migration [40 CFR 264.193(e)(1)(ii), (e)(2)(ii), and (e)(2)(vi)]

4.3 Potential Process Fluids

The effluent process stream from the LET&D facility being transferred to CPP-659 via the Acid Recycle System consists of fractionator bottoms product, 6 to 12 molar nitric acid containing the radionuclides specified in Table 4.3-1.

TABLE 4.3-1

LET&D BOTTOMS SOLUTION COMPOSITIONS

COMPONENT	CONCENTRATION
HNO_3, M	6 -12
F, mg/L	1000 - 1600
Al, * N	.11 - .17
Cl, mg/L	50 - 75
SO_4, mg/L	<500
Hg, mg/L	20
Cd, mg/L	10
H-3, mCi/L	1.3E-2 – 7.4E-2
I-129, mCi/L	1.6E-4 – 8E-4
Sr-90, mCi/L	1.6E-3 – 9.2E-4
Zr-95, mCi/L	1.5E-4 – 3.6E-4
Nb-95, mCi/L	1.8E-6 – 5.2E-4
Ru-106, mCi/L	1.0E-2 – 5.9E-4
Sb-125, mCi/L	1.0E-4 – 5.2E-3
Cs-134, mCi/L	1.0E-4 – 2.3E-4
Cs-137, mCi/L	1.0E-2 – 4.7E-4
Ce-144, mCi/L	1.5E-3 – 4.8E-4
Pu, mCi/L	1.2E-4 – 6.6E-5
* at 2Al:F	

4.4 Structural Integrity Assessment

Fluor Daniel identified, located and assembled the necessary drawings, specifications and supporting calculations to facilitate the structural integrity assessment. The original design drawings, copies of the contract specifications and copies of the supporting calculations are stored in a readily retrievable manner by the operating contractor LITCo.

4.4.1 Design Standards

The LET&D Acid Recycle components were identified in accordance with the following design criteria:

- DOE Order 6430.1A, "General Design Criteria Manual", Dec. 1987.
- DOE-ID Architectural Engineering Standards, Revision 7, Feb. 1987.
- ID-12044 Operational Safety Criteria Manual, Rev. April 1985.
- Project Design Criteria, Feb. 1989, as modified by ECR 13.2-24, July 1993.
- INEL Welding Manual

These design criteria reference and incorporate the following industry standards applicable to the design of the LET&D Acid Recycle components:

- ACI 318, "Building Code Requirements for Reinforced Concrete," 1983, including 1986 supplement.
- ANSI A58.1, "Minimum Design Loads for Building and Other Structures," 1982.
- AISC, "Load and Resistance Factor Design, Manual of Steel Construction," 1986.
- ICBO, "Uniform Building Code," 1985.
- ASME B31.3, "Chemical Plant and Petroleum Refinery Piping," 1990.

- ASME, "Boiler and Pressure Vessel Code," 1987.

4.4.2 Storage Tank Enclosure Building, Room 443:

The design assessment of the LET&D Acid Recycle Storage Tank Enclosure Building included an evaluation of the structural integrity to withstand dead, seismic and any applicable internal tank forces. Design calculations were reviewed for conformance with DOE-ID Architectural Engineering Standards, UCRL-15910 and DOE Order 6430.1A. The tank enclosure building is categorized as a "low hazard" essential facility with an importance factor of 2.0 for seismic design. A review of the design A-E drawings, specifications, calculations and construction interface documents (CID's) was performed to evaluate the integrity of the secondary containment. A volumetric evaluation of the building was made to assure full containment in the event of a spill.

The Storage Tank Enclosure Building is composed of reinforced concrete, masonry and precast concrete panels. The foundation is reinforced concrete with a sump located in the southeast corner. Stainless steel lining is provided at the floor level, at the base of the walls and in the sump to prevent possible contaminants from migrating into the concrete or soil. All structural steel within the building is stainless steel for corrosion resistance. The structure was designed for the following load conditions in accordance with the identified design standards:

Earthquake:	0.183g Horizontal Acceleration
Wind:	80 mph at Roof Height
Snow:	110 psf Snow Load & Drift Effects
Dead:	101 psf Roofing
Earth:	55.5 psf Lateral Earth Pressure
Live:	20 psf Roof Load

The building structure was designed and constructed of the following materials:

Carbon Steel:	ASTM A36 Structural Shapes ASTM A307 Bolts ASTM A500 Tubing ASTM A554 Mechanical Tubing

Stainless Steel:	ASTM A240 Plate ASTM A276 Structural Shapes ASTM A193 Bolts ASTM A194 Nuts
Concrete:	f'c = 4,000 psi, Walls, Slabs, Roof Topping f'c = 5,000 psi, Precast panels
Reinforcement Bars:	ASTM A615, Fy = 60 psi

4.4.3 Storage Tank VES-NCR-171 and Head Tank VES-NCR-173 Supports:

The design assessment of the Storage Tank and Head Tank also included an evaluation of the structural integrity of the supports to withstand dead, seismic and any applicable internal tank forces. Design calculations were reviewed for conformance with DOE-ID Architectural Engineering Standards, UCRL-15910, and DOE Order 6430.1A. The supports are categorized as a "low hazard" essential facility with an importance factor of 2.0 for seismic design. The Storage Tank Enclosure Building design accounts for the additional loads imposed by the Storage Tank and Head Tank supports. The Storage Tank is supported approximately 2 feet above the finished floor by four reinforced concrete piers. The supports are integrated with the building foundation through additional dowels and reinforcement. The foundation for the Storage Tank will withstand a full volume load plus seismic loads and any other internal forces.

The Head Tank supports secure the tank along the wall of the Storage Tank Enclosure Building. The supports are constructed of bolted stainless steel angles and are securely fastened to the wall with concrete expansion anchors.

Structural design considerations included measures to minimize building displacement, differential settlements and vibration. As a result, piping systems attached to the building in multiple locations will not be subject to excessive stresses induced by building motions.

All aspects of the structural package completed by the design A-E including all structural steel and concrete meet the RCRA Certification requirements. It is Fluor Daniel's assessment that the Storage Tank Enclosure Building, Storage Tank supports and Head Tank supports are adequately designed to withstand anticipated loads.

4.4.4 Piping Systems

The LET&D Acid Recycle piping systems consist of 304L Stainless Steel pipe and fittings (Class AR and AD), 304L or 316L Stainless Steel tube and fittings (Class AM) and malleable iron piping and fittings (Class NN). The various fittings are joined together by buttwelding, socketwelding, compression fittings, screwed fittings or by flanged connections. These systems provide a means of transfer for the various process and utility streams which makeup the LET&D Acid Recycle System. All systems are designed in accordance with the DOE-ID Architectural Engineering Standards, Rev. 7, and ID-12044, Operational Safety Criteria Manual, Rev. 04-85.

Service Categories Nitric Acid (NA), Decontamination Fluid (DC), and Process Liquid (PL) are designed to the requirements of ASME/ANSI B31.3 Chapter VIII, piping for category M Fluid service. All utility service categories are designed to ASME/ANSI B31.3 Chapters II thru VII, non category M (base code requirements). Category M chemical process fluids were identified as those including the pumped nitric acid fractionator bottoms solution transfer from the LET&D Bottoms Tank VES-WLL-195 to the Storage Tank VES-NCR-171 and the gravity flow nitric acid transfer from VES-NCR-171 to tie-points located in the South Operating Corridor of CPP-659. All Category M acid transfer pipe routings are fabricated from schedule 80 stainless steel pipe and fittings. The Category M routings are located either within schedule 10 stainless steel secondary containment pipe sleeves, within the stainless steel lined storage tank enclosure, or within epoxy coated rooms and corridors within CPP-659.

The transfer system begins in the LET&D Facility (CPP-1618), where the acid is pumped from the Bottoms Tank VES-WLL-195 by the two Bottoms Tank Pumps P-WLL-296-1 & 2. The acid runs overhead to a highpoint in the LET&D pipe bridge. The bridge is equipped with a stainless steel drain pan with leak detection. The transfer line 1"-PL-AD-152039 exits the pipe bridge and is routed within a schedule 10 stainless steel secondary containment pipe. The double contained transfer line is supported overhead from existing CPP-605 support steel. The line passes underground and continues approximately 325 feet where it enters the Storage Tank located in the Enclosure Building. Secondary containment and leak detection are continuous throughout the underground pipe routings. The secondary containment gravity drains to the stainless steel lined sump where an encasement low point drain valve is provided. Within the Storage Tank Enclosure, the category M transfer system includes piping for air lifting the acid to the Head Tank where it then gravity flows forward to the NWCF Off-Gas Cell. The system was designed without pockets or traps to allow for flushing and free draining.

Acid transfer line 1"-NA-AD-151674 is routed underground from the Storage Tank to the NWCF utility corridor. Secondary containment and leak detection are continuous throughout the underground routing. The outer containment pipe and leak detection terminate inside the epoxy coated reinforced concrete utility corridor where an encasement low point drain valve is provided.

The transfer line is then routed overhead inside CPP-659 into the south operating corridor where it tees into two stainless steel secondary containment valve boxes. These East and West Valve Splash Boxes provide secondary containment for the flanged control valve manifolds which direct the acid into various tie-points transferring to VES-NCC-119 for use as decontamination solution or for direct transfer to the tank farm. Both valve splash boxes are equipped with low point drains. The valve boxes are located overhead in the NWCF South Operating Corridor. They are equipped with acid specific leak sensing cables since their location makes visual inspection inside the boxes difficult.

All category M routing inside the NWCF without outer containment piping and leak detection will require scheduled visual inspection. Where outer containment drains are provided at encasement low points, the drain valves are equipped with clear acid resistant tubing routed to clear acid resistant drain bottles located and fixed at floor locations within easy access for inspection. Stainless steel pipe sleeves are provided where pipe passes through concrete walls, floors and roofs for all Category M chemical process and nitric acid transfer lines.

All Category M hazardous chemical piping systems were stress analyzed using the PipePlus computer program per ANSI/ASME B31.3 (through 1992 addenda). Seismic factors are in accordance with the Uniform Building Code (1991 Edition). The calculation files were developed in two separate packages: (1) PermAlert ESP - Secondary contained transfer pipe routings. (2) EG&G Idaho, Inc. - Storage Tank Enclosure and CPP-659 pipe routings.

Piping is not routed through electrical rooms, over electrical equipment or office areas. All wall penetrations are sleeved to protect the piping.

All piping systems are color coded and tagged in accordance with DOE-ID, A/E Standards and ID-12044, Operational Safety Design Criteria Manual.

4.4.5 Corrosion Protection for Buried Category M Acid Transfer Lines

The corrosion system protects the buried transfer lines 1"-PL-AD-152039 and 1"-NA-AD-151674. The lines carry nitric acid and are fabricated from 304L stainless steel carrier and containment piping.

The lines are connected to the cathodic protection system through rectifier REC-NCE-6 and are bonded to other piping in the existing cathodic protection system through Test Bond Station TBS-NCE-21.

The lines require corrosion protection per 40 CFR 264.192. The installation of the cathodic protection system was supervised by the Electrical SubContractors Superintendent and inspected by an Independent Corrosion Expert from Fluor Daniel. The assessment of the corrosion protection systems consisted of a review and acceptance of:

- Coating design on exterior of secondary containment pipe.
- Installation procedures, that installation and inspection was supervised by an "Independent Corrosion Expert" per 40 CFR 264.192(b).
- Inspection records and conversations with the site Cathodic Protection Engineer to verify that the requirements of 40 CFR 264.192(b) and NACE RP-02-85 inspection requirements had been met.
- Design of seals, methods of assuring dryness for the annular space between carrier and containment pipe. The seals are critical in preventing moisture in this area since it is not feasible to isolate the exterior "casing" from the carrier pipe as recommended by NACE RP-01-69.
- Connections at Test Bond Station TBS-NCE-21 to assure the pipelines are bonded to the rest of the ICPP Cathodic Protection system, mitigating the effects of stray current.
- Current operating load on rectifier REC-NCE-6 to assure that adequate capacity is available to protect the new transfer lines.

- Records to assess that WINCO procedure 4.4.2.9, "Cathodic Protection System Checking and Testing" which is in compliance with the CFR requirements, had been followed.

It is Fluor Daniel's assessment that all Category M Acid Transfer piping has been adequately designed, cathodically protected and contained against hazardous spills which could be encountered.

4.4.6 Acid Storage Tank VES-NCR-171

The LET&D acid storage tank is part of a nitric acid LET&D bottoms storage system which is regulated by RCRA (40 CFR 260.10) as an aboveground tank. The tank installation includes secondary containment and leak detection systems. The tank is used for storage or treatment of nitric acid which is considered to be RCRA waste and requires design and installation to 40 CFR 264 Regulations as well as Certification to Sections 264.31 in accordance with Section 270.11(d).

The assessment of the Storage Tank structural integrity and acceptability for storing the designated hazardous material included review and acceptance of:

- The storage tank proper, tank connections and attached components, tank supports, welded seams and controls showing that the tank has sufficient structural strength, compatibility with the waste stored and corrosion allowance to assure that the tank will achieve system functional objectives in a safe manner throughout the facility design life.

- Assessment of tank features required for proper operation of the tank in accordance with 40 CFR, Section 264.194, - General Operating Requirements. Included in these issues were spill prevention and overflow protection.

- Appropriate features for tank inspection as required by Section 264.195.

The tank was originally used as a Blow Down Suppression Tank at the LOFT Facility at INEL. The original fluid contained was water with Boron, 3000 ppm B as H_3BO_3. This tank was an ASME Section III Class 2 Coded N stamped vessel (40 CFR 264.191 b1 and b4). Several weld repairs and inspections were recorded during that period.

The tank was in use until LOFT operations concluded in July 1986. Additional modifications were made by Aerojet Nuclear Company and have been recorded up to September 30, 1992 (40 CFR 164.196 e, and f).

The structural integrity of this tank was evaluated and described in Engineering Design File EDF 0051, Attachment 1. It was reported to be structurally sound for the LET&D service by E.W. McArthur, P.E., INEL in 9-8-92, in the above reference.

According to Conference Notes AR-CN-001, dated June 10, 1993, several subsequent modifications were made after the Certification Analyses performed by E.W. McArthur. These modifications included the plugging of instrument taps and removal of internal piping on the code stamped vessel. For the new service as an acid storage tank, VES-NCR-171 operates at atmospheric pressure and therefore does not require a code stamp. The original code stamp was invalidated by these later modifications and the ASME nameplate was removed as part of this project. NDE on all new tank welds included a 100 percent visual inspection with back inspection for all fillet weld root passes and 100 percent LP for all final passes. A leak test with air and soap bubbles was also performed after the modifications were completed.

The tank was inspected prior to the E.W. McArthur investigation for rust, gouging and corrosion rates expected from reuse. Tank wall thickness of 7/8 of an inch was deemed adequate for the increased corrosion rates expected from the nominal 12 molar nitric acid LET&D bottoms solution.

Characterization of the current conditions of the tank with regard to its past history of use and modifications made to the tank from its original configuration included:

- An evaluation of material thicknesses, structural strength and any other characteristics which degrade the original design and impact the tank's ability to meet the new RCRA requirements for the revised mission, intended life and service conditions.

- A review of the Structural Analysis to determine if consideration for past service life have been evaluated along with new requirements for the new intended life and service conditions.

- An evaluation and review of the structural support attachments to the tank for UBC Seismic requirements.

- Performance of field investigation to determine if installed configuration conformed to the reviewed configuration.

All modifications to the tank discussed in Conference Notes AR-CN-001 dated June 10, 1993, were made subsequent to the stress analysis performed by E.W. McArthur and were therefore evaluated in order to support the RCRA Certification Statement. All items listed above have been reviewed. It is Fluor Daniel's assessment that the tank is structurally sound for use in it's newly intended service as a nitric acid storage tank.

4.5 Primary Containment System Assessment

The primary containment system for the LET&D Acid Recycle System consists of the Acid Storage Tank VES-NCR-171, the Head Tank VES-NCR-173 and the interconnecting piping, valves and fittings. During the course of this assessment, mechanical, piping, and structural specifications, drawings, calculations and construction interface documents were reviewed. Specifications, drawings and calculations are stored in a readily retrievable manner by the operating contractor, LITCo.

4.5.1 Design Standards

The LET&D Acid Recycle System primary containment system was designed in accordance with the following general design criteria:

- DOE Order 6430.1A, "General Design Criteria Manual", December 25,1987
- DOE-ID Architectural Engineering Standards, Revision 7, February, 1987
- ID-12044 Operational Safety Criteria Manual, Rev. 04-85
- Project Design Criteria for the LET&D Acid Recycle Project
- INEL Welding Manual

The following industry standards were used in the design of the primary containment system:

- American National Standards Institute (ANSI)
  - B16.104 Control Valve seat Leakage
  - B16.5 Pipe Flanges and Flanged Fittings
  - B16.9 Factory - Made Wrought Steel Buttwelding Fittings
  - B31.3 Chemical Plant and Petroleum Refinery Piping
- American Petroleum Institute (API)
  - Standard 601 Metallic Gaskets for Raised Face Pipe and Flanged Connections (Double Jacketed, Corrugated, and Spiral Wound)
- ASME Boiler and Pressure Vessel Code
  - Section II Material Specifications
  - Section V Nondestructive Examination
  - Section VIII Pressure Vessels
  - Section IX Welding and Brazing Qualifications
- American Society of Nondestructive Testing (ASNT)
  - SNT-TC-1A Recommended Practice

4.5.2 Storage Tank VES-NCR-171 and Head Tank VES-NCR-173

The storage tank was modified, inspected and tested in accordance with the ASME Boiler and Pressure Vessel Code. The newly constructed head tank operates at atmospheric pressure and therefore does not require ASME code certification. The maximum expected temperatures and pressures, however, were considered in determining the design values for the Head Tank. Equipment in contact with nitric acid was fabricated from Type 304, 304L or 316L stainless steel. Appropriate corrosion allowances were added to wall thicknesses to provide a 20 year life. It is Fluor Daniel's assessment that the tanks will maintain primary containment under intended service conditions.

4.5.3 Piping, Valves, and Fittings

All hazardous waste containing piping was designed in accordance with the ANSI B31.3 Piping Code for Category M service. Hazardous waste containing valves and fittings were designed in accordance with the ANSI codes listed in section 4.5.1. The maximum expected temperatures, pressures and thermal expansions were considered in the design of all piping systems. Piping systems in contact with nitric acid were fabricated from type 304L or 316L stainless steel. Appropriate corrosion allowances were added to wall thicknesses to provide an appropriate design life. It is Fluor Daniel's assessment that the piping, valves and fittings will maintain primary containment under intended service conditions.

4.5.4 Welding

All welding and Non-Destructive Examinations (NDE) for the LET&D Acid Recycle System were performed in accordance with the INEL Welding Manual, the ASME Boiler and Pressure Vessel Code – Sections V and IX, and ANSI B31.3. Weld inspection, except for visual inspection, was performed by personnel certified in accordance with the ASNT recommended practice SNT-TC-1A. It is Fluor Daniel's assessment that the welding and weld inspection are adequate to maintain primary containment under postulated operating conditions.

