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0028100

DATE: October 23, 1992

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SUBJECT: PAGE CHANGES - RD&D PERMIT APPLICATION

Attached are page changes to Section 4.0 and Appendix 5A of the Waste Water Pilot Plant RD&D Permit Application. The page changes are the result of changing containment berm vendors and an EPA information request. This should complete the draft page changes requested by EPA, assuming that the integrity assessment and critical parameters comments will be included as permit conditions.

In order to produce certified page changes, an internal review and certification process must be completed. It is expected that this process will be completed and certified page changes submitted to EPA and Ecology by November 30, 1992.

Please let me or Steve Skurla know as soon as possible if any other information is required or if any other questions arise.

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APPENDICES

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FIGURES

55 gallon (208 liter) drum overpack for disposal. Location of the activated charcoal units is shown in the process flow diagram (Figure 4-2).

Table 4-2 shows the design requirements for the charcoal adsorption system. The volatile organics characterized in Table 3-1 were identified, along with expected concentrations. From this data, and the conservative assumption that 100% of the 90% confidence interval expected concentrations will be volatilized, it was calculated that 1.6 pounds (0.72 kilograms) of charcoal would be required to control the volatile organic emissions for each 5,000 gallon (18,927 liter) tanker. This would mean that a single drum of charcoal would be adequate to control over 60 tankers, not including spiking chemicals. The amount of waste water to be treated at the pilot plant facility will not approach 60 tankers. Also shown, for reference, in Table 4-2 is the maximum calculated emission rate for each volatile organic if there were no charcoal controls present.

Portions of the feed stream may be spiked with added organics to test the efficiency of the unit operations at higher concentrations and for different compounds than normally found in the feed as described in Section 3.2. The tests conducted with the spiked waste usually will be of smaller volume than the 5,000 gallon (18,927 liter) tankers, with 1,000 gallons (3,785 liters) being the typical volume. Table 4-3 lists the design requirements for the charcoal adsorbers for the spiked waste. The design calculations assume a 1,000 gallon (3,785 liter) batch spiked waste with the maximum concentrations of the volatile organics listed in Section 3.0, Table 3-4 "Operation Envelope Maximum Concentrations". Again, the conservative assumption was made that 100 percent of the compounds will be volatilized. The calculated charcoal required for a batch under these conditions is 14 pounds (6.4 kilograms). Even with the very conservative assumptions, a single charcoal adsorber would have adequate capacity for over 7,800 gallons (29,000 liters) of maximally spiked waste.

A redundant charcoal adsorption system will be installed on the waste water pilot plant ventilation system. The charcoal units will be installed in series, so that if breakthrough occurs on the primary unit, a second unit will provide backup. A continuous organic vapor analyzer (Thermal Environmental Instruments Co. Model 52, or equivalent) will be used to sample the air stream after the first charcoal unit to detect any breakthrough of the charcoal. If breakthrough is detected, the primary charcoal unit will be removed and the secondary unit would become the primary unit. A fresh unit then would be installed as the secondary unit. Breakthrough of the first stage charcoal adsorber will be considered to be at 75 parts per million as shown on the organic vapor analyzer. The analyzer will be set to alarm at that point. Operations will be stopped within 24 hours of the alarm, and the adsorber changed out. Immediate shutdown is not necessary because of the redundant emission control provided by the second stage charcoal adsorber. Manufacturer's information on the organic vapor analyzer is presented in Appendix 4C.

4.1.3.3 Emission Monitoring Equipment. Stack effluent radionuclide content will be monitored with a particulate record sampler. These sampling systems a radioactive waste classification of low specific activity (LSA) per 49 CFR 173.403(n).

At LERF, the waste will be loaded into the tank trailers using a submersible pump lowered down an existing LERF Basin 43 riser. The riser connects LERF Basin 43 to the existing LERF catch basin. There will be continuous operator surveillance of the loading lines and the tank liquid level during filling. Unloading at the LERF will be accomplished using a pump mounted over the existing LERF catch basin.

Unloading at the 1706-KE Building will be accomplished using a self-priming pump located over a catch tank at the waste load/unload station located northwest of the 1706-KE Building. Loading of the tank trailer will be accomplished using internal 1706-KE Building process pumps. These process pumps will be interlocked to the liquid level instrumentation of the tank trailer to prevent overfill.

Onsite waste transfer sheets will be used to document the transfer-out and transfer-in of the waste at the LERF basins.

4.3.2 Road and Waste Routing Description

Drawing H-2-958 in Appendix 1A and Figure 1-1 show the major roadways on the Hanford Site. These routes are classified as either primary or secondary routes. The primary routes are constructed of bituminous asphalt [usually 2 inches (5.1 centimeters) thick, but the thickness of the asphalt layer will vary with each road] with an underlying aggregate base in accordance with U.S. Department of Transportation requirements. The secondary routes are constructed of layers of oil and rock mixture with an underlying aggregate base. The aggregate base consists of various types and sizes of rocks found onsite. Currently, no load bearing capacities are available; however, loads as large as 140 pounds per square inch (9,9 kilograms per square centimeter) have been transported without observable damage to road surfaces. All roads meet the requirements for the American Association of State Highway and Transportation Officials HS-20-44 load rating (AASHTO 1983). An HS-20-44 loading represents a two-axle tractor [front loading of 8,000 pounds (3,633 kilograms) and rear-axle loading of 32,000 pounds (14,535 kilograms)] plus a single-axle trailer with a 32,000 pound (14,535 kilogram) axle loading. The tractor and the trailer hauling waste to the waste water pilot plant will have three axles on the tractor and double axles on the tank trailer. The estimated load per axle of the loaded tractor trailer combination will be well below the AASHTO rating of 32,000 pounds (14,535 kilogram) per axle.

The waste routes from the LERF to the 1706-KE Building are shown on Figures 4-15, 4-16, and 4-17. Waste will travel from the 1706-KE Building to the LERF by reversing the routes shown. Except as noted, the roadways meet the requirements of primary or secondary routes. The tank trailer will be loaded at the northwest corner of the LERF Basin 43 and proceed out of the LERF fenced area to Camden Avenue as shown in Figure 4-16. Within the LERF fenced area, the roadway will be at a minimum, a minus 2-inch boulder gravel road. This surface is deemed adequate for the infrequent, short-term use that is anticipated to support the waste water pilot plant testing program. A crushed gravel surface might be applied to the roads within the fenced area at the LERF.

From Camden Avenue, the waste will be routed through the 200 East Area using primary and secondary road surfaces. The routing through the 200 East limited access area will be via the most direct or convenient route. Two such routes are shown in Figure 4-15. Both routes proceed north on Camden Avenue to the north end of the 200 East Area. One route turns west on the perimeter fence road and parallels the 200 East north fence, then proceeds south through Gate 815 (manned 24 hours a day) to Route 4 South. Route 4 South joins Route 4 North near the southwest corner of the 200 East Area. The other route (Figure 4-15) proceeds north on Camden Avenue through Gate 810 to Route 11A (a 4-lane divided highway). The waste will be transported west on Route 11A to Route 4 North. Gate 810 is normally locked and passage through the gate requires Hanford Patrol permission.

The waste is transported north on Route 4 North, then west on Route 1, then northwest on the 100K access road to the 100K perimeter fence (Figure 4-15). The waste proceeds northwest, through an unmanned gate, into the 100K Area (Figure 4-17). The waste is transported north through a second, gate (manned 24 hours a day) into the 100K limited access area. The waste is routed northeast to the 1706-KE Building load/unload area.

4.3.3 Equipment Description

The equipment required for transporting the waste to and from the LERF consists of the tank trailers, and the loading and unloading equipment at the LERF and 1706-KE Building.