4.5.5 Vehicle Impact Protection

All mechanical equipment and most piping are located within the acid storage tank enclosure or within the NWCF where vehicle impacts are not possible. The buried acid transfer lines 1"-PL-AD-152039 and 1"-NA-AD-151674 are routed under existing vehicle traffic corridors and parking areas. These routings are completely contained within secondary outer containment pipes which were analyzed and proven to be more than sufficient to withstand anticipated loadings. It is Fluor Daniel's assessment that vehicle impact protection is adequate to maintain primary and secondary containment under intended vehicle loads.

4.5.6 Materials Compatibility

Materials selection for the LET&D Acid Recycle System are based on the intended service being the transfer and storage of cold nitric acid. All storage tank, head tank and transfer piping components which come in contact with the nitric acid are made from type 304, 304L or 316L stainless steel. Adequate wall thicknesses required to meet the intended system design life were considered in selection of the previously used storage tank and specific piping components. Acid transfer line 1"-PL-AD-152039 and acid storage tank VES-NCR-171 were designed to meet maximum conditions of 100 psig at 200 degrees Fahrenheit. This design temperature was based on a "worst case" condition where a rupture at the LET&D would require a quick transfer of hot bottoms solution to VES-NCR-171. Acid transfer line 1"-NA-AD-151674 was designed to meet maximum conditions of 100 psig at 350 degrees Fahrenheit. This design temperature was based on a steam jet transfer of liquid from the acid storage tank enclosure sump. These design parameters are for extreme upset conditions which are unlikely to occur. The normal operating conditions for the acid recycle storage system are 60 to 80 degrees Fahrenheit at 15 psig. It is Fluor Daniel's assessment that materials selected for the Acid Storage Tank and acid transfer lines will maintain primary containment under intended service conditions.

4.6 Secondary Containment

The LET&D Acid Recycle System design uses a variety of secondary containment devices to ensure compliance with both DOE and State of Idaho requirements. The secondary containment consists of schedule 10 stainless steel outer containment for transfer lines 1"-PL-AD-152039 and 1"-NA-AD-151674. The 1"-PL-AD-152039 outer containment slopes towards the storage tank enclosure sump SU-NCR-174 while the 1"-NA-AD-151674 outer containment slopes towards the NWCF. Sump SU-NCR-174 is stainless steel lined with the transfer line outer encasement pipes sealed to the liner at the points of entry. Stainless steel outer encasement pipes and leak detection are continuous from the LET&D facility to the point where transfer line 1"-NA-AD-151674 enters the NWCF Utility Corridor. Inside CPP-659 the secondary containment consists of existing epoxy coated reinforced concrete floors, walls and valve splash boxes.

Where flanged control valves exist in personnel access areas of the transfer system, special stainless steel valve splash boxes with acid sensing leak detection have been provided. All

Category M pipe routings routed in the concrete corridors will require daily scheduled visual inspection for leak detection assessment.

4.6.1 Design Standards

The LET&D Acid Recycle System secondary containments were designed in accordance with the following design criteria:

- DOE Order 6430.1A, "General Design Criteria Manual", December 25, 1987.
- DOE-ID Architectural Engineering Standards, Revision 7, February 1987.
- ID-12044 Operational Safety Criteria Manual, Rev. 4-85.
- Project Design Criteria, Feb. 1989, as modified by ECR 13.2-24, July 1993.
- INEL Welding Manual

These design criteria reference and incorporate the following industry standards applicable to the design of the secondary containments:

- ACI 318, "Building Code Requirements for Reinforced Concrete," 1983, including 1986 supplement.
- AWS D1.1, "Structural Welding Code – Steel," 1987.

4.6.2 Adequacy for Handling Potential Leaks

Potential leaks from LET&D Acid Recycle System components will be captured in the secondary containment outer piping, in the stainless steel lined acid storage tank enclosure, or in the NWCF. The buried transfer lines are provided with continuous liquid leak sensing cable capable of identifying leakage points. The leak detection system alarms the NWCF and CPP-604 control rooms which automatically stops the transfer of solution from the LET&D facility. The transfer of acid from the LET&D facility to the storage tank is a remote operation controlled from the CPP-604 control room with status information provided to the CPP-659 control room. The acid storage tank volume is controlled by level instrumentation connected to a high level alarm. The acid transfer is interlocked through the plant distributive control systems such that high level in the storage tank will stop the transfer from the LET&D facility.

A bypass around the storage tank is provided so that acid can be sent to the tank farm via VES-NCC-119 in the NWCF when the VES-NCR-171 is unavailable for use. The buried, double contained acid transfer lines are constructed to slope either toward the storage tank enclosure sump or toward the NWCF.

The acid storage tank has a total capacity of 22,500 gallons. The project design criteria calls for a minimum working volume of 15,000 gallons. The stainless steel lined portion of the storage tank enclosure building was sized to contain the maximum tank capacity plus 20 minutes of firewater flow. The storage tank is provided with level indication and high and low level alarms, pressure indication and high pressure alarm, density indication, temperature indication, and a sampling system. The storage tank enclosure secondary containment consists of an 11 gauge stainless steel liner sloping to Sump SU-NCR-174. The sump is equipped with level instrumentation for detecting moisture in the sump. In the unlikely event of a catastrophic failure of the acid storage tank, evacuation of the sump and stainless steel lined enclosure would be accomplished manually by steam jet transfer to VES-NCC-119.

It is Fluor Daniel's assessment that the physical secondary containment features provided are sufficient for containment and handling of the nitric acid volumes expected to be transferred and stored in the LET&D Acid Recycle System.

4.6.3 Structural

The 11 gauge stainless steel liner plate serving as the secondary containment for the acid storage tank enclosure is designed to be leak-tight. Building operating conditions and building structural response to external load conditions is not expected to impair the ability of the liner plate to remain leak-tight. The liner plate is sloped to drain into Sump SU-NCR-174. The sump is sized to contain small leaks. The stainless steel lined portion of the enclosure building is sized to contain the full volume of the 22,500 gallon storage tank. All visually observed and detected leaks into the secondary containment will be removed in a timely manner. Because this secondary containment is located entirely within an enclosed building, infiltration of rainfall or stormwater drainage is precluded. In addition, the concrete walls and foundation of the building provide an additional barrier between the secondary containment and the soil and groundwater. It is Fluor Daniel's assessment that the secondary containment has sufficient structural features to preclude migration of wastes out of the system to the soil, ground water and surface water.

4.6.4 Materials Compatibility

Secondary containment of the acid storage tank and transfer lines is provided by the enclosure building, the outer pipe encasements and the NWCF floors and walls. The enclosure building and the NWCF are constructed from reinforced concrete. The entire floor area and approximately 5 feet of the walls in the enclosure building are lined with 304L stainless steel plate metal. The remaining wall surfaces and ceiling in the enclosure building and in the NWCF are epoxy coated with an epoxy suitable for acid decontamination. These materials can withstand the corrosive behavior of the process fluids.

4.6.5 Run-On Diversion / Moisture Barrier

The LET&D acid recycle storage tank is located within a fully enclosed building. This building extends approximately 4 feet below grade. The outer containment pipes for the buried transfer lines have been sufficiently coated for moisture resistance. The surrounding terrain has been properly contoured for surface water management. Surface water run-on and soil moisture will not impact the operation of the LET&D Acid Recycle System.

4.6.6 Leak Detection

A floor sump is provided at the southeast corner of the storage tank enclosure. Level transmitters with an alarm which actuates in the distributed control system (DCS) alerts the operator to the presence of any liquid that has spilled and drained to the low point sump SU-NCR-174 in the enclosure building. There are liquid sensing cables in the outer containment pipes enclosing the buried acid transfer lines and acid specific sensing cables in the valve splash boxes in the NWCF south operating corridor. When a leak sensing cable or level indicator indicates the presence of liquid, the operators take the appropriate investigative steps to determine the source and nature of the leak or in the case of the acid line, take actions to isolate the leaking line and shut down operations. The alarms may be activated by loss of primary containment or by leakage. The outer secondary containments are constructed from moisture proof 304L stainless steel schedule 10 pipe and are impermeable to the process fluids. It is Fluor Daniel's assessment that the leak sensing cables, alarms, locator modules and scheduled visual inspections are sufficient for detection of hazardous leaks and subsequent system shutdown.

4.7 Summary of the Design Assessment

Fluor Daniel has reviewed the LET&D Acid Recycle System design including drawings, specifications, construction interface documents, calculations, and performed a visual inspection of the facilities housing the system. It is Fluor Daniel's assessment that the system design conforms with the requirements of 40 CFR 264.192 and 264.193.

5.0 INSTALLATION AND INSPECTION ASSESSMENT

5.1 Introduction to the Installation and Inspection Assessment

A review and evaluation of the overall QA program, documentation recordkeeping and personnel qualifications was conducted to ensure that proper installations and inspections were performed. The certification of the installation was conducted in the following manner. A review was conducted of project committed requirements. QA programs, plans and procedures were used to assure that the work was performed and verified in a controlled manner. Inspections of the site and facilities were performed. Project document controls, work history and inspection records were reviewed as well as personal interviews to assure project compliance with established requirements. Personal interviews were conducted with inspectors, constructors and management personnel who were integral parts of the work performed.

The following is a list of the items reviewed (specific details are shown in Table 5.3-1).

- System Operation (SO) test planning and results thereof
- Inspection Instructions
- Inspection Qualifications
- Project Files
- Component Check Test Procedures
- Non Destructive Test Reports
- Project Documentation Controls
- Engineering Change Requests
- Construction Interface Documents
- Nonconformance Reports
- Planning and Inspection Record Controls
- Weld Maps
- Radiographs
- Worker Qualifications of the Construction Contractor
- Work Control Procedures of the Construction Contractor
- Supplier Documentation
- Procurement Activities Reports

In addition to the review described above, the site and facility inspections included a review and acceptance of:

Acid Storage Tank Enclosure Building, Room 443: Inspected for quality of concrete pours, structural integrity of stainless steel secondary containment liner plate and cracking due to settlement, vibration, expansion and contraction.

Acid Storage Tank VES-NCR-171: Inspected for physical damage, cracks, scrapes, corrosion, punctures and weld breaks.

Underground Transfer Line 1"-PL-AD-152039: Inspected for quality of secondary containment pipe coatings, physical damage during placement of transfer line into pipe trench and quality of backfill material.

Cathodic Protection System for Underground Transfer Lines 1"-PL-AD-152039 and 1"-NA-AD-151674: Inspected all cathodic protection system installation and testing documents for compliance to NACE Standard RP-01-69 (R92).

Aboveground Transfer Line 1"-NA-AD-151674 and 151676: Inspected for general pipe routing, pipe support integrity and spacing, and valve box integrity.

The site and facility inspections for review of the type of documents and field inspections described above, and the interviews of responsible personnel at the jobsite lead us to the conclusion that the work was planned, performed and completed satisfactorily and was done so in a controlled manner.

The original tank fabrication was in accordance with the requirements of ASME NQA-1. All design modifications to the acid storage tank VES-NCR-171 were designed, fabricated and inspected in accordance with the requirements of ASME Section VIII. Shop fabrication and inspection of the tank was performed under the control of ASME NQA-1 requirements. An in-depth assessment of the storage tank is described in section 4.4.6 of this report. All field modifications utilized the quality implementing procedures listed in section 5.3.3.

5.2 Regulatory Requirements

The applicable regulatory requirements related to installation and inspection of tank systems or components are cited in 40 CFR 264.192(b) and (f) as follows:

> 40 CFR 264.192
>
> (b) The owner or operator of a new tank system must ensure that proper handling procedures are adhered to in order to prevent damage to the system during installation. Prior to covering, enclosing, or placing a new tank system or component in use, an independent, qualified installation inspector or an independent, qualified, registered professional engineer, either of whom is trained and experienced in the proper installation of tank systems or components, must inspect the system for the presence of any of the following items:
>
> (1) Weld breaks;
> (2) Punctures;
> (3) Scrapes of protective coatings;
> (4) Cracks;
> (5) Corrosion;
> (6) Other structural damage or inadequate construction/installation.
>
> All discrepancies must be remedied before the tank system is covered, enclosed, or placed in use.
>
> (f) The owner or operator must provide the type and degree of corrosion protection recommended by an independent corrosion expert, based on the information provided under paragraph (a)(3) of this section, or other corrosion protection if the Regional Administrator believes other corrosion protection is necessary to ensure the integrity of the tank system during use of the tank system. The installation of a corrosion protection system that is field fabricated must be supervised by an independent corrosion expert to ensure proper installation. The programs described and the operating instructions were well written and acceptable.

5.3 Installation and Inspection Standards, Criteria and Procedures

The four levels of documentation, procedures and records for the project are as follows: a) Overall Control Level; b) Design Controls; c) Construction Controls; and d) Startup and Testing.

The Quality Program Plan of the maintenance and operations (M&O) contractor states the overall project quality assurance program requirements. Included in this plan is the commitment for QA procedures for the Construction Manager to ensure that work is completed in accordance with technical and quality requirements, and commitments for the operating contractor to assure proper managing and coordinating activities are carried out with the Construction Manager, the Architect - Engineer, the Title III agency and the Department of Energy. The commitment for the Architect - Engineer to assure that design services are provided and designs are accomplished in accordance with established criteria are set forth in this plan. The overall control level consists of the Quality Assurance Project Plan, Special Conditions, Work Control Procedures and Quality Implementing Procedures.

5.3.1 Special Conditions

Special conditions are those documented activities that relate directly to conditions at the site and support the construction effort. A list of the Special Condition procedures used for this project are as follows:

SPECIAL CONDITIONS FOR
THE LET&D ACID RECYCLE SYSTEM

SECTION	TITLE
SC-1	PROJECT CLASSIFICATION AND LOCATION
SC-2	DEFINITIONS
SC-3	CONSTRUCTION RESTRAINTS
SC-4	ACCESS TO CONSTRUCTION SITE
SC-5	QUALITY ASSURANCE
SC-6	TELEPHONE SERVICE
SC-7	ELECTRICAL POWER FOR CONSTRUCTION
SC-8	TOILET AND WASHROOM FACILITIES
SC-9	TEMPORARY WATER FACILITIES
SC-10	DESIGNATED LAYDOWN AND/OR STORAGE AREAS FOR CONSTRUCTION MATERIAL
SC-11	CONCRETE AND CONCRETE AGGREGATE

<u>ATTACHMENTS</u>

5.3.2 Work Control Procedures

In order to assure compliance with the Technical Specifications, the Quality Assurance Work Control Procedures listed below were made a part of this subcontract. The work control procedures were available to the craftsman at each work location.

LIST OF WORK CONTROL PROCEDURES

WCP	A-2	PLACEMENT OF STRUCTURAL AND HIGH DENSITY CONCRETE
WCP	E-1	CONTROL OF INSTRUMENTATION AND ELECTRICAL INSTALLATION
WCP	G-2	CONTROL OF PURCHASE ORDERS AND REQUISITIONS
WCP	P-2	CLEANING AND FLUSHING OF PIPING
WCP	P-3	HYDROSTATIC TESTING
WCP	P-4	SENSITIVE LEAK TESTING
WCP	P-5	HIGH PRESSURE PNEUMATIC TESTING
WCP	S-1	CONTROL OF CONSTRUCTION DANGER TAGS
WCP	S-2	HANDLING OF UNKNOWN MATERIALS PENETRANT

5.3.3 Quality Implementing Procedures

Quality Implementing Procedures are put in place to assure proper control of all training, vendor data, construction, testing and other related documentation.

QIP	2.1	TRAINING & INDOCTRINATION
QIP	3.1	CONSTRUCTION INTERFACE DOCUMENTS
QIP	3.2	VENDOR DATA CONTROL
QIP	3.3	RED LINE DRAWINGS
QIP	5.1	PROCEDURE DEVELOPMENT AND APPROVAL
QIP	5.2	SUBCONTRACTOR QUALITY PLAN DEVELOPMENT & APPROVAL
QIP	6.1	DOCUMENT CONTROL
QIP	7.1	CONTROL OF PURCHASED ITEMS & SERVICES
QIP	8.1	MATERIAL TRACEABILITY

QIP 9.1 WELD RECORD PACKAGE

QIP 11.1 TEST CONTROL

QIP 12.1 CONTROL OF MEASURING AND TEST EQUIPMENT

QIP 13.1 MATERIAL AND EQUIPMENT STORAGE AND MAINTENANCE

QIP 14.1 INSPECTION, TEST AND OPERATIONAL STATUS

QIP 15.1 CONTROL OF NONCONFORMANCES

5.3.4 Design Controls

Design Controls were described in the WINCO QA Requirements and implemented by Engineering Change Requests and Construction Interface Documents. These documents describe the system used to assure that the design is defined, controlled and verified, and that design changes, including field changes are governed by control measures commensurate with those applied to the original design.

5.3.5 Construction Component Test Procedures and Results

In addition to conducting system operation tests to proof the entire system, individual component test procedures were developed and components were tested independent of the entire system to assure the integrity of the individual designated components. These tests as well as the system operation tests were witnessed by quality inspectors who are qualified to analyze, review, inspect, test, audit or otherwise evaluate activities and work results because they are independent personnel who had no direct responsibility for or involvement in performing the activity or work. Also, independent personnel do not report directly to the immediate supervisors who are responsible for performing the activity or work being evaluated.

Weld Maps – Mapping of welds were done to provide the tracking necessary to assure that all welds were completed as planned. The mapping provided documented objective evidence that identified the welder, the procedures used, the inspector, and the non destructive methods used to accept the weld. The weld maps became part of the Quality Records system and are subject to audit.

Radiographs – Radiographs of completed welds that were performed at the jobsite as well as the radiographs that were completed by vendors on supplied equipment were reviewed and accepted by qualified film interpreters. These radiographs are stored in project quality record files and are subject to audit.