4.3.3.1 Tank Trailer. A side elevation of the tank trailer is presented in Figure 4-18. Each of the two identical tank trailers consist of a nominal 5,000 gallon (18,927 liter) horizontal cylinder 37 feet (11.3 meters) in length and 57.17 inches (145.2 centimeters) internal diameter, with 8-gage wall [0.1644 inch (0.418 centimeter) nominal thickness]. The dished heads have minimum wall thickness of 0.1255 inch (0.318 centimeter). Material of construction is 316 stainless steel. The tank trailer is U.S. Department of Transportation certified to carry corrosives, acids, and caustics. The waste water processed in the pilot plant will not approach the operating limits of the tank trailer.

Per 49 CFR 173.425(c)(2)(ii), the tank trailer has no bottom unloading capability. The only tank penetrations are located on the top centerline of the tank. These penetrations are enclosed by drip pans that are an integral part of the trailer (Figure 4-19). The penetrations are for the following equipment:

- 2-inch (5.08-centimeter) diameter load-in/load-out port with a dip tube extending into an 8.25 inch (21 centimeter) diameter sump in the bottom of the tank; the port is equipped with a ball valve and valved quick-disconnect; the port is located near the rear of the tank

- 2-inch (5.08-centimeter) flanged port with a 1/2-inch (1.3-centimeter) dip tube for liquid-level instrumentation; the dip tube is equipped with a ball valve and valved quick disconnect for liquid level instrumentation; the port also has a 3/4-inch (1.91-centimeter) capped sample pipe teed to a pressure gage and a vacuum relief device set to open at 0.5 to 5 inches (1.3 to 12.7 centimeter) of mercury; the port is located in the rear third of the tank

- 20-inch (50.8-centimeter) diameter manhole secured with wing nuts and security wiring; the manhole is located in the rear third of the tank

- 2-inch (5.08-centimeter) diameter vent port with ball valve and valved quick-disconnect; the vent port is located near the center of the tank

- 4-inch (10.2-centimeter) diameter load-out port with dip tube extending down into an 8.25-inch (20.9-centimeter) diameter sump in the tank bottom; the load-out port is equipped with a ball valve and valved quick-disconnect, located in the center of the tank; this port is not planned for use during waste water pilot plant operations

- 2-inch (5.08-centimeter) diameter port for American Society of Mechanical Engineers (ASME 1989) high pressure rupture disk [52 pounds per square inch (358 kilopascals)]; the port is located near center of the tank.

4.3.3.2 Waste Load/Unload Station at the LERF. Tank trailer loading and unloading operations will take place at the LERF load/unload station. The load/unload station will be located adjacent to the existing catch basin for LERF Basin 43. The load/unload station will utilize the catch basin and utilities wherever possible. Secondary containment will be provided as specified in WAC 173-303-630 and 640. The following sections describe tank trailer loading and unloading at the LERF.

4.3.3.2.1 Waste Loading at the LERF. The waste water will be transferred out of the LERF basin 43 using a submersible pump lowered down one of the existing emergency pumpout risers. The emergency pumpout riser terminates in the LERF catch basin (Figure 4-20). The discharge line from the pumpout riser will quick-connect to an all welded load/unload line that will run from the LERF catch basin along an overhead piping support structure (Figure 4-21). The support structure will be located over the position where the tank trailer will be spotted for both loading and unloading. At the outer end of this structure, the line will terminate in a flex hose. The terminal end of this flex hose will quick-connect to the load/unload port on the tank trailer. The on/off controls for the pump will be located at the load/unload station.

The tank trailer ventilation line will run from the LERF basin 43 carbon adsorber, located in the LERF catch basin, up and over the tank trailer utilizing the same piping support structure (Figure 4-21). The ventilation line will utilize a terminal end flexible hose with a quick-connector to make the final connection to the tank trailer vent port. This ventilation line configuration will be the same for both loading and unloading of the tank trailer at LERF.

The LERF air filtration system consists of a carbon-filled 55 gallon barrel connected to the LERF basin cover by a pipe. The system operates passively and filters any air displaced from under the basin cover. The tanker truck ventilation system will also be a passive system, with any air displaced from the tank trailer during load/unload operations passing through the carbon filters.

Bottled nitrogen gas maintained at the LERF catch basin will be supplied to the tank trailer for use in liquid-level indicator. The nitrogen line will be run up and over the tank trailer using the piping support structure described above (Figure 4-21). A terminal end flexible hose with quick-connect fitting will make the final connection to the tank trailer bubble pipe (liquid-level detector) port. This same line configuration will be used for both tank trailer loading and unloading. The liquid-level indicator output will be located at the load/unload station.

4.3.3.2.2 Waste Unloading at the Liquid Effluent Retention Facility. For unloading, the tank trailer will be spotted at the same location as during loading. The ventilation and liquid-level instrumentation connections will be the same as for loading. Also, the waste water connection at the tank trailer will be the same as for loading. The unloading pump will be located on a platform lying above the LERF catch basin. For unloading operations, the waste water line from the tank trailer will be quick-connected to the inlet of an unloading pump (Figure 4-21). The discharge of the unloading pump will be piped to a second LERF Basin 43 riser in the LERF catch basin (Figure 4-20). The on/off controls for this pump will be located at the load/unload station.

4.3.3.2.3 Containment and Surveillance at the Liquid Effluent Retention Facility Load/Unload Station. The piping from the flex hose to the LERF catch basin will be aboveground, all-welded, and hence does not require secondary containment. The LERF catch basin will provide secondary containment for the piping and the pump at the LERF basin (Figures 4-21 and 4-22). The LERF catch basin will have a drain leading back into the LERF 43 basin.

Secondary containment will be provided for the tank trailer, waste water load/unload flex hose, and connector through the use of a portable berm. The secondary containment structure selected for use is the SpilGard[a] portable berm manufactured by ModuTank Inc. The portable berm is discussed in detail in Section 4.3.3.4. A custom-made SpilGard will be used at the LERF. This portable berm will be a single-wide unit that is 11 feet 9 inches (3.6 meters) wide, by 58 feet (17.7 meters) long, by 2 feet (0.6 meters) deep. The berm will have a single end gate through which the tractor trailer will be backed into the berm for loading or unloading. The length will allow the tractor to remain connected to the tank trailer during waste loading or unloading activities.

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[a]SpilGard is a trademark of ModuTank Inc.

The portable berm unit at the LERF will have a capacity of 10,200 gallons (38,600 liters). The berm will have the capacity to contain the full contents of the 5,000 gallon (18,900 liter) tank trailer plus more than sufficient capacity to contain the 637 gallons (2,411 liter) that could result from a 25-year, 24-hour storm as required by WAC 173-303-630(7). The 25-year, 24-hour storm event is calculated to deliver 1.5 inches (3.8 centimeters) of rain. Precipitation data were obtained from the U.S. Weather Bureau *Rainfall Frequency Atlas of the United States* (U.S. Weather Bureau 1961, p. 101).

The loading and unloading processes at the LERF each will take less than 4 hours. An operator and health physics technician will provide continuous surveillance during these operations. Local tank trailer liquid-level indication will be available continuously and the load or unload pump will be locally shut down promptly at any sign of leakage. The portable berm and single-encased piping will be inspected at least every 24 hours.

4.3.3.3 Tank Trailer Unloading and Loading at the 1706-KE Building. The waste load/unload station will be located across the street and northwest of the 1706-KE Building (Figure 4-23). The load/unload station will accommodate two tank trailers simultaneously. One tank trailer will provide waste feed to the waste water pilot plant. The other tank trailer will accumulate waste from the waste water pilot plant before eventual transfer of the waste back to the LERF.

Waste transfers between the tank trailers and the 1706-KE Building will be intermittent, depending on the laboratory schedule for the waste water pilot plant. Also, the transfer rate will be relatively low, i.e., approximately 5 gallons (19 liters) per minute. The intermittent nature of the unloading and loading activities at the 1706-KE Building essentially will establish the tank trailers as short-term storage tanks, periodically located outside the 1706-KE Building. Because the tank trailer is single walled, provisions will be made for tank trailer secondary containment and surveillance as required by WAC 173-303-630(7).