Table 5.3-1

Documents Reviewed

Quality Inspection Plan (QIP) Reports (Extracted from overall list):

5881-C-4	Cast in place Concrete - Sump
5881-C-5	Cast in place Concrete - Acid Storage Tank Footings
5881-C-6	Cast in place Concrete - Enclosure Floor
5881-C-11	Cathodic Protection Anode and Electrode Locations
5881-C-15	Cathodic Protection Test Station and Ref. Electrode Locations
5881-C-7	Cast in place Concrete - Enclosure Walls
5881-M-1	Acid Storage Tank UT Thickness Measurements
5881-P-2	Acid Transfer Line Coordinates
5881-P-3	Weld Inspection for Acid Storage Tank Modifications
5881-P-15	Weld Inspection for Acid Storage Tank Modifications
5881-P-16	Acid Transfer Line Outer Pipe Coating
5881-P-18	Weld Inspection for Acid Storage Tank Modifications
5881-P-26	Containment Pipe Material, ASTM-A-312, Grade 304L Seamless or Welded
5881-P-29	Head Tank Fabrication
5881-P-33	Weld Inspection for Acid Storage Tank Modifications
5881-P-43	Weld Inspection on SS Liner Plate and SS Embedded Pipe in Sump
5881-P-47	20% RT Exam. of Shop Welds on Outer Containment Pipe
5881-P-51	20% RT Exam. of Field Welds on Outer Containment Pipe
5881-P-52	Encased Pipe Under Ramp, Slope and Non-Contact with Bore Sleeve
5881-S-2	Acid Storage Tank Anchor Bolt Installation

5881-S-4 Storage Tank Enclosure Liner, Welder Quals. & Plate Weld Examination

5881-S-7 Seal Weld Liner Plate to Embedded Steel

5881-S-17 SS Valve Box Containment Pans, Welder Quals. & Weld Examination

LITCo/WINCO Standard Operating Procedures:

F-18 Procedure for Projects Document Processing

WA-22 Records Management & File Code Index

Construction Interface Documents (Extracted from overall list):

7 Acid Storage Tank Repairs

11 Additional Acid Storage Tank Repairs

19 Sleeve for Containment Piping

28 Double Encased Line Routing

35 Leveling Course under Building Slab

63 Support attachment to Wall

64 Support at Sump

78 East Valve Splash Box

113 Threads on Existing Nozzle Replacement Bolts

120 Sealing of Outer Encasement for 1" Transfer Line at Sump

126 Electric Trace Power Supply

121 Encased Pipe Routing Conflicts

142 Redesign Buried Transfer Lines

151 Pipe Sleeve Material

163 Storage Tank VES-NCR-171 Conflicts and Concerns

173 Pipe Supports and Valves

175 Double Encased Piping System Design Temperatures

179 Liner Plate Welding

184 Containment Pipe Material

185 Repair Existing Weld on Vessel Support

186 Class AR and AD Ball Valve Packing

187 Storage Tank Support Details

196 Valve Splash Box Leak Detectors

204 Liner Plate Welding

206 Modify Head Tank Piping to match As-Built Nozzle Locations

209 Shims for Acid Storage Tank Supports

210 Acid Transfer Line Pipe Supports

213 Cathodic Protection Tabs

219 Acid Storage Tank Support Bolts

222 Acid Storage Tank Support Leg Bolt Replacement

223 Vessel Placement on Anchor Plate

229 Storage Tank Support Leg Welding

230 Install Spare Acid Pump in CPP-1618

231 1/2" A307 Bolts thru CMU Wall

232 Washer Modifications on VES-NCR-171 Supports

233 Extend & Install Cathodic Protection System

256 Reroute 1"-NA-AD-151684 at Storage Tank Nozzle 17

258 X-Ray and Pneumatic Test of Closure Sleeves for Containment Pipe

266 Seal Welding Butt Joints of SS Liner Embeds

268 SS Flashing at 4 Tank Supports and Concrete Piers

269 High Voltage Testing of Outer Containment Pipe Coating

275 Slope of Acid Transfer Lines in CPP-659

279 SS Liner and 12" SS Embedded Pipe in Sump

286 Underground Interferences

288 Underground Acid Transfer Line Relocation

293 Valve Box Installations

300 Underground Double Contained Pipeline Interferences

309 Circuit Breaker and Wiring for Acid Transfer Line Heat Tracing

310 X-Ray of Welds on Double Encased Acid Transfer Line

311 Mitered Pipe Joints for 1"-PL-AD-152039

316 Encasement Pipe Weld Repairs and NDE Requirements

317 Encasement Pipe Weld Repairs NDE Solution Notes (CID 316)

320 Pipe Support Changes

323 Technique for Closure Installation

326 Containment Pipe Leak Testing

328 Encasement Pipe Coatings

329 Location of Bore Sleeve under CPP-659 Ramp

331 Radiographic Examination of Category M Pipe

332 Cathodic Protection Conduit under NWCF Ramp

333 Cathodic Protection Conduit

336 Cathodic Protection Reference Electrode Locations

401 Cathodic Protection Installation, TS-121

410 Shrink Sleeve for sealing FRP Ins. Jacket to Containment Pipe

Construction Component Drawings, Calculations, Installation/Test Procedures and Catalog Data (through the construction vendor data transmittal and disposition form, 295881 -):

85 PermAlert Double Encased Pipe Routing & Detail Drawings & Calculations

86 Leak Detection System Installation Instruction

88 Leak Detection System Wiring Diagrams & Test Procedure

89 Double Encased Pipe Installation Instructions

90 Product Pipe Test Procedure

91 Encasement Pipe Test Procedure

94	Leak Detection Sensor Cable, Connectors and Monitoring Unit
96	PermAlert Stress Calculations for Double Contained Piping
97	Leak Detection Cable Installation Instruction
111	PermAlert Q.A. Manual
268	PermAlert Weld Record Package
320, 321, 326	QA Radiographic Review Report
329	PermAlert Weld Record Package
330, 331	PermaPipe Sensitive Leak Test
346	NDE Test Report

Weld Maps - 31 drawings were reviewed for QA acceptance stamping, Weld No. Identification, Heat Nos. fit up, visual, NDE:

YMC-M1, M2, M3	Modifications to Acid Storage Tank VES-NCR-171
YMC-M4	Head Tank VES-NCR-173
152039-04 & DEP-1	Acid Transfer Line 1"-NA-AR-152039
151674-01 & 12	Acid Transfer Line 1"-NA-AD-151674
151676-13	Acid Transfer Line 1"-NA-AD-151676
2258W-15	Acid Transfer Line 1/2"-NA-AD-2258
2259W-16 & 2259-25	Acid Transfer Line 1/2"-NA-AD-2259
295881-329	PermAlert Weld Record Package, 1"-NA-AR-152039 & 1"-NA-AD-151674 (17 Maps Total)
4310-14 & 17	Acid Transfer Line 2"-DC-AD-4310

Engineering Change Requests (ECR's):

13.2-18	Delete Secondary Containment Inside NWCF
13.2-24	Acid Transfer Line Design Temperature

5.3.6 Startup and Testing

The Systems Operation Test Procedures are very detailed and specific to the tested areas, equipment and instrumentation and acceptance criteria. The test data to be recorded and evaluation instructions are included and clear. The tests are performed by test engineers and witnessed by quality inspectors who have sign-off responsibilities through the test sequence. The system operation tests are performed in addition to the tests required by purchase orders for individual components, i.e., vessels, tanks, pumps, etc. Also, interim CC tests are performed to further enhance the quality checks of individual portions of the system. Leak repair procedures exist as well as the supporting documentation to show acceptance. The purpose of each of the SO and integrated tests were as follows:

System: LET&D Acid Recycle Equipment
SO Test Procedure: NWCF-NCR-SO-AR1
To prove that equipment and instruments of the Acid Recycle System operate according to the design criteria and engineering specifications when using water only. Another test, NWCF-NCR-IN-AR2, will prove the operation of the system with systems already in operation at the LET&D facility and the NWCF if needed and permitted by the availability of operating vessels.

System: Cathodic Protection of the Acid Recycle Buried Transfer Lines
SO Test Procedure: NWCF-NCR-SO-CP3
To prove the cathodic protection system of the buried pipelines for the Acid Recycle System has been installed properly for corrosion control.

Section 40CFR 264.192f of the regulatory requirements states that the installation of the corrosion protection system that is field fabricated must be supervised by an independent corrosion expert to ensure proper installation. Fluor Daniel provided Christopher J. Inano, P.E., Corrosion Protection Engineer for this purpose. Mr. Inano developed a Cathodic Protection Checklist which was used to check completeness of the system installation, testing and documentation. The checklist included the following items which were satisfactorily completed:

<u>Cathodic Protection Checklist</u>

As built drawings as recommended by NACE RP-01-69 showing:

- Connections from test bond stations to reference electrodes.

- Addition of test bond station to allow potential measurement of 1"-PL-AD-152039 at the entrance to sump SU-NCR-174.
- Cross references on Drawings E-1 and SK-1 to clarify that the same reference electrode and test station was used to measure potentials of line 1"-PL-AD-152039 and PIV's.
- Corrected turning point coordinates (Reference: CID W2F2-95881).

Review inspection documents as follows

- Holiday test reports for underground piping.
- Inspection reports detailing method of sleeve closure and lack of contact with transfer pipe.
- Readings indicating proper anode installation.
- Inspection reports indicating proper location of reference electrode installation.
- Photographs of thermite weld connections.
- Test lead from reference electrode near CPP-605.
- Test lead from piping to be used in conjunction with above reference electrode.

Field Measurements

- Voltage setting on Rectifier REC-NCE-6 ___68V, 15Amp___.
- Current measurement at TBS-NCE-21 ___1.4mv___.
- Potential measurement is TS-121 (PIV's) ___TWO @ -1.082V, ONE @ -1.088V___.
- Potential measurement at turn point "B", 1"-NA-AD-151674 ___-0.678 On, -0.238V Off___.

(300 millivolt shift criteria used).

- It was pointed out that the "300 millivolt polarization shift" acceptance criteria used at the ICPP is no longer listed in National Association of Corrosion Engineers (NACE) standard RP-01-69 (R-'92).

- The NACE standard does, however, state that the listed criteria is to be used in "the absence of specific data". LITCo was requested to provide specific data showing that the 300 millivolt polarization shift criteria is applicable to the ICPP Site.

- The results of Cathodic Protection Surveys back to 1987 were reviewed with LITCo. The surveys showed several lines operating successfully without meeting the more commonly used "-0.85 volt potential difference" criteria. Among them were:

  (1) Two lines designated 2 inch-ONAE-104409, 1/2 inch-KRNB-4404 which are stainless steel lines located very near the midpoint of line 1 inch-PL-AD-152039, and which are depicted on Drawing 088329, Revision 20 dated 10/5/73. These lines have shown virtually identical readings in surveys since 1989, two of which are listed below.

  Aug 14, 1989 - current off reading (-0.333 V), current on reading (-0.712 V)
  Aug - Oct 1992 - current off reading (-0.288 V), current on reading (-0.535 V)

  These lines have been in operation since the mid 1970's, and LITCo stated that though records are not available that far back, these lines had no known corrosion problems and have never met the -0.85V criteria.

  (2) Line HSN-3001, which is a steam line made of carbon steel located approximately 200 yards west of line 1 inch-PL-AD-152039. Readings are:

  May 12, 1987, current off reading (-0.34 V), current on reading (0.56 V)
  Aug - Oct 1990 - current off reading (-0.158 V), current on reading (-0.160 V)
  Oct 10, 1991 - current off reading (-0.327 V), current on reading (-0.505 V)

Aug 15, 1994 - current off reading (-0.098 V), current on reading (-0.115 V)

LITCo stated that this line has been in operation since the early 1960's and has also never met the -0.85 V criteria.

- Potential measurement at TS-121 (1"-PL-AD-152039) -1.09V TS-121 .
- Potential measurement at Turning Point "C". -1.426 TBS-NCE 235.
- Potential measurement near CPP-605. -2.44V .
  - Line PLA-2000, located approximately 400 yards west of CPP-605 was used to qualify a line polarized to this high potential. The line is stainless steel with a Polyken tape wrap, and shows the following measurements off TBS-5.

    -4.51 V (9/18/89)
    -3.95 V (10/10/91)
    -4.76 V (8/15/94)

  - Instrumentation & calibration: Fluke model 23 multimeter, calibrated 1/28/94, by EG&G, calibrated #715189, recalibration required 1/28/96.

Other installation items addressed:

- Cable pull port height adjusted.
- All cable and wire leads properly identified.
- Positive lead to anode bed from Rectifier REC-NCE-6.

Based on the above information and the data reviewed it is Fluor Daniel's opinion that the corrosion protection system meets NACE requirements for cathodically protected underground piping.

5.4 Qualifications of the Constructors

Construction Management for all installations was provided by Morrison Knudson – Ferguson (MK) of Idaho, a construction management company approved by the Department of Energy (DOE). MK awarded a fixed price contract to Ovard Construction Inc. for construction of the Acid Recycle System. On Oct. 1, 1994 LITCo assumed all construction management responsibilities from MK. Ovard Construction self performed the civil work and concrete construction and subcontracted all other work as follows:

- Idaho Steel Inc. for all steel work.
- YMC Inc. for all mechanical work (piping, equipment installation, ducting, etc.).
    - PermAlert ESP for all double contained piping.
    - Mountain States Insulation for installation of insulation.
- G & R Electric for all electrical and instrumentation work.
- 3D Fire Protection for fire alarm system and fire protection system design and installation.
- A Core Inc. for all concrete sawing and drilling.
- E & E Painting for application of all special coatings.

Welding was performed by welders who were trained and certified to perform specific welds in accordance to specific procedures approved for this project. In addition to this, the welds and weld techniques were inspected by qualified inspectors who are qualified to analyze, review, inspect, test, audit or otherwise evaluate activities and work results. The inspectors are independent personnel who had no direct responsibility for or involvement in performing the activity or work. Also, the inspectors do not report directly to immediate supervisors who are responsible for performing the activity or work being evaluated.

5.5 Construction Inspections

Construction Controls were separated into two categories: WINCO/LITCo Controls and Work Controls. WINCO\LITCo Controls include Inspector Qualifications, Inspection Plans, Inspection Instructions, Inspection Reports, and Non Conformance Reports. Work Controls included worker

Qualifications, Component Check Test Procedures, Component Check Test Results, Weld Maps and Radiographs.

WINCO/LITCo inspectors were trained and qualified to perform inspections for specific disciplines. The inspectors certification provides written documentation of qualification attested to by the Quality Assurance Inspection Manager. The specific inspector categories were established to certify that an individual has skills pertaining to a specific type test or an entire discipline of activity.

The inspections were performed using detailed inspection plans which provided descriptions of the work activity being inspected. These inspection plans were also supplemented with specific inspection instructions to assure that the work effort performed was adequately documented by continual inspection acceptance steps throughout the work control procedure. The use of these inspection plans, instructions and reports resulted in a documented inspection program that assured that the work was accomplished in a controlled manner.

Worker Qualifications are similar to the inspection qualifications described above but apply to the Construction Manager and Subcontractors. As with the inspectors, the work being performed for this project was done by workers qualified in the various project disciplines. This qualification program combined with the inspection program, assured that the work effort was adequately planned, described and completed under a formally controlled approach.

The construction inspections that were performed were done by the use of inspection planning documents that described the tasks that were to be inspected and provided acceptance criteria to assure that the work was performed in compliance to specification requirements. As stated previously, the inspections were performed by personnel who were qualified to do the work and also had independent reporting paths from the personnel who performed the work. Records were kept of the inspections performed and proper record keeping practices were followed.

5.6 Facility Inspections

The following facility inspections were conducted by Fluor Daniel representatives as listed below.

May 26, 1993: Michael J. Hickey P.E. met with WINCO to discuss structural aspects of the design and inspect initial storage tank enclosure concrete construction.

July 15, 1993: Daniel R. Nerison met with WINCO to discuss ECR 13.2-24 and perform field survey in the LET&D Cell 2 in preparation for that work.

March 24, 1994: Daniel R. Nerison met with WINCO to review additional ECR and CID revisions and to discuss coordination of remaining facility inspection dates with specific RCRA related construction activities.

May 10, 1994: Daniel R. Nerison and Christopher J. Inano, P.E. met with WINCO to witness construction activities in progress for final preparation and lowering of the acid transfer line 1"-PL-AD-152039 into the pipe trench. Activities witnessed included the final outer wrap electric holiday test, bedding sand composition and actual lowering of the acid transfer line.

May 25 & 26, 1994: Daniel R. Nerison, Marcia S. Brown, P.E. and James A. McClellan, P.E.met with WINCO to witness construction activities in progress within the Storage Tank Enclosure Building, the NWCF South Operating Corridor and the NWCF Utility Corridor.

June 1, 1994: Michael J. Hickey, P.E. met with WINCO to conduct physical inspection of construction work to date.

November 9 & 10, 1994: Michael J. Hickey, P.E. and Christopher J. Inano, P.E. met with LITCo to review construction inspection reports. The review centered around the installation of the tank, ancillary equipment and cathodic protection of the buried transfer lines.

The inspections of the facility included a review of project documents, a review of completed design documents and the control of changes to these documents as indicated in Table 5.3-1. A review of completed design and inspection records as indicated in Table 5.3-1 was also performed to prove that the regulatory requirements were satisfied. Several walk downs of the facility both during and after RCRA related construction activities were conducted to visually inspect the work performed. Interviews were conducted with various project personnel at the site to review the work performed and to assure compliance.

During the plant walk downs, a review for structural damage, physical damage, cracks, scrapes, corrosion, punctures, weld breaks, settlement vibration, expansion and contraction was conducted and no deficiencies were noted. Welder training was acceptable, weld inspection records were satisfactory, the inspection of the welds showed good quality and proper identification practices were followed. The planning of the work was well documented as was the testing requirements and results thereof. Personnel who performed the work were properly trained and certified as were the inspection personnel who inspected the works.

Interviews with project personnel showed very good knowledge of project requirements and compliance thereto. Records were controlled in an acceptable manner and are retained for audit purposes.

5.7 Summary of the Installation and Inspection Assessment

It is Fluor Daniel's professional opinion that the installation and inspection of the LET&D Acid Recycle System was planned, performed, and completed satisfactorily and was done so in a controlled manner. It is Fluor Daniel's assessment that the system installation and inspection conforms with the requirements of 40 CFR 264.192 and 264.193.6.0

6.0 LEAK TESTING ASSESSMENT

6.1 Regulatory Requirements

All tank systems and ancillary equipment must be leak tested prior to being placed in service and any required repairs must be performed prior to use. The specific requirements for leak testing are contained within 40 CFR 264.192(d) and are follows:

> (d) All new tanks and ancillary equipment must be tested for tightness prior to being covered, enclosed, or placed in use. If a tank system is found not to be tight, all repairs necessary to remedy the leak(s) in the system must be performed prior to the tank system being covered, enclosed, or placed into use.

6.2 Leak Testing Requirements for Product and Containment Piping

All product piping used for transfer of the acid solution within the Acid Recycle System was hydrostatically leak tested in accordance with ANSI/ASME B31.3 345.4 as modified by Chapter VII for Category M fluids. Test pressure for the product piping was 150 psig. Secondary containment piping was pneumatic leak tested in accordance with ANSI/ASME B31.3 paragraph 345.5 as modified by Chapter VII for Category M fluids. Test pressure was 15 psig. Product piping and containment piping was sensitive leak tested in accordance with ANSI/ASME B31.3 as modified by Chapter VII for Category M fluids.

6.3 Leak Testing Requirements for the Acid Recycle Storage Tank

Acid Storage Tank VES-NCR-171 was pneumatically tested at 5 psig with soap bubbles and liquid SO tested per test procedure NWCF-NCR-SO-AR1.

6.4 Leak Integrity Assessment

The System was designed to be leak tight by the choice of materials used, the Codes and Standards chosen (i.e., ASME, ANSI, ASNT, NACE etc. that are recognized highest standards of the industry), the individual component tests conducted and the system operations tests performed and successfully completed. Based on the use of qualified construction personnel to perform the work, qualified inspection personnel to check the work, nondestructive test results to approve the work and visual checks for leakage during testing, combined with the visual checks for structural damage, physical damage, cracks, scrapes, corrosion, punctures, weld breaks, settlement, vibration, expansion and contraction, it is Fluor Daniel's assessment that the system is free from leaks.

The SO tests described in Section 5.3.6 of this report were successfully planned, conducted, verified by QA and Test Engineering personnel, and completed in a controlled manner. During the testing process, the inspection for leakage was a continuously monitored activity. Test engineers and QA inspectors inspected the system for any evidence of leakage.

The first requirement for the SO leak test is to review the overall system for leaks. If a leak is identified during the test, the procedure calls for generation of a discrepancy report, repair of the leak, retest and then QA sign-off to ensure that the repair and retest were satisfactorily completed. This procedure ensures that, in every instance, all repairs necessary to remedy the leak(s) in the system are performed prior to the system being placed in use. Each of the SO test procedures is very detailed and the acceptance criteria and test data instructions are very clear as to the requirements of the test. The acceptance criteria contain both measurable criteria and observable criteria to be witnessed and recorded by both Test Engineering and QA personnel. Measurable criteria are specific items such as: maximum and minimum feed rates. Observable criteria are typically items such as: flow through pipe lines is unrestricted; fluids are clean and free of debris; etc. Only qualified personnel record observed and/or measured data.

A section of the test data and evaluation portion of the SO test procedure is used to document test exceptions and discrepancies. This is used to control failed hardware and components and to reference nonconformance reports that are "loop closing" documents to ensure that all repairs necessary to remedy leaks or other conditions are corrected prior to the system being placed in use. During SO testing, when transferring water from the acid storage tank VES-NCR-171 into head tank VES-NCR-173, some of the liquid leaked into the sump SU-NCR-174 through check valve NAV-NCR-28. A block valve more suitable for this application was subsequently installed in place of the faulty check valve. The new block valve was pressure tested in the factory prior to shipment and was vacuum box tested after installation. The signed component test report and the factory test report were reviewed for completion prior to approval of this certification document.

7.0 CONDITIONS OF ATTESTATION

In the performance of this system certification, Fluor Daniel reviewed and evaluated records, procedures and criteria, as well as design and construction documents. Fluor Daniel did not review every QA/QC record for the LET&D Acid Recycle System. However, Fluor Daniel reviewed a representative sample of the QA/QC records that were related to specific RCRA design and construction issues. In the professional judgement of our representatives the proper procedures were followed. Fluor Daniel did not witness all facility construction activities and the leak testing of the facility since these activities were carried out over a period 1-1/2 years. Fluor Daniel reviewed the installation plans and procedures, inspected QA/QC records, checked the training records of QA inspectors and visually inspected the facility. Fluor Daniel also reviewed the approved leak testing report. Based on the review of these records, plans and procedures, interviews with site personnel, and visual inspection of the facilities, it is Fluor Daniel's assessment that the facility has been properly designed, installed and leak tested.

VES-WL-101/VES-WL-102 VAULT AND VES-WL-150

RCRA TANK CERTIFICATION FOR WL-101/102 VAULT SECONDARY CONTAINMENT

FINAL

WASTREN **Task Order No. 2**
Under
BOA No. 223166

June 1993

Prepared by
WASTREN, Inc.
Idaho Falls, Idaho

TABLE OF CONTENTS

LIST OF TABLES

1.0 CERTIFICATION

Tank System Component Being Certified

The tank system component being addressed by this attestation is the external liner and sump system providing secondary containment for the radioactive mixed waste tanks VES-WL-101 and VES-WL-102. These tanks are in a subfloor vault located in the Waste Treatment Building/Rare Gas Plant (CPP-604) within the Idaho Chemical Processing Plant. The secondary containment system is further described in Section 3.1 of this Assessment.

Attestation

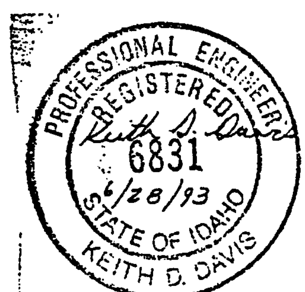
The secondary containment system (1) has been designed, installed, and tested to prevent any migration of wastes or accumulated liquid out of the system to the soil, ground, or surface water at any time during the use of the VES-WL-101/102 tank systems, and (2) is capable of detecting and collecting releases and accumulated liquids until the collected material is removed. This system has sufficient structural integrity and provides acceptable secondary containment for the designated tanks, used in the management of hazardous waste. This attestation is contingent upon certain conditions which are also identified in this assessment.

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Keith D. Davis — 6/28/93

Keith D. Davis — Date
Idaho P.E. Registration #6831
WASTREN, Inc.



Donald A. Armour — 6/25/93

Donald A. Armour — Date
Quality Inspector, AWS-CWI #86040121
WASTREN, Inc.

2.0 INTRODUCTION

The Resource Conservation and Recovery Act (RCRA) hazardous waste regulations that address the operation of hazardous waste tank systems (40 CFR Part 265, Subpart J) require an assessment of the tank system by an independent registered professional engineer. By definition (40 CFR 260.10), associated ancillary equipment and any containment system are part of the tank system. The preceding certification attests that the secondary containment system (external liner and sump) for the VES-WL-101 and VES-WL-102 tanks within Building 604 at the Idaho Chemical Processing Plant (ICPP) meet requirements established within Subpart J of 40 CFR 265 for secondary containment. These requirements are summarized as being (1) designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, ground, or surface water at any time during the use of the VES-WL-101/102 tank systems, and (2) capable of detecting and collecting releases and accumulated liquids until the collected material is removed.

Westinghouse Idaho Nuclear Company, Inc. (WINCO) is operator of the ICPP that includes Building 604 (CPP-604) where the VES-WL-101 and VES-WL-102 tanks are located in a subfloor vault. These two tanks each have a capacity of 18,200 gallons and are used to support radioactive liquid waste treatment in the Process Equipment Waste (PEW) evaporator. VES-WL-102 is used to collect liquid waste prior to transfer to the PEW evaporator and VES-WL-101 collects the bottoms from the evaporator which are subsequently transferred to the ICPP tank farm for storage and treatment with other liquid waste designated as high-level radioactive waste. The liquid radioactive waste managed in this system also qualifies as being RCRA hazardous, therefore the waste is considered "mixed waste" and is subject to RCRA (and the corresponding State of Idaho) hazardous waste regulations. The subject of this certification is the secondary containment system for the VES-WL-101 and VES-WL-102 tanks that has recently been upgraded to meet RCRA requirements.

3.0 DESIGN AND INSTALLATION ASSESSMENT

3.1 DESCRIPTION OF VES-WL-101/102 TANK SYSTEMS' SECONDARY CONTAINMENT, AND LEAK DETECTION

The WL-101/102 vault has been modified to provide RCRA-compliant secondary containment for the two 18,200 gallon tanks. Under the WL-101/102 Vault Secondary Containment Project, WINCO has installed a Hypalon® (chlorosulfonated polyethylene) liner in the vault to provide secondary containment for the two tanks. The project included installation of a new sump liner, sump jet, sump sampling line, and sump level instrumentation to ensure detection of any leakage from the tanks and to facilitate removal of any leaked material.

The floor of the WL-101/102 vault is located approximately 42 feet underground. Its dimensions are approximately 30-feet 6-inches wide, by 43-feet long, by 16-feet high. The vault has walls, floor and ceiling of reinforced concrete that range in thickness from two to four feet; the section of floor in which the original sump was located is even thicker. The floors of the vault are gently sloped from all sides toward the centrally located sump. Due to the use of the tanks for storage of radioactive liquids and the solids/sludges that have accumulated in them, the vault is a high radiation zone with strictly controlled access through a single hatch in the vault's ceiling.

This system evaluation includes the secondary containment liner, the sump system, and the piping installed under the WL-101/102 Vault Secondary Containment Project. The integrity of the existing tanks and other portions of the tank systems have already been evaluated.

Materials of construction for the secondary containment, the sump system, and newly installed piping that could potentially be wetted from a spill or leak from vessels VES-WL-101 or VES-WL-102 are shown in Table 1. The secondary containment consists of the concrete vault lined with the Hypalon® liner which covers the floor of the vault as well as extending three feet up the wall of the vault. The main body of the Hypalon® liner has a 45 mil nominal

Table 1. Process System Wetted Parts

COMPONENT	WETTED PARTS
Storage tank saddles	347 stainless steel
Tank saddle/liner interface	Silicone RTV potting compound (Dow-Corning Silastic J) 304L stainless steel saddle frame assembly 304 stainless steel bolts and nuts
Sump	Viton O-rings, stainless steel pins 304L stainless steel pipe and liner supports 304L stainless steel sump liner 304L seal ring assembly 17-4 PH (AMS 5604) stainless steel clamp plate assembly
Sump suction line	1½ inch 304L stainless steel
Steam jet	304L stainless steel
Steam line	1 and 1½ inch 304L stainless steel
Liquid level indicator probe	⅝ inch 304L stainless steel tubing
Sample piping	¼ inch 304L stainless steel tubing
Process lines	1½ inch 304L stainless steel
Piping supports	304L stainless steel and Nitronic 60 stainless steel plate angle, square tubing, bolts, hubs, and washers
Secondary containment liner	Hypalon® - 45 mil (nominal) - reinforced 60 mil (nominal) - unreinforced

thickness and is reinforced with 10 x 10 x 1000 denier polyester fabric scrim. (The denier unit represents the weight in grams per 9,000 meters of a thread of yarn.) Unreinforced Hypalon® that is used for corner reinforcement and around the sump liner insert which must be molded to fit, is 60 mil nominal thickness (three plies of 20 mil thickness). A silicone rubber sealant is used to seal the liner around the stainless steel saddles which support the VES-WL-101/102 tanks. The sump assembly is made of 304L stainless steel. Viton o-rings are used to ensure even compression of the Hypalon® for the seal between the sump liner assembly and the Hypalon® liner. New piping provides: 1) steam to the sump solution transfer jet; 2) solution transfer from the sump; 3) sampling of the sump; and 4) liquid level measurement of the sump. All of the new piping, the supports, and the new steam jet are fabricated of either 304 or 304L stainless steel.

Prior to installation of the Hypalon® liner, the vault floor was cleaned of all loose debris and surface cracks and scaling were mended. Large gouges were filled with a non-shrink grout, specified with a 28-day compressive strength of 5,000 psi. A pourable floor sealant was used to fill small cracks and rough areas. This work was accomplished to ensure the Hypalon® liner had continuous support and that no rough areas existed which might puncture or damage the liner.

The stainless steel sump liner was designed to be inserted into the existing concrete sump. The sump unit was placed in the existing hole, leveled, and grouted in place.

The steam jet transfer system (utilized to transfer solutions from the sump) has been designed to transfer the contents of an entire tank, and water added to the vault to rinse off the liner, within 72 hours after detection of liquid in the sump. The solutions are transferred to vessel VES-WL-102, though another project will reroute this line into vessel VES-WL-132, located in another vault within CPP-604. With the current piping configuration, liquids leaking from the VES-WL-102 tank would be cycled by the steam jet transfer system back to the leaking tank while the existing tank transfer capabilities would be transferring its contents to VES-WL-132. Until the sump's jet transfer system is rerouted to VES-WL-132, final cleanup of any leak from VES-WL-102 may have to be through the placement of a portable jet and transfer line into the vault. Once the line is rerouted to VES-WL-132, both the sump's jet transfer system and the tank transfer capabilities would be used to move solutions from a leaking tank to VES-WL-132.

3.2 DESIGN

3.2.1 Regulatory Requirements

This assessment addresses the secondary containment system for the mixed hazardous waste tanks designated VES-WL-101 and VES-WL-102 located in a subfloor vault within CPP-604. Included in the assessment are the secondary containment liner and its supporting foundation, the integral sump where any leaked or spilled liquids are collected, and the newly installed piping that supports the liquid removal, liquid level monitoring, and liquid sampling functions of the sump system. Subpart J (Tank Systems) of 40 CFR Part 265 establishes requirements that must be met by a tank system's secondary containment. The requirements cited in Subpart J that apply to the design of the secondary containment, along with the regulatory citation, are summarized in Table 2. (Note: Additional requirements that are more closely associated with installation and inspection of the system are addressed in Section 3.3.)

3.2.2 Design Standards

As identified in the project specifications [United Engineers & Constructors, Inc. (UE&C), 1992a], the elements of the tank systems that are the subject of this assessment are designed and manufactured in accordance with the following codes and standards:

- National Sanitation Foundation (NSF)
  - Standard 54 Flexible Membrane Liners (as revised May 1991)

Table 2. Regulatory Requirements Related to Design

Citation	Designation	Requirement
Tank Systems and Components		
265.192(a)(1)	Design Standards	The assessment must identify the design standard(s) according to which the tank ancillary equipment is constructed.
265.192(a)(2)	Waste Characteristics	The hazardous characteristics of the waste to be handled must be identified.
265.192(a)(3)&(4)	Corrosion Control and Vehicle Damage	Not Applicable - These requirements are for underground tank systems and/or tank systems where metal is in contact with soil or water.
265.192(a)(5)	Design - Foundation - Anchored	- The tank foundation must be able to maintain the load of a full tank. (Not applicable since the tank is not within the scope of this assessment.) - Tank systems must be anchored to prevent dislodgement during seismic activity.
265.192(e)	Support of Ancillary Equipment	Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.
265.192(g)	Certifying Statements	The owner or operator must obtain and keep on file written statements that certify to the tank systems' design and installation.
Secondary Containment Systems		
265.193(c)(1)	Compatibility & Strength	The secondary containment must be constructed of or lined with materials compatible with the wastes in the tank system and must be of sufficient strength and thickness to prevent failure.
265.193(c)(2)	Foundation	It must be placed on a foundation or base capable of providing adequate support.
265.193(c)(3)	Leak Detection	It must have a leak detection system capable of detecting any accumulated liquid in the secondary containment within 24 hours.
265.193(c)(4)	Liquid Removal	It must be sloped or otherwise designed, to facilitate removal of liquids.
265.193(d)	Containment System	(For tanks) It must be (1) a liner (external to the tank), (2) a vault, (3) a double-walled tank; or (4) an equivalent, approved, device.
265.193(e)(1)	Requirements for liners - Capacity - Run-on/Infiltration - Cracks or Gaps - Lateral and vertical control	The secondary containment liner must - be designed or operated to contain 100% of the capacity of the largest tank, - prevent run-on or infiltration of precipitation, unless it has sufficient excess capacity, - be free of cracks or gaps, and - be capable of preventing lateral as well as vertical migration of the waste
265.193(f)	Containment for Ancillary Equipment	Ancillary equipment (pipes and the steam jet system in this case) must be provided with secondary containment unless it is visually inspected for leaks on a daily basis and (1) it is above ground, (2) all flanges, joints, and connections are welded, (3) pumps and valves are sealless, and (4) pressurized piping systems have automatic shutoff.

- American Society for Testing & Materials (ASTM)
  - A 182 Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
  - A 240 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
  - A 312 Specification for Seamless and Welded Austenitic Stainless Steel Pipe
  - A 403 Specification for Wrought Austenitic Stainless Steel Welding Fittings
  - C 109 Compressive Strength of Hydraulic Cement Motors
  - C 191 Time of Setting of Hydraulic Cement by Bicat Needle
  - C 827 Early Volume Change of Cementitious Mixtures
  - D 751-89 Test Methods for Coated Fabrics
  - D 4545-86 Standard Practice for Determining the Integrity of Factory Seams Used in Joining Manufactured Flexible Sheet Geomembranes (as reapproved 1991)

- American Welding Society (AWS):
  - D1.1 Structural Welding Code - Steel
  - D1.3 Structural Welding Code - Sheet Steel

- American Society of Mechanical Engineers (ASME):
  - B16.9 Factory-Made Wrought Steel Buttwelding Fittings
  - B16.25 Buttwelding Ends
  - B31.1 Power Piping
  - B31.3-90 Chemical Plant and Petroleum Refinery Piping
  - B36.19 Stainless Steel Pipe
  - Boiler and Pressure Vessel Code (BPV)

Section II	Material Specifications, Part C
Section V	Nondestructive Examination
Section VIII	Pressure Vessels
Section IX	Welding and Brazing Qualifications

- American National Standards Institute (ANSI):
  - A13.1 Scheme for the Identification of Piping Systems

- Corps of Engineers (CRD)
  - CRD-C-621 Specification for Non-Shrink Grout

- Pipe Fabrication Institute (PFI):
  - ES-3 PFI Standard Tolerances

- Allowable Steel Design (ASD)
  - Chap. F Beams and Other Flexural Members

This assessment relied primarily upon the ASD and commonly recognized strength and material manuals to verify structural integrity.

3.2.3 Structural Integrity Assessment

The only structural integrity assessment included in this certification is that for piping alterations performed as part of the WL-101/102 Vault Secondary Containment Project. Assessment of the integrity of the tank, tank stand/platform, tank anchorage, and supporting foundation are all part of the original assessment of the VES-WL-101 and VES-WL-102 tank systems.

Support of Ancillary Equipment

Two key areas of the new piping were considered in assessing the adequacy of the support and its structural integrity. These two areas of concern are where the highest concentrated stresses in the pipe network will occur and are 1) the 90 degree elbows located between the steam jet and the discharge to VES-WL-102 and 2) the support of the inlet steam pipe at the base of tank VES-WL-102. (Calculations performed to verify the structural integrity of the piping components are provided in Attachment A.)

The 90 degree elbows considered consists of 1½ inch, Schedule 40, stainless steel pipe. A typical elbow was analyzed to determine if it might deform under a full load of pressure since it has no external supports. The capacity of the steam jet is 45 gallons per minute (gpm) at a steam pressure of 80 pounds per square inch (psi). To be conservative, the design capacity was assumed to be 0.12 cubic feet per second (54 gpm) at 100 psi. The analysis (see Attachment A) showed the loading on the pipe to be grossly under the maximum it could carry without deforming or failing.

The pipe that carries steam to the sump jet (also 1½ inch, Schedule 40, stainless steel at this point) is supported at the base of the VES-WL-102 tank saddle. This support experiences two different external forces: 1) a horizontal force due to pressure in the pipe, and 2) a vertical force because of the 17 foot suspension between the support and the connection on the sump pump. The support welds and bolt fasteners were analyzed for both forces (see Attachment A). The loadings on both the welds and the bolts were grossly under their ultimate load capacity.

In addition to the independent calculations described above, design calculations performed by UE&C (UE&C, 1992c) were also reviewed as were the results of the AUTOPIPE computer analysis (UE&C, 1992b) that was performed on the pipe system. Again, no problems were found with regard to the support provided to the ancillary equipment.

3.2.4 Adequacy of Handling Potential Leaks

The design of secondary containment and leak detection system is discussed in the paragraphs that follow.

Secondary Containment

The secondary containment system being evaluated is located within a concrete vault located within building CPP-604. As described in Section 3.1, tanks VES-WL-101 and VES-WL-102, and the ancillary equipment being considered under this assessment are all located within this containment.

The floor of the secondary containment structure slopes to a sump in the center of the cell (vault). Any accumulated liquid can either be pumped (with the steam jet), or otherwise removed, from the containment.

The secondary containment structure is formed of reinforced concrete walls and floor, and lined with a Hypalon® membrane which extends up three feet on the walls. The liner is designed to stop both vertical and lateral migration of any contained liquids. All seams in the secondary containment liner are heat-welded or adhesive bonded to avoid any cracks or gaps. The Hypalon® liner is sealed around the tank saddles by silicone rubber sealant, which is capable of withstanding the expected waste solutions for extended periods of time. Viton o-rings are used to ensure even compression of the Hypalon® for the seal between the sump liner assembly and the Hypalon® liner.

The volume of the lined portion of the vault is well in excess of the full capacity (18,200 gallons) of either of the two tanks. A calculation verifying the capacity of the secondary containment was performed (see Attachment A) in which it was assumed that the tanks sit directly on the floor of the vault. Even with the tanks taking up this much of the volume formed by the three foot high liner, the secondary containment had a calculated capacity of over

19,000 gallons. Considering the tanks are actually supported well off the floor of the vault, the required secondary containment capacity is easily met. Since the secondary containment structure is located inside of a building, neither run-on of surface water nor accumulation of precipitation are considerations as to the adequacy of its capacity.