4.3.3.3.1 Waste Unloading at the 1706-KE Building Load/Unload Station. The waste water will be transferred from the tank trailer to the waste water pilot plant in the 1706-KE Building using a pump located adjacent to the load/unload station (Figure 4-24). The self-priming, low-capacity pump will be positioned over a small catch tank. The pump will be used to feed the waste water to the pilot plant process equipment. Pump on and off switches will be located at the central control panel in the 1706-KE Building and at the load/unload station.

The tank trailer will be connected to the 1706-KE Building using a combination of flex hose and all-welded pipelines. The tank trailer load-in/load-out port will be connected to a flex hose using a quick-connect fitting. The flex hose will be connected to the transfer pump using an all-welded pipeline. The all-welded pipeline from the flex hose to the pump will be suspended from the piping support structure. The pump will be connected to the 1706-KE Building using an aboveground, all-welded pipeline. The pipeline will be suspended from a piping support structure over the roadway.

Tank trailer air emissions during unloading will be controlled using the existing carbon adsorbers and HEPA filters of the 1706-KE Building ventilation system. The existing ventilation system will be connected to the load/unload station by using a tee in the ventilation line to the 3,000 gallon (11,356 liter) storage tanks located at the west side of the 1706-KE Building. A pipeline will be run from the tee in the storage tank ventilation line to the end of the load/unload station piping support structure. From the piping support structure, the ventilation line will continue to the tank trailers using flex hoses. The final connection from the flex hoses to the trailer vent ports will be accomplished using a valved quick-connects at the terminal end of the flex hoses.

As at the LERF, bottled nitrogen gas will be supplied for tank trailer liquid level indication (Figure 4-24). The supply line is hard piped out to the end of the piping support structure. From the piping support structure, flex lines with quick disconnects will provide the connection to the bubble-pipe (liquid-level detector) ports on the tank trailers. Liquid-level indication and alarm will be provided at the control panel inside the 1706-KE Building.

4.3.3.3.2 Waste Loading at the 1706-KE Building Load/Unload Station. Waste from the waste water pilot plant will be transferred in tank trailers to the LERF for storage. The tank trailers will be filled at the load/unload station located northwest of the 1706-KE Building (Figure 4-23 and 4-25). Loading of the treated waste will be accomplished using the waste water pilot plant process pumps. An all-welded pipe will carry the waste discharge from the process pumps through the 1706-KE Building wall to the load/unload station piping support structure. A flex hose will join the all-welded pipe to the tank trailer. The terminal end of the flex hose will be provided with a quick-connect coupling to the tank trailer load-in/load-out port.

The tank trailer air emissions controls and liquid-level detection will be configured in the same manner as described for the unload system (Section 4.3.3.3.1).

4.3.3.3.3 Containment and Surveillance at the 1706-KE Building Load/Unload Station. The all-welded waste piping between the tank trailers at the load/unload station and the 1706-KE Building is single-encased, aboveground construction and does not require secondary containment per WAC 173-303-640. Secondary containment will be provided for the unload pump connections by a catch tank with a leak detector (Figure 4-24). Secondary containment will be provided for the tank trailers, flex hoses, and connectors by a portable berm (Figures 4-24 and 4-25). The single-encased piping and portable berm will be inspected at least every 24 hours.

The catch tank is mounted on the unload pump platform that will be located at the 1706-KE Waste Load/Unload Station. The purpose of the catch tank is to provide secondary containment for the waste unload pump and its associated threaded/screwed pipe fittings. The unload pump is mounted on a grating supported by the platform. The grating is 9 feet (2.7 meters) above the ground. The catch tank is located directly below this grating. The platform grating and catch tank are supported by four 4-inch by 4-inch by 0.5-inch (10-

centimeter by 10-centimeter by 1.3-centimeter) angle iron uprights anchored in concrete pilings that will be 18 inches (48 centimeters) in diameter and 3 feet (0.9 meters) deep. The pump is elevated above the tank trailer to eliminate the potential for inadvertantly siphoning waste from the tank trailer.