Ancillary equipment is limited to process piping and the Hypalon® liner in the cell also provides the secondary containment for this piping. Leaks or spills from the ancillary piping would drain to the sump.

Leak Detection

The secondary containment project included the installation of liquid detection instrumentation in the new sump. Tubing installed in the vault sump is connected to a differential pressure transmitter which in turn provides signals to read out instrumentation in the facility control room. Since the vault is a high radiation area, routine (daily) physical inspection of the containment structure for the presence of accumulated liquids is not a desirable method of leak detection. Rather leak detection will consist of daily inspections of sump and tank level instrumentation. This procedure will accommodate the requirement for detecting leaks within 24 hours. Also, level alarms will sound before 14 gallons of liquid enters the sump.

3.2.5 Chemical Solutions Considered and System Compatibility

The chemical constituents of the corrosive wastes that could potentially be in contact with the secondary containment system are shown in Table 3. The table shows the maximum anticipated chemical constituent concentrations in each tank, to give an idea of the range of concentrations expected. The values shown in Table 3 for VES-WL-101 came from a study (Shelton-Davis, 1992) that exposed Hypalon® samples to a chemical solution that was formulated to simulate concentrations of the maximum reactive/corrosive components of the bottoms coming back from the evaporator. These test solutions created an environment much harsher than the liner would see if VES-WL-102 failed.

Table 3. Process Waste

CHEMICAL CONSTITUENT	VES-WL-102 MAXIMUM CONCENTRATION(1) mg/l / g-mole/l (M)	VES-WL-101 MAXIMUM CONCENTRATION(2) g-mole/l (M)
Zr (Zirconium)	– (3)	–
F^- (Fluoride)	200.0 / 0.01M	0.1M
Cd (Cadmium)	1.0	–
SO_4 (Sulfate)	100.0 / 0.001M	0.04M
Pb (Lead)	10.0	–
Cr (Chromium)	5.0	–
Cl (Chloride)	50.0 / 0.0014M	0.06M
Ca (Calcium)	– (3)	0.1M
Al (Aluminum)	– (3)	0.1M
NO_3 (Nitrate)	– (3)	5.0M
HNO_3	– (3)	5.0M
H_2O (Water)	–	–
Hg (Mercury)	0.2	–
U-235 (Uranium)	5.0	–
Pu (Plutonium)	5.0	–
Phosphate	950.0	–
As (Arsenic)	5.0	–
Ba (Barium)	100.0	–
Se (Selenium)	1.0	–
Ag (Silver)	5.0	–
NA + K (Sodium + Potassium)	1.0M	2.6M
pH	<4	–

Note: The water concentration is inversely related to the concentrations of the other constituents.
1) Obtained from WINCO SOP, P.O.40, Chemical Acceptability for Waste Processing at ICPP, 1990.
2) See reference Shelton-Davis, 1992
3) Value not given in identified SOP

From Table 1 we can see that the following materials must be compatible with the process solutions contained in vessels VES-WL-101 and 102:

- Hypalon® (chlorosulfonated polyethylene)
- 304/304L stainless steel
- 347 stainless steel
- 17-4 PH stainless steel
- Nitronic 60 stainless steel
- Silicone RTV potting compound
- Viton

The list of possible wetted materials from Table 1 was evaluated against the process solutions contained in the waste storage tanks. The major chemical constituents from the tanks that may result in corrosion are Cl^-, F^-, NO_3 and SO_4. The mixture of potential corrosive agents makes the corrosion considerations complex. The method used to determine the compatibility was to assess the compatibility of the pure chemical reagent with each wetted material. Experience at the ICPP has shown that the different types of stainless steel present in the cell and Viton o-rings will withstand the possible solutions to which they could be exposed. Tests were preformed on the Hypalon® material which show the material to adequately withstand the possible solutions even after irradiation in a 20R field for 30 years (Jacobus, 1992). Dow Corning provided vendor data that shows the silicone rubber potting compound to adequately withstand irradiation, with some swelling when exposed to 6.5M HNO_3. These considerations are reflected in the discussion below.

The following conclusions were reached:

1. The materials of construction are acceptable as long as the following conditions are followed:

- The service life of the liner will not exceed the design lifetime of 20 years (UE & C, 1992a). However, the service life is based on a 20 rad/hour radiation field. Since the average field is currently less than 20 rad/hour, a reevaluation should be performed at the end of 20 years to determine the acceptable extension period of the service life of the liner.

- If any spill or leak occurs and it is not cleaned up within 72 hours or if the concentration of HNO_3 exceeds 30%, then an evaluation will be required to determine if the prolonged chemical exposure caused any possible damage to the Hypalon® liner or to the silicone rubber sealant. This evaluation should determine if the liner and/or sealant should be retested for leaks and reevaluated for its integrity and acceptable remaining service life.

- Any entry onto the liner in the cell, by personnel or equipment, will require an inspection to determine if any possible damage was inflicted to the Hypalon® liner. If the liner shows evidence of damage, it must be patched to repair the damage.

2. Plans and equipment will be put in place to remove solution from the cell within 72 hours if a large leak is detected in VES-WL-102. This special removal capability may be required until a process line is installed from the cell sump to WL-132. This is necessary to meet the requirement to remove any spilled or/leaked solution from the secondary containment. The problem with the present configuration is that any solution leaking from tank VES-WL-102 must be pumped back into VES-WL-102 before it can be transferred to WL-132.

3. Leak detection must be included in required administrative procedures in order to verify detection of any leaks within 24 hours.

3.2.6 Summary Assessment

A summary of the manner in which design related regulatory requirements are met by the WL-101/102 secondary containment system is presented in Table 4. The Table presents the summary data according to the requirements' citation and designation as originally identified in Table 2.

Table 4. Summary Assessment for Meeting Design Requirements

Citation	Designation	Summary of How Requirement is Met
Tank Systems and Components		
265.192(a)(1)	Design Standards	The design standards by which the liner and ancillary equipment were specified and constructed are presented in this assessment and documented in the project design and construction files.
265.192(a)(2)	Waste Characteristics	The maximum concentration of solutions to be sent to the VES-WL-101 and VES-WL-102 tanks are identified in Table 3 of this assessment.
265.192(a)(5)	Design - Foundation - Anchored	- Not applicable. The tank foundation is not part of this assessment. - Calculations performed show that the piping evaluated under this assessment will not shear or break free from supports during normal usage or during a design earthquake.
265.192(e)	Support of Ancillary Equipment	Calculations performed during this assessment show pipes to be supported adequately to withstand design pressures without deforming or breaking free.
265.192(g)	Certifying Statements	The written statement that certifies the design and installation of the liner and ancillary equipment is provided in Section 1.0 of this assessment.
Secondary Containment Systems		
265.193(c)(1)	Compatibility & Strength	The secondary containment's Hypalon® liner is compatible with the range of solutions identified to be put through the tank systems and is supported by concrete walls and floor. Preparation of the walls and floor prior to liner installation ensured smooth surfaces to avoid puncture or abrasion damage to the liner. The liner is not expected to undergo any significant stress in place other than three feet of its own weight hanging from the batten strips. The 45 mil, reinforced Hypalon® material should have more than adequate strength.
265.193(c)(2)	Foundation	The Hypalon® liner is directly supported by concrete sides and bottoms.
265.193(c)(3)	Leak Detection	Operation of the secondary containment depends on daily inspections of the sump and tank level readouts in the control room whenever waste is in the tanks to ensure leaks are detected within 24 hours.
265.193(c)(4)	Liquid Removal	The floor of the secondary containment is sloped toward the sump. Accumulated liquids can be removed through the use of the installed steam jet or through placement of a portable sump pump and lines.
265.193(d)	Containment System	Containment is provided by a Hypalon® liner (backed by concrete walls and floor), external to the tank.
265.193(e)(1)	Requirements for liners - Capacity - Run-on/Infiltration - Cracks or Gaps - Lateral and vertical control	- The secondary containment was designed, and independently verified, to contain greater than 100% of the contents of the largest hazardous waste tank. - The tank vault is located inside a building, protected from run-on and infiltration of precipitation. - The secondary containment liner is designed of welded sheets of Hypalon® with no gaps or cracks. Liner interface with the tank saddles is sealed with silicone rubber and with the sump liner by compression-fit Viton o-rings. - The liner is supported totally by concrete walls and floor.
265.193(f)	Containment for Ancillary Equipment	The ancillary equipment addressed by this assessment is all located within the tank vault with secondary containment provided by the Hypalon® liner.

3.3 INSTALLATION AND INSPECTIONS

3.3.1 Regulatory Requirements

Subpart J (Tank Systems) of Part 265 also establishes requirements that are applicable to the installation of the hazardous waste systems in the WL-101/102 tank vault. These requirements, summarized in Table 5, are in addition to those related to the tank systems' design which were summarized in Table 2. The requirements for the support of ancillary equipment are shown in each table, indicating both design and inspection elements.

3.3.2 Independent Inspections

In accordance with 40 CFR Parts 265.192 and 265.193, this assessment is to include a verification that the liner and ancillary equipment have been properly installed, free of structural damage or inadequate construction. Since the WL-101/102 liner project involves construction in a vault that is considered a high radiation zone, physical inspection of installed materials was not accomplished as part of this independent assessment. However, video tapes of work in the vault were observed as was liner and sump installation training performed on a mock-up vault facility. Actual liner and sump conditions were also observed through cameras installed in the vault. Work (via video tape), vault and equipment conditions, and training that were observed are itemized in the following:

- April 13, 1993 - Inspected sump liner assembly (pre-installation) and toured the mock-up facility constructed to mimic the WL-101/102 vault.

- April 13, 1993 - Inspected the WL-101/102 vault through video cameras mounted in the vault. There were no workers in the vault at the time, but grout patches could be seen where cracks and holes had been filled. The floor of the vault appeared to be in poor condition, but closer inspection revealed that the floor did not have deep irregularities, but rather mottled coloration caused primarily by paint chipping.

Table 5. Regulatory Requirements Related to Installation

Citation	Designation	Requirement
Tank Systems and Components		
265.192(b)	Proper Installation	Prior to placing a new tank components in use, they must be inspected for the presence of any of the following: - Weld breaks; - Punctures; - Scrapes of protective coatings; - Cracks; - Corrosion; and - Other structural damage or inadequate construction/installation.
265.192(c)	Backfill	Not Applicable - These requirements are for underground tanks that are backfilled.
265.192(d)	Tightness Test	New tanks and ancillary equipment must be tested for tightness prior to being placed in use.
265.192(e)	Support of Ancillary Equipment	Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.
265.192(f)	Installation of Corrosion Protection	Not Applicable - These requirements apply to tanks that are underground or where metal is in contact with soil or water.

- April 30, 1993 - Viewed video tape on the condition of the vault floor after grouting was completed, but before significant amounts of epoxy had been applied. The floor appeared to be very clean. A second video was also viewed that showed the floor after all of the epoxy had been applied to the rough areas. At the time of this video, the epoxy sealer had not been applied all the way to the sump because the grout around the sump was still damp. In another video sequence, the sump assembly was seen in place, the sump leveling device was seen, and the tube to pour grout into the sump cavity (around the assembly) was observed.

- May 12, 1993 - Observed heat and solvent welding of Hypalon® test material in the mock-up vault facility. A test run of welding the main center seam of the liner was performed by workers actually suited in protective gear as they would be in the vault. The heat machine could only be used to within three feet of the walls to allow for its removal; the remainder of the welding would be through use of a chemical solvent and liquid Hypalon® solution. The heat weld was observed to take approximately 8 minutes to complete. (Note: It was subsequently learned that the heat machine could not be used in the actual vault welding because the epoxy floor sealant was not fully cured and would deform under the heat of the welder. The solvent/adhesive weld was used for all seaming performed in the vault.)

- June 4, 1993 - Observed video tape of the major elements of the liner installation. Work observed included the following:
  - The first half of the liner being lowered into the vault, moved into place, laid out, sides being pulled up the wall by ropes through the grommets;
  - The solvent/adhesive welding of the seam at the south saddle (application of solvent cleaning, then adhesive and rolling followed by heat pad and more rolling);
  - The second half of the liner put into place, pulled under the tank by ropes, sides pulled up the wall and hung, and welding of both saddle seams;

- Prepping of main seam weld (taping back flaps at saddles, solvent cleaning of seam overlap), adhesive weld of main seam, welding of seam up to wall, and welding of section running up the wall (welded from the back); and
- Heat forming of the liner around/atop the sump liner (formed by placing stainless steel ring on warm Hypalon® with lead blanket on top).

- June 24, 1993 - During a visit to the ICPP, viewed conditions of the secondary containment through the cameras installed in the WL-101/102 vault in CPP-604. Items observed included the following:
  - The batten strips holding the liner to the walls were all in place and the pins, as well as the top of the liner, had been caulked;
  - The sump liner assembly was in place, with the clamp plate installed to join the sump and the Hypalon®, and all pipe connections were made; and
  - The RTV potting compound was in place within the frames around each of the tank saddles. (Drips and smears of the potting compound were apparent around the saddle areas, but all appeared to minor spillage and should have no impact on the liner.)

- June 24, 1993 - Watched a previously viewed video to verify that the main seam weld of the liner was performed with the overlap towards the sump. The weld was in the proper direction.

- June 24, 1993 - Attended meeting of the WINCO Test Requirements Review Team (TRRT) at the ICPP. The TRRT reviewed results of the SO test on the secondary containment system.

The systems' functional operability and integrity was verified through the performance of a SO test (WHAS-WL-SO-LD1 - WL-101/102 Vault Sump Jet, Level Instrumentation, and Sampler Operability, 6/02/93) conducted by WINCO. The results of this test were reviewed and it was concurred that the systems are operationally acceptable.

Concurrent with the review of the SO test and the observation of training and videos of work, a review of the liner system project files was performed to verify that material, construction, inspection, and installation requirements were performed and documented in accordance with the design and construction specifications. This review was conducted to verify that welding and inspection practices were performed by qualified personnel, at the appropriate intervals, and that traceability of welder, weld process and materials was maintained. Further, it was verified that the prescribed nondestructive examination requirements were performed, in conjunction with material certification acceptance and traceability, and field installation and configuration requirements. The project record files were complete and demonstrated compliance for all of the above parameters.

The project record files provided documentation that all ancillary piping welds had been inspected and passed pressure/leak testing in accordance with the design and construction specifications. They also documented that the concrete floor and walls of the secondary containment area had passed inspection and the secondary containment (Hypalon® liner) seams and/or joints had passed visual inspections and leak testing. Table 6 lists the system components and the associated project record files reviewed.

3.3.3 Summary of Assessment

A summary of the manner in which installation related regulatory requirements are met by the VES-WL-101/102 secondary containment system (and ancillary equipment) is presented in Table 7. The Table presents the summary data according to the requirement citations and designations originally identified in Table 5.

Table 6. Process Components and Related Project Files

COMPONENT	WETTED PARTS	PROJECT FILE REFERENCE
Tank saddle/liner interface	Silicone RTV potting compound (Dow-Corning Silastic J) 304L stainless steel saddle frame assembly 304 stainless steel bolts and nuts	Inspection Records 2031-C-3, R-1, R-6 & R-9
Sump	Viton O-rings, stainless steel pins 304L stainless steel pipe and liner supports 304L stainless steel sump liner 304L seal ring assembly 17-4 pH stainless steel compression plate	Inspection Records 2031-A-3, C-2, P-2, P-4, R-9, R-12 & T-2 Vendor Data Submittals 292031-9, 12, 13, 14, 15, 16, 33, 33r1, 38, 40r1 & 45
Sump suction line	1½ inch 304L stainless steel	Inspection Records 2031-P-2, R-8, R-9 & R-12 Vendor Data Submittals 292031-9, 22r1, 26r1, 28, 29, 38, 40r1
Steam jet	304L stainless steel	Inspection Records 2031-P-1, & P-5 GFE Form 8030 4/09/93
Steam line	1½ inch 304L stainless steel	Inspection Records 2031-P-1, R-1, R-8, R-9 & T-1
Liquid level indicator probe	⅝ inch 304L stainless steel tubing	Inspection Records 2031-P-3, & R-9
Sample piping	¼ inch 304L stainless steel tubing	Inspection Records 2031-P-3
Process lines	1½ inch 304L stainless steel	Inspection Records 2031-P-1, R-1, R-8, R-9 & T-1
Piping supports	304L stainless steel and Nitronic 60 stainless steel plate angle, square tubing, bolts, hubs, and washers	Inspection Records 2031-R-1, R-9 & R-12 Vendor Data Submittals 292031-15, 16 & 40r1
Secondary containment liner	Hypalon® - 45 mil (nominal) - reinforced 60 mil (nominal) - unreinforced	Inspection Records 2031-A-1, A-2, A-4, A-5, C-1, PA-1, R-3, R-5, R-11, R-13 & T-2 Vendor Data Submittals 292031-57, 58, 59, 74, 78, 79, 80, 81, 82, 84, 85, 87, 87R1, 100R1, 102R1& 103

Table 7. Summary of Compliance with Installation Requirements

Citation	Requirement Designation	Summary of Requirement Compliance
Tank Systems and Components		
264.192(b)	Proper Installation	During an on-site inspection on April 13, 1993 - the sump liner assembly and suction line were inspected (prior to installation) for weld breaks, punctures, cracks, corrosion, structural damage, and inadequate construction. Also, on April 30, 1993 a video of the sump liner installation was reviewed. No adverse conditions were noted on either date. The video tape of the major elements of the hypalon liner installation, observed on June 4, 1993, and the review of related inspection documents verified that the secondary liner was properly installed and of sound integrity.
264.192(d)	Tightness Test	The system functional operation test, SO Test WHAS-WL-SO-LD1, conducted on 6/18/93 and 6/21/93 demonstrated that the system was fully operational. All connections were inspected for leaks and tightness, no leaks were observed at the completion of the test.
264.192(e)	Support of Ancillary Equipment	The support of the ancillary equipment was inspected and accepted during installation, (reference Inspection Planning 2031-P-1). Further, during the functional operation test (SO Test WHAS-WL-SO-LD1), the inspector noted that the ancillary equipment was sufficiently supported and fastened, and did not demonstrate any significant vibration during operation.

4.0 CONDITIONS OF ATTESTATION

The hazardous waste tank system components evaluated for this registered professional engineering certification, as required in 40 CFR 265.192, include the external liner and sump system providing secondary containment for the radioactive mixed waste tanks VES-WL-101 and VES-WL-102 in building CPP-604. Evaluated components also include the associated piping installed as part of the WL-101/102 Vault Secondary Containment Project.

The following conditions are a condition of the certification approval.

- The 20 year service life of the liner will not be exceeded without a reevaluation to determine an acceptable extension period.

- If any spill or leak occurs and it is not cleaned up within 72 hours or if the concentration of HNO_3 exceeds 30%, then an inspection will be required to determine if the prolonged chemical exposure caused any possible damage to the Hypalon® liner or to the silicone rubber sealant. This inspection should determine if the liner should be retested for leaks and reevaluated for its integrity and acceptable remaining service life.

- Any entry onto the liner in the cell, by personnel or equipment, will require an inspection to determine if any possible damage was inflicted to the Hypalon® liner.

- Plans and equipment will be put in place to remove solution from the cell within 72 hours if a large leak is detected in VES-WL-102. This special removal capability may be required until a process line is installed from the cell sump to WL-132. This is necessary to meet the requirement to remove any spilled or/leaked solution from the secondary containment should it involve a failure of VES-WL-102.

- Daily inspection of tank and sump level indicators must continue as a standard operating procedure to verify detection of any leaks within 24 hours.

- The solutions and chemical concentrations identified in this assessment will be consistent with the solutions actually put through the system.

5.0 REFERENCES AND ATTACHMENTS OF CONFIRMATORY INFORMATION

5.1 References

1. Jacobus, Mark J., Idaho Chemical Processing Plant VES-WL-101/102 Vault Project Report on the Irradiation of Hypalon® Liner Test Samples, Sandia National Laboratories, Albuquerque, New Mexico, October, 1992.

2. Shelton-Davis, C. V., correspondence of November 12, 1992 (CVSD-16-92) to D. L. Penwell, Run Report for Corrosion Testing of Hypalon® for the VES-WL-101/102 Vault Liner.

3. United Engineers & Constructors (UE&C), September 30, 1992(a), Specifications for ICPP 604 WL-101/102 Vault Secondary Containment Project, Subcontract No. S292031, Project No. 9354.152.

4. United Engineers & Constructors (UE&C), October 27, 1992(b), Technical Analysis for Pipe Stress Analysis - ICPP 604 Vault Piping (AUTOPIPE program runs), Task No. 16-604-001 Rev. 0, Project No. 9354.152.

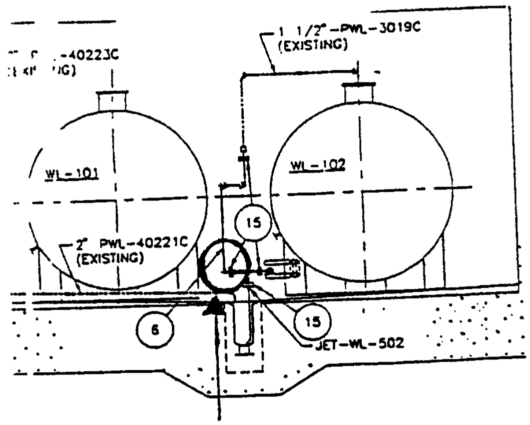
5. United Engineers & Constructors (UE&C), December 7, 1992(c), ICPP CPP-604, WL-101/102 Vault Project, Calculations No: 15-PS-1, Pipe Supports - Bldg 604 WL-101/102 Vault Proj., Project No. 9354.152.

5.2 Attachments

Several design calculations have been performed in support of the structural integrity and secondary containment certification. Attachment A presents calculations performed in support of the certification as follows:

- Stress on 90 degree elbows,
- Horizontal force on pipe support at the base of VES-WL-102,
- Vertical forces on pipe support at the base of VES-WL-102, and
- Capacity of secondary containment.

ATTACHMENT A
STRUCTURAL INTEGRITY
AND SECONDARY CONTAINMENT CAPACITY
CALCULATIONS



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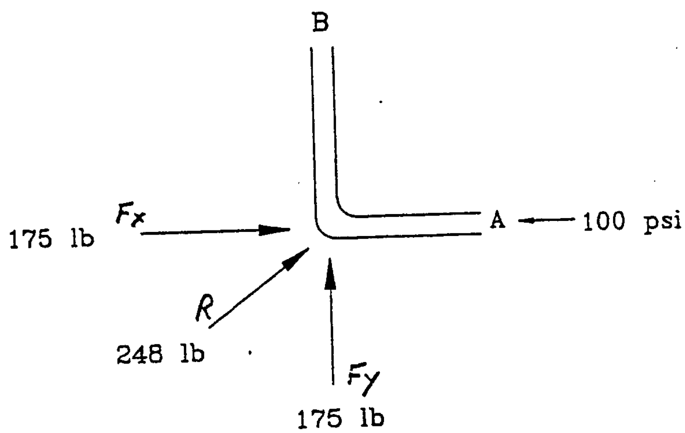


$$v_{1,2} = \frac{Q}{A} = \frac{.12\ ft^3/s}{1.2e\text{-}2\ ft^2} = 10\ ft/s$$

$$\dot{m} = vA\rho = 10\ ft/s\ (1.2e\text{-}2\ ft^2)(62.4\ lbm/ft^3) = 7.49\ lbm/s$$

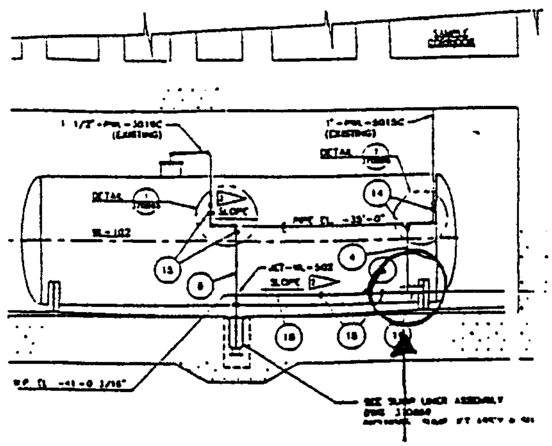
$$F_x = P_B A_B \cos\theta - P_A A_A + \frac{\dot{m}\,(v_2 \cos\theta - v_1)}{32.2} = 0 - 173 - 2.3 = -175\ lb$$

$$F_y = \left(P_B A_B + \frac{\dot{m} v_B}{g_c}\right)\sin\theta = \left(14{,}400(1.2e\text{-}2) + \frac{7.49(10)}{32.2}\right)1 = 175\ lb$$

$$R = \sqrt{F_x^2 + F_y^2} = 248\ lb$$

This pipe can hold up to 36,000 psi before it starts to deform. The pipe experiances $R/A_p = \frac{248\ lb}{.8\ in^2} = 310$ psi

Therefore it will not deform



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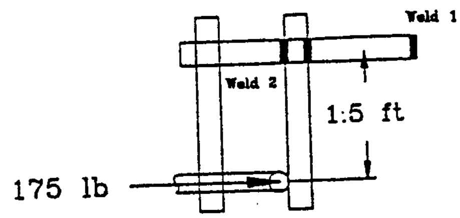
Plan View

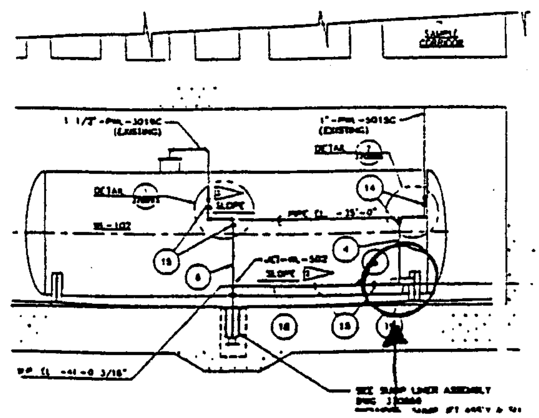


The only force that the support experiences horizontally is 175 lb due to pressure and movement of steam in the pipe.

The moment that is produced is 175 lb X 1.5 ft = 263 lb-ft. This moment is distributed over two bolts and puts these bolts into tension. The two bolts experience 175 lb / 2 / (π x .25in^2) = 446 psi. The bolts in tension can hold up to 6,100 psi before deforming therefore bolts will not fail.

Weld 1 experiences no shear forces.

Weld 2 experiences a shear force of 175 lb. The maximum shear that the weld can hold .707 X 21,000 psi X 3 in X 3/16 in = 8351 lb therefore weld will not fail (based on minimum welding rod strength).



Side View

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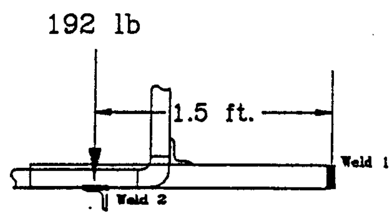


1 1/2" pipe weighs 2.72 lb/running foot of pipe. It is 13 feet From this support to the sump pump therefore the weight of the pipe is 13 ft. X 2.72 lb/ft. = 35.4 lb. This weight is equally distributed between the sump pump and the support. Also the support will experience 175 lb force vertically due to the pressure and movement in the pipe. This gives a total of 192 lb of vertical force that the support will experience.

There are four half inch bolts that connect the pipe support to the tank saddle. The 192 lb shear force will be distributed over the four half inch bolts therefore each bolt has a shear force of 244 psi. The maximum load that a half inch bolt can carry before failing is 3,100 psi therefore bolts will not fail under shear load.

Moment on the bolts is 192 lb X 1.5 ft. = 297 lb-ft. This force will put the two top bolts into tension. The maximum load that the bolts can hold in tension is 6,100 psi. The two top bolts experience 297 lb / 2 / (π x .25in^2) = 756 psi. Therefore bolts will not fail in tension.

Weld 1 experiences a shear of 192 lb. The maximum shear that the weld can hold .707 X 21,000 psi X 12 in X 1/4 in = 44,000 lb therefore weld will not fail (based on minimum welding rod strength)

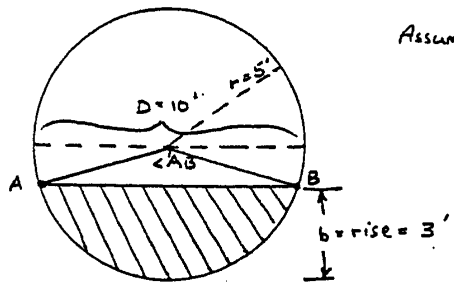
Weld 2 experiences a shear of 192 lb. The maximum shear that the weld can hold .707 X 21,000 psi X 3 in X 3/16 in = 8351 lb therefore weld will not fail (based on minimum welding rod strength).

K.D. Davis 6/23/93

Capacity of Secondary Containment

Capacity = Volume of room, up 3 feet on wall less volume of tanks (up 3 feet)

Volume tank up by tanks (Tank size approximately 10' Diameter by 33' long)



Assuming tank is sitting directly on the floor (conservative assumption since they are sitting on saddles), the cross hatched area is that unavailable for secondary containment.

straight line A to B is the chord C

$$r = \frac{4b^2 + c^2}{8b}$$

$$8br = 4b^2 + c^2$$

$$c = \sqrt{8br - 4b^2} = \sqrt{8(3)(5) - 4(3^2)}$$
$$= \sqrt{120 - 36} = \sqrt{84} = 9.17$$

$$b = \frac{c}{2}\tan\frac{\angle AB}{4}$$
$$\tan\frac{\angle AB}{4} = \frac{2b}{c}$$

$$\angle AB = 4\ \mathrm{ArcTan}\,\frac{2b}{c}$$
$$= 4\ \mathrm{ArcTan}\,\frac{(2)(3)}{9.17} = 4(33.197) = 132.79 \text{ degrees}$$

$$\mathrm{Arc}(A \text{ to } B) = \frac{\pi r \angle AB}{180°} = \frac{\pi(5)(132.79)}{180} = 11.59'$$

$$\text{Area of Segment} = \frac{(\mathrm{Arc})(r) - c(r-b)}{2}$$
$$= [(11.59)(5) - 9.17(5-3)]/2$$
$$= [57.95 - 18.34]/2$$
$$= 19.80 \text{ sq ft}$$

Capacity = (Volume of room) − (Volume taken up by tanks)

for a 3-foot depth and where the length of the tanks is 33'

= (43' x 30.5' x 3') − (2)(19.80)(33)

= 3934.5 cubic ft − 1306.8 cubic ft

= 2627.7 ft^3

@ 7.48 gal/ft^3

= 19,655 gal

∴ There is sufficient secondary containment capacity

WASTREN, INC.

A Multi-Service Corporation

Waste Management • Transportation • Training
Environmental/Regulatory Compliance
Quality Assurance • Engineering • Remediation

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11.3.3

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April 23, 1996
In Reply Refer to: DAA\005\0496

Mr. Richard Jones
Lockheed-Martin Idaho Technologies
1955 Fremont Avenue
PO Box 1625
Idaho Falls, ID 83415

SUBJECT: Final RCRA Tank Certification for the Isolation of VES-WL-102, Subcontract: C 93-229971-003

Dear Mr. Jones:

Enclosed is the final tank assessment and certification for the isolation of VES-WL-102. Provided is the unbound original and two bound copies. All of the comments you provided April 18, 1996 have been included or otherwise addressed. This should complete work under the subject task. Please let me know if you have any questions. We've enjoyed and appreciated the opportunity to work with you.

Sincerely,

Donald A Armour

Donald A. Armour
Regulatory Compliance Manager

wls:DAA

Enclosures

cc: Keith Davis

RCRA Tank Certification for the Isolation of VES-WL-102

FINAL

Completed for
Lockheed-Martin Idaho Technologies
Under
Contract C93-229971-003

Prepared by
WASTREN, Inc.
477 Shoup, Suite 209
Idaho Falls, ID 83402

Under
Work Order 1045-003

April 1996

TABLE OF CONTENTS

LIST OF TABLES

1.0 CERTIFICATION

Tank System Being Certified

The tank system being addressed by this attestation is the radioactive mixed waste tank VES-WL-150 system, installed to isolate VES-WL-102. This tank is in a subfloor vault located in the Waste Treatment Building/Rare Gas Plant (CPP-604) within the Idaho Chemical Processing Plant. The tank system is further described in Section 3.1 of this Assessment.

Attestation

The tank system and the existing secondary containment have been designed, installed, and tested to prevent any migration of wastes or accumulated liquid out of the system to the soil, ground, or surface water at any time during its use. The VES-WL-150 system has sufficient structural integrity and is acceptable for the storing of the radioactive and hazardous mixed waste identified in this assessment. This attestation is contingent upon certain conditions which are also identified in this assessment.

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

April 10, 1996

Keith D. Davis — Date
Idaho P.E. Registration #6831
WASTREN, Inc.

PROFESSIONAL ENGINEER REGISTERED 6831 4/10/96 STATE OF IDAHO KEITH D. DAVIS

April 19, 1996

Donald A. Armour — Date
Quality Inspector, AWS-CWI #86040121
WASTREN, Inc.

2.0 INTRODUCTION

The Resource Conservation and Recovery Act (RCRA) hazardous waste regulations that address the operations of hazardous waste tank systems (40 CFR Part 264, Subpart J for fully permitted facilities and 265, Subpart J for interim status facilities) require an assessment of the tank system by an independent registered professional engineer. By definition (40 CFR 260.10), associated ancillary equipment and any containment system are part of the tank system. The preceding certification attests to the integrity of the radioactive and hazardous mixed waste tank system which is defined by the tank VES-WL-150 within Building 604 at the Idaho Chemical Processing Plant (ICPP). The remainder of this document presents the written assessment of the tank system upon which the certification is based.

Lockheed Idaho Technologies Company (LITCO) is operator of the ICPP that includes Building 604 (CPP-604) where the VES-WL-101, VES-WL-102, VES-WL-150 tanks are located in a subfloor vault. Historically, waste tank VES-WL-102 has served as a radioactive waste collection vessel and feed tank for the Process Equipment Waste (PEW) evaporators which are located in nearby cells. The VES-WL-102 primarily functions as a backup tank for VES-WL-133 (installed in 1983 as a replacement for VES-WL-102) with the exception of some low volume flows which go directly to VES-WL-102. The origins of the low volume flows include sample drains, floor drains, and condensate drains. Since the tank has been in use for approximately twice its design life, the condition of internal surfaces is unknown, and solids buildup has caused two of the level probes to be inoperable. This project was undertaken to further isolate the tank from routine usage. The Isolate VES-WL-102 Project reduces all process connections to the tank to two: one inlet and one outlet. The single inlet will be connected to a feed head tank (WL-109) that will allow the tank to be used for emergency overflow from VES-WL-133. The outlet will be connected to feed pumps, allowing the removal of waste that must be sent to the tank and will support its final closure scheduled to begin in 1998. Under this project a new 50-gallon material transfer vessel (VES-WL-150) was installed to which all of the low volume flows previously flowing to VES-WL-102, noted above, were routed.

In addition to installing new equipment and piping, the Isolate VES-WL-102 Project reroutes and reuses process piping, and makes use of existing secondary containment within the building. The primary actions under the project, which include a new tank and new tank system components, that are included in this certification are summarized as follows:

- Installation of a new 50-gallon transfer tank, VES-WL-150, in the WL-101/102 vault, including: vessel off gas line 1" VG-AR-155554; temperature thermowell TE-WL-150; level/pressure indicator lines 3/8" LI2-AM-155555, 155556, 155814 & 155815, and sparge line 1" HS-AR-155557.

- Installation of a new pipe, 1 ½" PL-AR-155566, in the WL-101/102 vault that intercepts the discharge from the WL-101/102 vault sump (SU-101/102S), via existing JET-WL-502, and redirects it to VES-WL-150.

- Installation/construction of a stainless steel floor sump, SU-WL-153, in the Access Corridor which is located above and to the south of the WL-101/102 vault.

- Installation of new piping, ½" CT-AR-155561, within the Access Corridor which intercepts an existing condensate line and allows the option of draining it to the newly installed floor sump. Initially existing drain lines coming down from the overhead Piping Corridor were to be rerouted to the sump also, however, this modification was deleted from the scope of work near the completion of the project.

- Installation of a new pipe, 3/4" PL-AR-155553, from the Access Corridor sump to VES-WL-150. This pipe allows liquid accumulated in the sump to be jetted to VES-WL-150 and goes up through the Access Corridor, into the overhead Piping Corridor, north along the Piping Corridor to the Sample Corridor, and from there down to the WL-101/102 vault.

- Installation of new piping, 1 ½" PL-AR-155568 & 3" PL-AR-155567, in the WL-101/102 vault to intercept lines coming down into the vault from Sample Gallery #2 (located within the overhead Sample Gallery) and reroute their flows to VES-WL-150.

- Installation of a discharge pipe, 1 ½" PL-AR-155565, from VES-WL-150 that goes from the WL-101/102 vault to valve box DVB-WM-PW-C32 where it connects to an existing line. Also, the installation of a new jet (JET-WL-550) and jet steam supply line (1" HS-AR-155559) to facilitate discharge of VES-WL-150.

- Rerouting of a pipe, 1 ½" PL-AR-155563, beginning in the Middle Gas Cell (adjacent to the Access Corridor), up to the Piping Corridor, north along the Piping Corridor to the Sample Corridor, down to the WL-101/102 vault, and to valve box DVB-WM-PW-C32 where it connects to an existing line. This line does not connect to VES-WL-150 and is considered as ancillary to the PEW feed sediment/feed collection tanks, VES-WL-132/VES-WL-133 (depending on which tank the line goes to). However, its integrity is being certified as part if this effort.

- Installation of steam jet, JET-WL-553, and instrumentation lines 3/8" LI2-AM-155550 & 155560 to the Access Corridor sump, including jet steam supply line 3/4" HS-AR-15552 and VES-WL-150.