The tank is 3 feet 4-5/8 inches (1 meter) wide x 1 foot 6 inches (0.5 meters) high x 5 foot 3 inches (1.6 meters) long. It is constructed of ASTM A36 carbon steel plate that is 1/8 inch (3 millimeters) thick. The capacity of the tank is 199 gallons (753 liters). There is a 1-inch (2.5-centimeter) diameter drain hole located in the bottom of the tank. A 1-inch (2.5 centimeter-) half-coupling welded to the bottom of the hole provides for the attachment of a lockable drain valve.

A leak detector will be installed in the unload pump catch tank (Figure 4-24), and will be interlocked to shutdown the unload pump and to alarm at the central control panel in the 1706-KE Building. The liquid-level indicator for the tank trailer being loaded will be interlocked to shutdown the waste water pilot plant process pumps at high level.

Secondary containment will be provided for the tank trailers, waste water load/unload flex hoses, and connectors through the use of a portable berm. The secondary containment structure selected for use is a portable berm. The portable berm is discussed in detail in Section 4.3.3.4. A double-wide portable berm will be used at the 1706-KE Building load/unload station. The portable berm will have inside dimensions of 23 feet (8.8 meters) wide by 49 feet 3 inches (15 meters) long by 2 feet (0.6 meter) deep. The berm is sized to contain two tank trailers side by side.

The portable berm unit at the 1706-KE Building will have a capacity of 15,000 gallons (56,780 liters). The berm will have the capacity to contain the full contents of the two 5,000 gallon (18,900 liter) tank trailers plus more than sufficient capacity to contain the 1,060 gallons (4,013 liters) that could result from a 25-year, 24-hour storm as required by WAC 173-303-630(7). The 25-year, 24-hour storm event is calculated to deliver 1.5 inches (3.8 centimeters) of rain. Precipitation data were obtained from the U.S. Weather Bureau *Rainfall Frequency Atlas of the United States* (U.S. Weather Bureau 1961, p. 101).

Because of the lengthy loading and unloading times (up to 4 months) at the 1706-KE Building, it will be desirable that the tractors be disconnected from the tank trailers during the loading and unloading processes. The berm will have gates at both ends to allow the trailers to pull through.

4.3.3.4 Portable Berms. The secondary containment structure selected for use at both the LERF and 1706-KE waste load/unload stations is the SpilGard portable berm manufactured by ModuTank Incorporated. The portable berm will provide secondary containment for the tank trailer and flex hose connectors. The portable berm is an engineered modular containment system that will be assembled onsite. The walls of the portable berm will consist of steel panels. The walls will be held in position by exterior steel frames and interior steel cables. A geomembrane will be draped over the top of the steel walls and will be fastened to the walls with extruded plastic clips. The geomembrane will provide for liquid containment and will be supported by the steel wall panels and an engineered foundation (subgrade). All seaming of the geomembrane will be performed in the factory before shipment to the Hanford Facility. The vendor information on the design and assembly of the portable berm is included in Appendix 4E.

The portable berm will be placed on an engineered foundation consisting of a 0.35 foot (11-centimeter) thick asphalt concrete pad placed over a base of 0.3 feet (9 centimeter) thick crushed gravel and compacted site soil. Calculations are included in Appendix 4F showing that the engineered foundation will be adequate to prevent undue geomembrane stress due to foundation settlement caused by a loaded tank trailer. The bottom of the foundation will be sloped to allow liquids to be collected and removed.

Movable steel gate panels will allow for ingress and egress from the bermed area. To open the gate, the geomembrane liner is pulled back off the gate area, the gate is opened, and the liner is laid flat. The flattened liner will be protected by laying a neoprene coated polyester mat over the liner at the ingress/egress location.

The liner of the portable berm will consist of an 8130 XR-5[a] geomembrane. The geomembrane will be an 'ethylene interpolymer alloy' (polyvinyl chloride) coated polyester fabric.. The fabric is 30 mils thick. The geomembrane coating will be modified with Elvaloy[b]. The Elvaloy modifier will make the geomembrane more flexible and more chemically resistant. Before the containment system is put into service, the thickness and weight of the geomembrane material will be verified using test methods specified in ASTM D 751 (ASTM 1989).