The new tank system (i.e., the tank and its ancillary equipment, including the ancillary piping that feeds to the tank) has been identified as a hazardous waste storage unit subject to regulation under the Resource Conservation and Recovery Act (RCRA). The hazardous waste tank system is considered to be the new tank (VES-WL-150), the secondary containment provided by the Hypalon®-lined concrete in the bottom of the WL-101/102 vault, and the new piping and sump described above in the bulletized actions performed under this project. Since this project involves modifications to existing systems, it overlaps into tank systems that have already been certified. This certification effort does not address tank system components that are not altered by this project. For example, the secondary containment provided by the Hypalon® liner has not been reevaluated other than ensuring that liquid wastes reaching VES-WL-150 and flowing through pipes installed under this project are not incompatible with the liner material. Also, new pipes are covered by the certification only to the point where they connect with existing piping.

3.0 DESIGN AND INSTALLATION ASSESSMENT

3.1 Description of Tank Systems, Secondary Containment, and Leak Detection

The WL-101/102 vault has already been certified to be RCRA-compliant (*WASTREN*, 1993) for providing secondary containment. An installed Hypalon® (chlorosulfonated polyethylene) liner in the WL-101/102 vault provides secondary containment for the two existing tanks and for the new VES-WL-150 tank system. The vault's secondary containment includes a sump liner, sump jet, sump sampling line, and sump level instrumentation to ensure detection of any leakage from the tanks and to facilitate removal of any leaked material.

The floor of the WL-101/102 vault is located approximately 42 feet underground. Its dimensions are approximately 30-feet 6-inches wide, by 43-feet long, by 16-feet high. The vault has walls, floor and ceiling of reinforced concrete that range in thickness, from two to four feet; the section of floor in which the sump is located is even thicker. The floors of the vault are gently sloped from all sides toward the centrally located sump. Due to the use of the tanks for storage of radioactive liquids and the solids/sludges that have accumulated in them, the vault is a high radiation zone with strictly controlled access through a single hatch in the vault's ceiling.

This system evaluation also includes the secondary containment liner of the corridors and cells through which the ancillary piping pass, the Access Corridor new sump system, and the piping installed under the Isolate VES-WL-102 Project. The integrity of the existing tanks and other portions of the tank system have already been evaluated.

Materials of construction for the secondary containment, the sump systems, and the newly installed piping that could potentially be wetted from a spill of leak from vessels VES-WL-150, VES-WL-101, or VES-WL-102 or ancillary piping are shown in Table 1. The main secondary containment for the tank system consists of the concrete vault lined with the Hypalon® liner which covers the floor of the vault as well as extending three feet up the wall of the vault.

Table 1. Process System Wetted Parts

COMPONENT	WETTED PARTS
Storage tank saddles (VES-WL-101/102)	347 stainless steel
Tank saddle/liner interface	Silicone RTV potting compound (Dow-Corning Silastic J) 304L stainless steel saddle frame assembly 304 stainless steel bolts and nuts
Sumps	Viton O-rings, stainless steel pins 304L stainless steel pipe and liner supports 304L stainless steel sump liner 304L seal ring assembly 17-4 PH (AMS 5604) stainless steel clamp plate assembly
Sump suction lines	304L stainless steel
Steam jets	304L stainless steel
Steam lines	304L stainless steel
Liquid level indicator probes	304L stainless steel
Sample piping	304L stainless steel
Piping, flanges, reducers, tees, caps	304L stainless steel
Piping supports, clamps, and bolts	304L stainless steel and Nitronic 60 stainless steel plate angle, square tubing, bolts, hubs, and washers
Secondary containment liner (WL-101/102 Vault)	Hypalon® - 45 mil (nominal) - reinforced 60 mil (nominal) - unreinforced
Secondary containment liner (other cells/corridors)	Epoxy paint
Storage tank VES-WL-150	304L stainless steel
Demister	304L stainless steel
Demister screen	Carpenter 20 CB3 stainless steel (0.011" wire mesh)
Tank adapters (flanges)	304L stainless steel
Flange gaskets	Grafoil with 304L stainless steel ring
Ball valves	316L stainless steel with polyetheretherketone (Arlon 1000, PEEK) seats and seals
Sparge ring	304L stainless steel
Thermowell	304L stainless steel

The main body of the Hypalon® liner has a 45 mil nominal thickness and is reinforced with 10 x 10 x 1000 denier polyester fabric scrim. (The denier unit represents the weight in grams per 9,000 meters of a thread of yarn.) Unreinforced Hypalon® used for corner reinforcement and around the sump liner insert which was molded to fit, is 60 mil nominal thickness (three plies of 20 mil thickness). A silicone rubber sealant was used to seal the liner around the stainless steel saddles which support the VES-WL-101/102 tanks. The sump assembly is made of 304L stainless steel. Viton o-rings are used to ensure even compression of the Hypalon® for the seal between the sump liner assembly and the Hypalon® liner. The concrete floors and walls of the Access Corridor, the Piping Corridor, and the Sample Corridor are all painted with an epoxy paint capable of withstanding harsh chemical environments for a limited period of time. The Separations and Condensation Cell and the Middle Gas Cell have stainless steel liners and have been previously certified as being RCRA-compliant. These cells have sumps with level detection and liquid removal capabilities. The Piping Corridor and the Sample Corridor have drains that will carry any leaked material to a process tank. The Access Corridor has a newly installed sump that will collect any leaked solutions. The sump is stainless steel lined.

Ancillary piping provides: 1) steam to the sump solution transfer jets; 2) solution transfer from the sumps; 3) sampling of the sumps; 4) collection of solution from floor drains; and 5) liquid level measurement of the sumps. All of the piping, the supports, and the steam jets are fabricated of either 304 or 304L stainless steel.

The steam jet transfer system which serves to transfer solutions from the WL-101/102 vault sump was designed to transfer the contents of an entire tank, and water added to the vault to rinse off the liner, within 72 hours after detection of liquid in the sump. The solutions from the WL-101/102 and Access Corridor sumps are transferred to vessel VES-WL-150. With the current piping configuration, liquids leaking from the VES-WL-150 tank would be cycled by the steam jet transfer system back to the leaking tank while the existing tank transfer capabilities would be transferring its contents to valve box C-32. Final cleanup of any leak for VES-WL-150 could be performed through the placement of a portable jet and transfer line into the vault.

3.2 Design

3.2.1 Regulatory Requirements

This assessment addresses the mixed hazardous waste tanks system designated VES-WL-150 located in a subfloor vault within CPP-604. Included in the assessment are the secondary containment, the integral sumps where any leaked or spilled liquids are collected, and newly installed piping that supports the liquid removal, liquid level monitoring, and liquid sampling functions of the sump systems. Subpart J (Tank Systems) of 40 CFR Part 264, as well as the corresponding subpart of Part 265, establishes requirements that must be met by a tank system and the secondary containment. The requirements cited in Subpart J that apply to the design of the tank system and secondary containment, along with the regulatory citation, are summarized in Table 2. The regulatory citations shown are those from 40 CFR Part 264, but they could as well have been from Part 265 as the requirements are the same. (Note: Additional requirements that are more closely associated with installation and inspection of the system are addressed in Section 3.3).

3.2.2 Design Standards

As identified in the project specifications EG&G A-ECS-40743 (July 1994), the elements of the tank systems that are the subject of this assessment are designed and manufactured in accordance with the following codes and standards:

- American Welding Society (AWS):
  - -A2.4 Symbols for Welding and Nondestructive Testing
  - -A3.0 Welding Terms and Definitions
  - -D1.1 Structural Welding Code - Steel
  - -D1.3 Structural Welding Code - Sheet Steel
  - -QCI AWS Standard for Qualification and Certification of Welding Inspectors

Table 2. Regulatory Requirements Related to Design

Citation	Designation	Requirement
Tank Systems and Components		
264.192(a)(1)	Design Standards	The assessment must identify the design standard(s) according to which the tanks and ancillary equipment are constructed.
264.192(a)(2)	Waste Characteristics	The hazardous characteristics of the waste to be handled must be identified.
264.192(a)(3)&(4)	Corrosion Control and Vehicle Damage	Not applicable - These requirements are for underground tank systems and/or tank systems where metal is in contact with soil or water.
264.192(a)(5)	Design - Foundation - Anchored	- The tank foundation must be able to maintain the load of a full tank. - Tank systems must be anchored to prevent dislodgement during seismic activity.
264.192(e)	Support of Ancillary Equipment	Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.
264.192(g)	Certifying Statements	The owner or operator must obtain and keep on file written statements that certify to the tank systems' design and installation.
Secondary Containment Systems		
264.193(c)(1)	Compatibility & Strength	The secondary containment must be constructed of or lined with materials compatible with the wastes in the tank system and must be of sufficient strength and thickness to prevent failure.
264.193(c)(2)	Foundation	It must be placed on a foundation or base capable of providing adequate support.
264.193(c)(3)	Leak Detection	It must have a leak detection system capable of detecting any accumulated liquid in the secondary containment within 24 hours.
264.193(c)(4)	Liquid Removal	It must be sloped or otherwise designed, to facilitate removal of liquids.
264.193(d)	Containment System	(For tanks) It must be (1) a liner (external to the tank), (2) a vault, (3) a double-walled tank; or (4) an equivalent, approved, device.
264.193(e)(1)	Requirements for liners - Capacity - Run-on/Infiltration - Cracks or Gaps - Lateral and vertical control	The secondary containment liner must - be designed or operated to contain 100% of the capacity of the largest tank, - prevent run-on or infiltration of precipitation, unless it has sufficient excess capacity, - be free of cracks or gaps, and - be capable of preventing lateral as well as vertical migration of the waste
264.193(f)	Containment for Ancillary Equipment	Ancillary equipment (pipes, and the steam jet system in this case) must be provided with secondary containment unless it is visually inspected for leaks on a daily basis and (1) it is above ground, (2) all flanges, joints, and connections are welded, (3) pumps and valves are sealless, and (4) pressurized piping systems have automatic shutoff.

- American Society of Mechanical Engineering (ASME):

  -B31.1 Power Piping

  -B31.3 Chemical Plant and Petroleum Refinery Piping

  -Boiler and Pressure Vessel Code (BPV)

  Section II Material Specifications. Part C

  Section V Nondestructive Examination

  Section VIII Pressure Vessels

  Section IX Welding and Brazing Qualifications

- American National Standards Institute (ANSI):

  -Z49.1 Safety in Welding and Cutting

- American Society for Nondestructive Testing (ASNT)

  -SNT-TC-1A Personnel Qualifications and Certification in Nondestructive Testing■ Uniform Plumbing Code

- INEL Welding Procedure Manual

3.2.3 Structural Integrity Assessment

Support of Tank

The small VES-WL-150 tank is mounted on the wall of the WL-101/102 vault. It is well supported in a welded frame made from 2-inch by 2-inch by ¼-inch angle steel. The frame is bolted into the concrete walls with ¾-inch anchor bolts, embedded at least 6 inches. The tank is stable and this design appears adequate to hold the tank and its contents.

Support of Ancillary Equipment (pipes)

Although visual inspection of the system did not include the measurement of spacing between pipe supports, they appeared to be consistent with the design specifications and, therefore, are considered adequate. In addition, review of design changes approved through Construction Interface Documents (CIDs) indicates two additional pipe supports were added: one in the Pipe Corridor to keep the pipe on the proper grade in a high traffic area and one in the Middle Cell near a tie in point between two lines.

3.2.4 Adequacy of Handling Potential Leaks

The design of secondary containment and leak detection systems are discussed in the paragraphs that follow.

Secondary Containments - WL-101/102 Vault

The main secondary containment system of concern is located within a concrete vault located within building CPP-604. As described in Section 3.1, tanks VES-WL-150, VES-WL-101, and VES-WL-102, and much of the associated ancillary equipment being considered under this assessment are located within this vault. The secondary containment for this vault was previously certified as being RCRA-compliant under the project wherein it was installed (*WASTREN*, 1993). This project has inspected the liner to assure that no rips, tears, or perforations were created during project construction activities.

Secondary Containments - Access Corridor

The Access Corridor has had a stainless steel lined sump installed as part of this project (Isolate VES-WL-102 Project). Any leaked solution will be collected in this sump. The sump has leak detection installed and a steam jet that will pump (jet) the collected solution to VES-WL-150. The Access Corridor floor and walls are coated with an epoxy paint.

Secondary Containments - Piping Corridor

The Piping Corridor floor and walls are coated with an epoxy paint. The floor has drains that collect any solution on the floor and route that solution to the existing tank VES-WL-102.

Secondary Containments - Sample Corridor

The Sample Corridor floor and walls are coated with an epoxy paint. The new piping installed as part of this project (Isolate VES-WL-102 Project) reroute solutions from Sample Gallery No. 2 to the new tank VES-WL-150.

Secondary Containments - Middle Gas Cell

The Middle Gas Cell has a stainless liner on the floor, extending up the walls. The cell also has a sump and sump transfer system to pump (steam jet) any solutions from the sump. The secondary containment for this cell has previously been certified to be RCRA-compliant and is not part of this certification effort.

Leak Detection

The secondary containment includes liquid detection instrumentation in the sumps. Tubing installed in the sumps is connected to differential pressure transmitters which in turn provides signals to read-out instrumentation in the facility control room. Since the vault and cells are high radiation areas, routine (daily) physical inspection of the containment structure for the presence of accumulated liquids is not a desirable method of leak detection. Rather leak detection will consist of daily inspections of sump and tank level instrumentation. The other corridors/cells drain to a sump or have daily access so that leak detection is accomplished on a daily basis. This procedure will accommodate the requirement for detecting leaks within 24 hours. Also, level alarms will sound before more than about 14 gallons of liquid enters the WL-101/102 vault sump.

3.2.5 Chemical Solutions Considered and System Compatibility

The chemical constituents of the corrosive wastes that could potentially be in contact with the secondary containment system are shown in Table 3. The table shows the maximum anticipated chemical constituent concentrations in each tank, to give an idea of the range of concentrations expected. The values shown in Table 3 for VES-WL-101 came from a study to simulate concentrations of the maximum reactive/corrosive components of the bottoms coming back from the evaporator. These test solutions created an environment much harsher than the liner would see if VES-WL-150 or VES-WL-102 failed.

From Table 1 we can see that the following materials must be compatible with the process solutions contained in vessels VES-WL-101, -102, and -150 and ancillary process piping:

- Hypalon® (chlorosulfonated polyethylene)
- 304/304L stainless steel
- 347 stainless steel
- Carpenter 20 stainless steel
- Nitronic 60 stainless steel
- Silicone RTV potting compound
- Viton
- Grafoil gasket material
- Polyetheretherketone (Arlon 1000, PEEK)
- Epoxy paint

Table 3. Process Waste

CHEMICAL CONSTITUENT	VES-WL-102, -150 MAXIMUM CONCENTRATION(1) mg/l / g-mole/l (M)	VES-WL-101 MAXIMUM CONCENTRATION(2) g-mole/l (M)
Zr (Zirconium)	-- 3	--
F (Fluoride)	200.0 / 0.01M	0.1M
Cd (Cadmium)	1.0	--
SO_4 (Sulfate)	100.0 / 0.001M	0.04M
Pb (Lead)	10.0	--
Cr (Chromium)	5.0	--
Cl (Chloride)	50.0 / 0.0014M	0.06M
Ca (Calcium)	-- (3)	0.1M
Al (Aluminum)	-- (3)	0.1M
No_3 (Nitrate)	-- (3)	5.0M
HNO_3	-- (3)	5.0M
H_2O (Water)	--	--
Hg (Mercury)	0.2	--
U-235 (Uranium)	5.0	--
Pu (Plutonium)	5.0	--
Phosphate	950.0	--
As (Arsenic)	5.0	--
Ba (Barium)	100.0	--
Se (Selenium)	1.0	--
Ag (Silver)	5.0	--
NA + K (Sodium + Potassium)	1.0M	2.6M
pH	<4	--

NOTE: The water concentration is inversely related to the concentrations of the other constituents.
1) Obtained from WINCO SOP, P.O.40, Chemical Acceptability for Waste Processing at ICPP, 1990.
2) See reference Shelton-Davis, 1992
3) Value not given in identified SOP

The list of possible wetted materials from Table 1 was evaluated against the process solutions contained in the waste storage tanks. The major chemical constituents from the tanks that may result in corrosion are Cl^- , F^-, NO_3 , and SO_4. The mixture of potential corrosive agents makes the corrosion considerations complex. The method used to determine the compatibility was to assess the compatibility of the pure chemical reagent with each wetted material. Experience at the ICPP has shown that the different types of stainless steel present in the cell and Viton o-rings will withstand the possible solutions to which they could be exposed. Tests were performed on the Hypalon® material which show the material to adequately withstand the possible solutions even after irradiation in a 20 R field for 30 years (Jacobus, 1992). Dow Corning provided vendor data that shows the silicone rubber potting compound to adequately withstand irradiation, with some swelling when exposed to 6.5 M HNO_3. These considerations are reflected in the discussion below.

The following conclusions were reached:

1. The materials of construction are acceptable as long as the following conditions are followed:

   - The service life of the liner will not exceed the design lifetime of 20 years (UE &C, 1992a). However, the service life is based on a 20 rad/hour radiation field. Since the average field is currently less than 20 rad/hour, a revaluation should be performed at the end of 20 years to determine the acceptable extension period of the service life of the liner.

   - If any spill or leak occurs and it is not cleaned up within 72 hours or if the concentration of HNO_3 exceeds 30%, then an evaluation will be required to determine if the prolonged chemical exposure caused any possible damage to the Hypalon® liner or to the silicone rubber sealant or to the epoxy paint. This evaluation should determine if the liner and/or sealant should be retested for leaks and reevaluated for its integrity and acceptable remaining service life.

- Any entry onto the liner in the VES-WL-101/102 cell, by personnel or equipment, will require an inspection to determine if any possible damage was inflicted to the Hypalon® liner. If the liner shows evidence of damage, it must be patched to repair the damage.

2. Plans and equipment will be put in place to remove solution from the WL-101/102 vault within 72 hours if a large leak is detected in VES-WL-150. The problem with the present configuration is that any solution leaking from the tank VES-WL-150 must be pumped back into VES-WL-150 before it can be transferred to valve box C-32.

3. Visual leak detection must be included in required administrative procedures for piping areas outside of the WL-101/102 vault in order to verify detection of any leaks within 24 hours.

3.2.6 Summary Assessment

A summary of the manner in which design related regulatory requirements are met by the VES-WL-150 tank is presented in Table 4. The Table presents the summary data according to the requirements' citation and designation as originally identified in Table 2.