The general chemical resistance and material strength characteristics of the geomembrane material are presented in the vendor information (Appendix 4E). General information on the weather (ultraviolet radiation) resistance and chemical resistance of the geomembrane also is presented in Appendix 4E. A piece of the geomembrane material (coupon) will be exposed as part of the containment structure to assess the geomembrane for deterioration. The coupon will be from the same batch as the geomembrane material and will include a seamed area. The coupon will be tested for deterioration per method ASTM D 751 (ASTM 1989) either when a spill has occurred or a least yearly.

To protect the geomembrane, a 100-mil nonwoven geotextile fabric, as provided by ModuTank, will be placed under and on top of the geomembrane material. As a further precaution, the upper geotextile layer will be covered with a 5/16-inch (0.8-centimeter) thick neoprene coated polyester fabric to protect the geomembrane liquid containment liner from any potential damage, and to aid in cleaning and maintenance.

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[a]8130 XR-5 is a trademark of the Seaman Corporation.

[b]Elvaloy is a trademark of the E.I. DuPont de Nemours & Company.

To demonstrate the acceptability of the portable berm liner system for use at the waste water pilot plant, several liner failure scenarios were examined. The following mechanisms have been postulated for potential berm failure:

- Shear and seam
- Puncture
- Impact
- Compression
- Foundation settlement

A brief engineering analysis for each of these potential failure mechanisms is presented in Appendix 4F. The results of these analyses, and recommended berm failure preventive measures, are described in the following.

- **Shear and Seam Failure**--The most likely scenario for shear failure is during tractor acceleration from a standing start while pulling a loaded tank trailer. Shear also is the failure mode for seam failure. The limiting case is seam failure with a shear strength of 52.5 pounds per square inch (362.0 kilopascals) for a seam verses 500 pounds per square inch (3,448 kilopascals) shear strength for the fabric. The load/unload procedure administratively will restrict tractor acceleration to less than 1 mile (1.6 kilometers) per hour per second. This will provide a safety factor of 2 over the seamed and 20 over the unseamed geomembrane. No credit is taken for the significant load distribution provided by the geotextile and neoprene rubber mat overlays.

- **Puncture**--The greatest risk of puncture to the geomembrane is considered to be due to the presence of sharp rocks or other foreign objects lying under the loaded trailer tire either directly above or directly below the geomembrane. Rocks embedded in the tires are also a source of potential puncture. Any foreign objects will be cleared from the geomembrane foundation and upper surface during installation. Any rocks embedded in the tractor or trailer tires will be removed before vehicle entry into the berm. The engineering analysis indicates that the absence of rocks with a diameter of 0.5 inch (1.3 centimeter) or greater will provide a factor of safety of at least 15. No credit is taken for the load distribution properties of the geotextile and neoprene rubber mat.

- **Impact**--Impact failure most likely would be caused by the accidental dropping of a heavy tool with a pointed end, such as a crow bar or electric drill. The engineering analysis indicates that a 5 pound (2.2 kilogram) crow bar with a 1-inch (2.5-centimeter) wide chisel end dropped from a height of 4 feet (1.2 meters) could cause impact failure of the unprotected geomembrane. Administrative procedures will require that no tools weighing more that 1 pound (0.4 kilogram) be allowed in the berm without a waiver (and training) from the Engineering and Environmental Development Laboratory manager. Maintenance personnel also will be counseled before performance of any repair activities over the berm. No credit is taken for the neoprene rubber mat that will cover most of the bermed area.

- Compression--The tank trailer tires will exert a compressive load of 125 pounds per square inch (862 kilopascals) on the berm floor. The geomembrane can withstand a hydrostatic pressure of 500 pounds per square inch (3,448 kilopascals). This provides a safety factor of 4 against the possibility of failure in compression. No credit is taken for the significant load distribution properties of the geotextile and neoprene rubber mat overlays.

- Settlement--Any settlement of the berm foundation (subgrade) could potentially result in the stressing in tensile of the geomembrane. To preclude potential damage due to this mechanism, an engineered foundation will be provided for the berms that will limit berm foundation settlement. The berm foundation settlement under a dynamic load will be less than 0.013 inches (0.03 centimeter). The amount of deflection the liner can withstand is 0.64 inches (1.6 centimeters), assuming a safety factor of 2.

Truck speed into or out of the bermed area will not exceed 5 miles (8 kilometers) per hour. To further protect the liner, the tank trailer spotting procedure will caution the driver to avoid 'locking' the truck and trailer wheels on the liner material. Because of the space limitations within the berms, positioning the tank trailer will be performed as a low-speed operation.

4.3.4 Critical Parameters and Safety Features

Certain waste transfer system design features and operating procedure requirements are critical to operator safety and protection of the environment. These parameters and safety features are provided in the following sections.

4.3.4.1 Design Features. Waste transfer design features are as follows:

- Tank trailer has a factory-installed ASME pressure relief rupture disk - rated at 52 ± 5 pounds per square inch (359 ± 34 kilopascals).

- Tank trailer has a Hanford Site-installed vacuum relief device - rated at 0.5 to 5 inches (1.3 to 12.7 centimeter) of mercury.

- Tank trailer gaseous discharges are tied into the 1706-KE Building or the LERF ventilation system.

- 1706-KE Building tank trailer loading pumps are interlocked to the tank trailer liquid-level instrumentation.

- 1706-KE Building unload station discharge pump is interlocked to the pump catch basin leak detector and the 1706-KE Building receiving tank liquid-level instrumentation.

- All alarm switches activate visible and audible alarms at the central control panel, as well as the appropriate interlocks.

4.3.4.2 Operating Parameters. Waste transfer operating parameters are as follows.

- **Ventilation line valve is open during loading and unloading. Heat tracing to prevent freezing is functional when ambient temperatures are below 40 °F (4.4 °C).**

- Pumpout line valve alignment sequence is verified correct before pumping is initiated.

- Tank trailer and liquid-level instrumentation is under continuous manned surveillance during loading and unloading at the LERF.

- Reviewed and approved operating procedures are used for loading and unloading.

- Protection of the area where the tank trailer is loaded and unloaded is accomplished by the use of a portable berm during the loading and unloading operations at the LERF and the 1706-KE Building.

- Surveillance, at least once every 24 hours, is performed of the load/unload station at the 1706-KE Building.

- Verification is performed that the waste water is ≤ low-specific activity before shipment (Section 3.0).

- Verification is performed that waste water characteristics fall within the operating envelope before waste is unloaded at the 1706-KE Building.

4.5 EQUIPMENT DECONTAMINATION

When decontamination of equipment is required (e.g., for leaks or spills), decontamination will consist of rinsing equipment that has been contacted by a listed dangerous waste. A guideline decontamination procedure has been developed that meets the triple-rinsing criteria for vessels that previously held dangerous waste. The waste water pilot plant equipment also could be decontaminated at any time using this procedure during a testing program. The decontamination procedure is included in Appendix 4G.

Waste Water Pilot Plant Daily Inspection Checklist

Inspection Item	Yes	No	NA
1. Review the data logger printout for the last operating period. Have any operating parameters been exceeded?			
2. Are the phones functioning?			
3. Is there protective clothing for each person expected in the plant and three spare sets for emergencies and visitors?			
4. Are secondary containment pans inside the 1706-KE Building free of liquid?			
5. Are the interior floor surfaces free of cracks, gaps, and excessive wear?			
6. Is the secondary containment under the feed and receiving tankers free of liquid?			
7. Is the portable berm under the feed and receiving tankers free from tears, punctures, and excessive abrasion degradation?			
8. Is there any evidence of leaks from the tankers, piping connections, or pumps associated with the tanker trucks?			
9. Is the feed tanker pump leak detector energized?			
10. Is there any liquid in the annulus of the intermediate storage tanks?			
11. Are there any other unusual conditions?			

Comments:

Inspector ______________________/______________________/______________
print name   signature   date

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