Table 4. Summary Assessment for Meeting Design Requirements

Citation	Designation	Summary of How Requirement is Met
Tank Systems and Components		
264.192(a)(1)	Design Standards	The design standards by which the tank and ancillary equipment were specified and constructed are presented in this assessment and documented in the project design and construction files.
264.192(a)(2)	Waste Characteristics	The maximum concentration of solutions to be sent to the VES-WL-150, VES-WL-101, and VES-WL-102 tanks are identified in Table 3 of this assessment.
264.192(a)(5)	Design - Foundation - Anchored	- The small tank is mounted on the massive concrete structure that makes up the wall of the WL-101/102 vault. - The tank is well anchored to the vault wall through the use of a welded steel frame and anchor bolts.
264.192(e)	Support of Ancillary Equipment	The design basis shows pipes to be supported adequately to withstand design pressures without deforming or breaking free.
264.192(g)	Certifying Statements	The written statement that certifies the design and installation of the liner and ancillary equipment is provided in Section 1.0 of this assessment.
Secondary Containment Systems		
264.193(c)(1)	Compatibility & Strength	The secondary containments' Hypalon® and epoxy liners are compatible with the range of solutions identified to be put through the tank systems and is supported by concrete walls and floor.
264.193(c)(2)	Foundation	The Hypalon® liner and the epoxy liner are directly supported by concrete
264.193(c)(3)	Leak Detection	Operation of the secondary containment depends on daily inspections of the sump and tank level readouts in the control room whenever waste is in the tanks to ensure leaks are detected within 24 hours. Daily inspections are also required of piping located outside of the WL-101/102 vault.
264.193(c)(4)	Liquid Removal	The floor of the secondary containment areas are sloped toward the sumps or drains. Accumulated liquids can be removed through the use of the installed steam jets or through placement of a portable sump pump and lines.
264.193(d)	Containment System	Containment is provided by Hypalon® or epoxy liner (backed by concrete walls and floor), external to the tanks.
264.193(e)(1)	Requirements for liners - Capacity - Run-on/Infiltration - Cracks or Gaps - Lateral and vertical control	- The secondary containment was designed and independently verified to contain greater than 100% of the contents of the largest hazardous waste tank. - The tank vault, cells, and corridors are located inside a building, protected from run-on and infiltration of precipitation. - The secondary containment liner is designed of welded sheets of Hypalon® or continuous epoxy paint with no gaps or cracks. Liner interface with the tank saddles is sealed with silicone rubber and with the sump liner by compression-fit Viton o-rings. - The liner is supported totally by concrete walls and floor.
264.193(f)	Containment for Ancillary Equipment	The containment for the ancillary equipment addressed by this assessment is provided by the Hypalon® or epoxy liners.

3.3 Installation and Inspections

3.3.1 Regulatory Requirements

Subpart J (Tank Systems) of Part 264 also establishes requirements that are applicable to the installation of the hazardous waste systems in the WL-101/102 tank vault. These requirements, summarized in Table 5, are in addition to those related to the tank system's design which were summarized in Table 2. The requirements for the support of ancillary equipment are shown in each table, indicating both design and inspection elements.

Table 5. Regulatory Requirements Related to Installation

Citation	Designation	Requirement
Tank Systems and Components		
264.192 (b)	Proper Installation	Prior to placing a new tank components in use, they must be inspected for the presence of any of the following: -Weld breaks; -Punctures; -Scrapes of protective coatings; -Cracks; -Corrosion; and -Other structural damage or inadequate construction/installation.
264.192©	Backfill	Not Applicable - These requirements are for underground tanks that are backfilled.
264.192(d)	Tightness Test	New tanks and ancillary equipment must be tested for tightness prior to being placed in use.
264.192(e)	Support of Ancillary Equipment	Ancillary equipment must be supported and protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.
264.192(f)	Installation of Corrosion Protection	Not Applicable - These requirements apply to tanks that are underground or where metal is in contact with soil or water.

3.3.2 Independent Inspections

In accordance with 40 CFR Parts 264.192 and 264.193, this assessment is to include a verification that the tank and ancillary equipment have been properly installed, free of structural damage or inadequate construction. The verification of proper installation was performed by *WASTREN* personnel through the review of the project design criteria, fabrication records, inspection records, vendor data submittals, system walkdowns, and witnessing the performance of system pressure testing, sensitive leak testing and functional operation SO testing.

Since the Isolate VES-WL-102 Project involves construction in a vault that is considered a high radiation zone, physical inspection of materials installed in the vault was not accomplished as part of this independent assessment. However, work in the vault and actual liner and sump conditions were observed through cameras installed in the vault. Work (including that observed via vault cameras) and vault and equipment conditions that were observed are itemized in the following:

- On January 18, 1996 Keith Davis and Don Armour of *WASTREN* observed the general condition of the vault activities via the vault cameras/monitor. On this date it was noted that VES-WL-150 was installed and that installation of ancillary piping was in progress. The vault equipment and liner appeared to be in good condition with no evidence of damage or poor work practices.

- On February 13 & 14, 1996 Keith Davis and Don Armour observed LITCO construction and inspection personnel torquing the flange connections of VES-WL-150 prior to the performance of the system sensitive leak and pressure testing. The personnel performing the work had verified torque wrench calibration and reviewed the torque values and sequence prior to entering the vault and performed the work without incident. Tightness testing, line configuration, and system component identification tagging were also witnessed/verified at this time in the access and piping corridors.

- On February 15, 1996, during the VES-WL-150 system sensitive leak and pneumatic pressure testing, Don Armour observed LITCO inspection personnel checking the mechanical and welded joints in the vault with Snoop (bubble forming solution) while the system was under pressure. No evidence of leaks were noted. Also, on this date Mr. Armour witnessed inspection personnel checking the mechanical and welded joints with Snoop in both the Access Corridor and Piping Corridor, no evidence of leaks were noted. Pneumatic and sensitive leak testing was performed to LITCO approved procedure CMSM 10A-2-57, Rev 2, by qualified LITCO inspection personnel.

- On March 26, 1996, during the systems' functional operability SO test (WHAS-WL-SO-102) Don Armour observed the swing bolt connector, associated with the vault sump jet (JET-WL-502), while in operation. Because the connection is in a high radiation field it was determined that this mechanical connection would be visually examined for leaks during the SO test, via vault cameras, in lieu of pressure testing. The swing bolt connection was viewed while under pressure for leaks, no leaks were observed. It was also noted at this time that the vault jet (JET-WL-502) functioned as designed.

The systems' functional operability and integrity was verified through the performance of a SO test WHAS-WL-SO-102, the performance of this test was witnessed by Don Armour on March 25 and 26, 1996. The test demonstrated that the systems are operationally acceptable and performed as designed. The ability to jet material from both access corridor and vault sumps to VES-WL-150, and to jet material from VES-WL-150 to VES-WL-133 was confirmed by the performance of the SO test, as well as the operation of the CPP-604 distributed control system (DCS) through which the operators control and monitor the system.

Concurrent with the review of the SO test and the observation of work, a review of the tank system project files was performed to verify that material, construction, inspection, and installation requirements were performed and documented in accordance with the design and construction specifications. This review was conducted to verify that welding and inspection practices were performed by qualified personnel, at the appropriate intervals, and that traceability of welder, weld process and materials was maintained. Further, it was verified that the prescribed nondestructive examination requirements were performed, in conjunction with material certification acceptance and traceability, and field installation and configuration requirements. The project record files were complete and demonstrated compliance for all of the above parameters.

The project record files provided documentation that all ancillary piping welds had been inspected and passed pressure/leak testing in accordance with the design and construction specifications. They also documented that the concrete floor and walls of the secondary containment area had passed inspection and the secondary containment (Hypalon® liner, stainless steel liner, and epoxy paint) had passed visual inspections and leak testing. Table 6 lists the system components and the associated project record files reviewed.

Table 6. Process Components and Related Project Files

COMPONENT	WETTED PARTS	PROJECT FILE REFERENCE
Storage tank saddles (VES-WL-101/102) to liner interface	Silicone RTV potting compound (Dow-Corning Silastic J) 304L stainless steel saddle frame assembly 304 stainless steel bolts and nuts	Inspection Records: 2031-C-3, R-1, R-6 & R-9
Sumps: SU-101/102S, & SU-WL-153	Viton O-rings, stainless steel pins 304L stainless steel pipe, sump, and liner supports 304L seal ring assembly	Inspection Records: 2031-A-3, C-2, P-2, P-4, R-9, R-12 & T-2 4770-S-1, P-1, P-2, R-4, R-5 & Weld Record Pkg - Sump 102 Vendor Data Submittals: 292031-9 thru 45 264770-1 thru 51 Test Records: SO Test - WHAS-WL-SO-102
Sump suction lines	304L stainless steel	Inspection Records: 2031-P-2, R-8, R-9 & R-12; 4770-P-1, R-5 & Weld Record Pkg - 3/4" PL-AR-155553 Vendor Data Submittals: 292031-9 thru 40r1, & 264770-1 thru 51 Test Records: SO Test - WHAS-WL-SO-102, & 264770 Pneumatic & Sensitive Leak Tests

Table 6. Process Components and Related Project Files

COMPONENT	WETTED PARTS	PROJECT FILE REFERENCE
Steam jets: JET-WL-502 (existing) JET-WL-550 JET-WL-553	304L stainless steel	Inspection Records: 2031-P-1, & P-5; 4770-P-1, P-2, R-5 & Weld Record Pkgs - 3/4" PL-AR-155553, 3/4" HS-AR-155552, 1 ½" PL-AR-155565 & 1" HS-AR-155559 Vendor Data Submittals: 264770-33, & GFE Form 8030 4/09/93 Test Records: SO Test - WHAS-WL-SO-102, & 264770 Pneumatic & Sensitive Leak Tests
Steam lines	304L stainless steel	Inspection Records: 4770-P-1, P-2, R-5 & Weld Record Pkgs - 3/4" HS-AR-155552, 1" HS-AR-155557, & 1" HS-AR-155559 Vendor Data Submittals: 264770-1 thru 51 Test Records: SO Test - WHAS-WL-SO-102, & 264770 Pneumatic & Sensitive Leak Tests
Level indicator probes	304L stainless steel	Inspection Records: 4770-P-1, P-2, R-5 & Weld Record Pkgs - 3/8" LI2-AM-155555, 3/8" LI2-AM-155556 Vendor Data Submittals: 264770-1 thru 51 Test Records: SO Test - WHAS-WL-SO-102, 264770 Pneumatic & Sensitive Leak Tests, & 3/8" LI2-AM-155560 In-Service Test
Sample piping	304L stainless steel	Inspection Records: 4770-P-1, R-5, 96-022 & Weld Record Pkgs - 1 ½" PL-AR-155568, 3" PL-AR-155567 Vendor Data Submittals: 264770-1 thru 51 Test Records: SO Test - WHAS-WL-SO-102, & 264770 Pneumatic & Sensitive Leak Tests
Piping, flanges, reducers, tees, caps	304L stainless steel	Inspection Records: 4770-P-1, P-2, R-5 & Weld Record Pkgs - ½" HS-AR-155551, 3/4" HS-AR-155552, 3/4" PL-AR-155553, 1" VG-AR-155554, 3/8" LI2-AM-155555, 3/8" LI2-AM-155556, 1" HS-AR-155557, 1" HS-AR-155559, ½" CT-AR-155561, 1 ½" PL-AR-155563, 1 ½" PL-AR-155565, 1 ½" PL-AR-155566, 3" PL-AR-155567, 1 ½" PL-AR-155568, TE-WL-150 Vendor Data Submittals: 264770-1 thru 51 Test Records: SO Test - WHAS-WL-SO-102, 264770 Pneumatic & Sensitive Leak Tests, & 3/8" LI2-AM-155560 In-Service Test

Table 6. Process Components and Related Project Files

COMPONENT	WETTED PARTS	PROJECT FILE REFERENCE
Piping supports, clamps, and bolts	304L stainless steel and Nitronic 60 stainless steel plate angle, square tubing, and bolts	Inspection Records: 4770-S-1&2, R-5 & Weld Record Pkgs - ½" HS-AR-155551, 3/4" Vendor Data Submittals: 264770-1 thru 51
Secondary containment liner (WL-101/102 Vault)	Hypalon® - 45 mil (nominal) - reinforced 60 mil (nominal) - unreinforced	Inspection Records 2031-A-1, A-2, A-4, A-5, C-1, PA-1, R-3, R-5, R-11, R-13 & T-2 Vendor Data Submittals 292031-57, 58, 59, 74, 78, 79, 80, 81, 82, 84, 85, 87, 87R1, 100R1, 102R1& 103
Sample Cell Sleeves	304L stainless steel	Inspection Records: 4770-R-5, CID No. 25, & Weld Record Pkg - Sample Cell Sleeves Vendor Data Submittals: 264770-1 thru 51
Storage Tank VES-WL-150 and flanges	304L stainless steel	Inspection Records: 4770-R-1, & Weld Record Pkg - VES-WL-150 Vendor Data Submittal: C95-232113.002 Test Records: SO Test - WHAS-WL-SO-102, 264770 Pneumatic & Sensitive Leak Tests
Demister	304L stainless steel	Inspection Records: 4770-P-1, R-5 & Weld Record Pkg - 1" VG-AR-155554 Vendor Data Submittals: 264770-1 thru 51 Test Records: SO Test - WHAS-WL-SO-102, 264770 Pneumatic & Sensitive Leak Tests
Demister screen	Carpenter 20 CB3 (0.011" wire mesh)	Inspection Records: 4770-P-1, R-5 & Weld Record Pkg - 1" VG-AR-155554 MK Purchase Order: PO 6072
Flange gaskets	Flexitallic Spiral-wound with 304L stainless steel ring	Inspection Record: 4770-P-1, & CID No.29 Test Records: SO Test - WHAS-WL-SO-102, 264770 Pneumatic & Sensitive Leak Tests
Ball valves	316L stainless steel, ASTM A351, Grade CF3M, with polyetheretherketone (ARLON 1000, PEEK) seats and seals	Inspection Records: 4770-P-1, R-5, CID 24 & Weld Record Pkgs - 3/4" PL-AR-155553, 1" VG-AR-155554, ½" CT-AR-155561, 1 ½" PL-AR-155563, 1 ½" PL-AR-155565 Vendor Data Submittals: 264770-1 thru 51 Test Records: SO Test - WHAS-WL-SO-102, 264770 Pneumatic & Sensitive Leak Tests

Table 6. Process Components and Related Project Files

COMPONENT	WETTED PARTS	PROJECT FILE REFERENCE
Sparge ring	304L stainless steel	Inspection Records: 4770-R-1, & Weld Record Pkg - VES-WL-150 Vendor Data Submittal: C95-232113.002 Test Records: SO Test - WHAS-WL-SO-102, 264770 Pneumatic & Sensitive Leak Tests
Tappered Plugs for abandoned lines	304L stainless steel	Inspection Records: 4770-P-1, R-5, & Weld Record Pkg - Abandoned lines for 102 Vendor Data Submittals: 264770-1 thru 51
Thermowell	304L stainless steel	Inspection Records: 4770-P-1, R-5 & Weld Record Pkg - TE-WL-150 Vendor Data Submittals: 264770-1 thru 51 Test Records: SO Test - WHAS-WL-SO-102, 264770 Pneumatic & Sensitive Leak Tests

3.3.3 Summary of Assessment

A summary of the manner in which installation related regulatory requirements are met by the VES-WL-150 tank and ancillary equipment is presented in Table 7. The Table presents the summary data according to the requirement citations and designations originally identified in Table 5.

Table 7. Summary of Compliance with Installation Requirements

Citation	Requirement Designation	Summary of Requirement Compliance
Tank Systems and Components		
264.192(b)	Proper installation	During an on-site inspection on February 13, 14, and 15, 1996 it was verified that the liner and ancillary equipment have been properly installed, free of structural damage or inadequate construction. The functional operation test, WHAS-WL-SO-102, conducted on March 25 & 26, 1996, further demonstrated proper installation by demonstration that all operating parameters are functional.
264.192(d)	Tightness Test	During the VES-WL-150 system sensitive leak and pneumatic pressure testing, February 15, 1996, all mechanical and welded joints were snoop tested for leaks with no leaks found. Also, during both tests the system(s) maintained test pressure for the prescribed periods of time. The system functional operation test, WHAS-WL-SO-102, conducted on March 25 & 26, 1996, demonstrated that the system was fully operational. Connections were inspected for leaks and tightness, no leaks were observed at the completion of the test.
264.192(e)	Support of Ancillary Equipment	The support of the ancillary equipment was inspected and accepted during installation. Further, during the functional operation test (WHAS-WL-SO-102), it was observed that the ancillary equipment was sufficiently supported and fastened, and did not demonstrate any significant vibration during operation.

4.0 CONDITIONS OF ATTESTATION

The hazardous waste tank system components evaluated for this registered professional engineering certification, as required in 40 CFR 264.192, include VES-WL-150 and the associated piping, sump and jet newly installed in building CPP-604 as part of the Isolate VES-WL-102 Project. The certification also addresses the compatibility of this tank system with existing secondary containment in the WL-101/102 vault. Specific component descriptions are as described in Section 2 of this certification.

The following stipulations are a condition of the certification approval:

- The 20 year service life of the liner will not be exceeded without a reevaluation to determine an acceptable extension period.

- If any spill or leak occurs and it is not cleaned up within 72 hours or if the concentration of HNO_3 exceeds 30%, then an inspection will be required to determine if the prolonged chemical exposure caused any possible damage to the Hypalon® liner or to the silicone rubber sealant in the VES-WL-101/102 vault or to the epoxy paint liner in the Access Corridor, Piping Corridor, or Sample Corridor. This inspection should determine if the liner should be retested for leaks and reevaluated for its integrity and acceptable remaining service life.

- Any entry onto the liner in the VES-WL-101/102 cell, by personnel or equipment, will require an inspection to determine if any possible damage was inflicted to the Hypalon® liner.

- Plans and equipment will be put in place to remove solution from the WL-101/102 cell within 72 hours if a large leak is detected in VES-WL-150 (so leaked material is not simply recycled to the leaking tank).

- Daily inspection of tank and sump level indicators and corridors must continue as a standard operating procedure to verify detection of any leaks within 24 hours.

- Daily visual leak inspection of piping covered by this certification which lies outside of secondary containment areas.

- The solutions and chemical concentrations identified in this assessment will be consistent with the solutions actually put through the system.

5.0 REFERENCES

1. Jacobus, Mark J., Idaho Chemical Processing Plant VES-WL-101/102 Vault Project Report on the Irradiation of Hypalon® Liner Test Samples, Sandia National laboratories, Albuquerque, New Mexico, October, 1992.

2. Shelton-Davis, C.V., Correspondence of November 12, 1992 (CVSD-16-92) to D.L. Penwell, Run Report for Corrosion testing of Hypalon® for the VES-WL-101/102 Vault Liner.

3. EG&G Idaho, Inc., A-E Construction Specification for Isolate VES-WL-102 Project, A-ECS-40743, July 1994, Subcontract No. S-264770, Project No. 020616.

4. *WASTREN, Inc.*, RCRA Tank Certification for WL-101/102 Vault Secondary Containment, June 1993.

RCRA PART B PERMIT APPLICATION

FOR THE

IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY

Volume 14
INTEC Liquid Waste Management System

Section E
Groundwater Monitoring

October 2003

E. GROUND WATER MONITORING [IDAPA 58.01.05.008; 40 CFR §§ 264.90 through 264.101]

In accordance with 40 CFR 264.90 (a)(2), all solid waste management units must comply with the requirements in 40 CFR 264.101, corrective action for solid waste management units.

The corrective action requirements for the units covered by this permit application are addressed in the previously issued INEEL Radioactive Sodium Storage Facility/Radioactive Scrap and Waste Facility Partial Permit Module V.

The groundwater monitoring requirements of 40 CFR 270.14(c), including IDAPA 58.01.05.008; 40 CFR 264.91 through 264.100, are not applicable to the INTEC Liquid Waste Management System buildings as these buildings are not landfills, surface impoundments, waste piles, or land treatment facilities.

Hydrogeologic information required by 40 CFR 270.14 (b)(11) is addressed in Volume 3 of the INEEL HWMA/RCRA Part B Permit Application.