Chemical Spill Prevention, Control, and Countermeasures Plan -- 100 Areas

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CHEMICAL SPILL PREVENTION, CONTROL, AND COUNTERMEASURES PLAN--100 AREAS

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EXECUTIVE SUMMARY

In the past the most common means of addressing a chemical spill at the 100 Areas was to neutralize its reactivity or reduce its toxicity if possible, and dispose of the residue by the most environmentally acceptable method. Also, when most of the chemical facilities were constructed, isolating chemicals from personnel or equipment was the primary intent of any containment devices installed.

The enactment of the Clean Water Act in 1972 brought about federal regulations governing the point discharging of oil and certain chemicals into water bodies. Thus, for the past decade the emphasis of the 100 Areas environmental control program has been to minimize oil and chemical spills out point discharges. Administrative controls aiding in this effort are the Oil Spill Prevention, Control, and Countermeasures Plan, put in place May 1974, and the Chemical Spill Prevention, Control, and Countermeasures Plan, put in place April 1979.

However, as in the past, spills to the soil were considered less significant since generally they could be cleaned up or stabilized with no hazardous discharge to the ground water, the Columbia River, or the atmosphere.

With the advent of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) a new set of ground rules has been established. Certain chemicals have been designated hazardous substances

EXECUTIVE SUMMARY (continued)

with assigned reportable spill quantities. Also a system for reporting spills of hazardous substances has been established. CERCLA is administered through regulations promulgated by the Environmental Protection Agency.

Complete spill containment that would prevent a CERCLA-reportable release is found infrequently at the 100 Areas. Administrative controls at some facilities has offset the lack of physical containment devices.

Due to such factors as the lack of adequate spill containment devices and the routing of drain systems, the potential exists for Westinghouse Hanford Company to accidentally release a reportable quantity of a hazardous substance over a 24-h period to the environment. In addressing this potential, objective assessments of each chemical system have been performed and included in this document.

To come to grips with CERCLA, Westinghouse Hanford evaluated all chemical systems and chemical handling procedures at 100 Areas. This document summarizes this evaluation. Appendix A lists the various chemical systems, spill destinations, probable quantities, and current spill containment devices. It also summarizes suggested improvements which could be made on certain systems to enhance spill control.

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1.0 INTRODUCTION

The purpose of the Chemical Spill Prevention, Control, and Countermeasures (SPCC) Plan is to identify the chemical spill control practices, procedures, and containment devices Westinghouse Hanford Company (Westinghouse Hanford) employs to prevent a reportable quantity (RQ) of a hazardous substance (as defined in 40 CFR Part 302) from being released to the environment. The chemical systems and chemical storage facilities in the 100 Areas are described. This document traces the ultimate fate of accidental chemical spills at the 100 Areas. Also included in the document is a table listing the probable spill quantities, spill paths and destinations, spill containment devices, and systems surveillance frequencies.

This information is necessary to evaluate the danger of RQs of a chemical being released to the environment. The Environmental Protection Agency (EPA) has issued a list of chemicals considered to be hazardous substances. Several of these chemicals are used at Westinghouse Hanford facilities. Release of a RQ over a 24-h period to the environment could result in a civil penalty assessed against the discharger from the EPA or the U.S. Coast Guard.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as "Superfund" was enacted in December 1980. Extensive amendments, known as the Superfund Amendments and Reauthorization Act (SARA) were adopted in October 1986. The rulings relating to hazardous substance releases are included in 40 CFR Part 302 which was promulgated in April 1985, and 40 CFR Part 355. These regulations establish federal authority to deal with releases or threats of releases, and notification of releases of hazardous substances. These regulations, adopting criteria from the Clean Water Act, define a set of hazardous substances and their respective RQs. They also set forth spill notification requirements and describe provisions for continuous releases.

The CERCLA and SARA require that any person in charge of a facility that releases a hazardous substance to the environment in a quantity equal to or greater than the RQ immediately notify the National Response Center (NRC). Upon receipt of notification the NRC will relay the information to the relevant EPA regional office or U.S. Coast Guard district office. An on-scene coordinator will evaluate the circumstances of the release and decide whether and in what manner the federal government should respond. The government is not obligated to respond to all releases of RQs. The notification mechanism furnishes the government with the facts necessary to make an evaluation.

To clarify the term "release of a RQ," 40 CFR Part 302 contains the following definitions:

Environment--Navigable waters or any other surface water, groundwater, drinking water supply, land surface or subsurface strata, or ambient air within the United States.

Facility--Any building, structure, installation, equipment, pipe or pipeline, well, pit, pond, lagoon, ditch, landfill, storage container, or motor vehicle.

Person--An individual, firm, corporation, or United States Government.

Release--Any spilling, leaking pumping, pouring, emitting, emptying, discharging, injecting, escaping, dumping, or disposing into the environment.

Reportable quantity--That quantity as set forth in 40 CFR Part 302.4 released over a 24-h period.

Certain releases are exempt from general CERCLA notification requirements if they are continuous, stable in quantity and rate, and notification is given to the EPA annually or at such time as there is a statistically significant increase of the hazardous substance being released. Other exemptions from reporting requirements are "federally permitted releases" such as National Pollutant Discharge Elimination System (NPDES) discharges.

In response to the CERCLA ruling the SPCC Plan has been revised to include the following:

- o Systems Description--The plan inventories locations within the 100 Areas where a RQ of a hazardous substance may be released by describing chemical systems, chemical storage facilities, and associated chemical use areas.
- o Spill Destinations--Included in the text and in Appendix A of the plan are the predicted spill paths and destinations for hazardous substances spilled at the 100 Areas.
- o Spill Prevention Measures--The plan also documents measures currently being taken by Westinghouse Hanford to prevent releases of hazardous substances in RQs by identifying spill containment devices, systems surveillance frequencies, and chemical handling procedures.
- o Upgrading Spill Prevention--Areas are identified where deficiencies in spill containment devices or chemical systems maintenance schedules may contribute to a RQ being released. In these areas the probability of the release of a RQ is evaluated by considering such items as system size (storage capacity), frequency of use, system surveillance, etc. Based on this evaluation recommendations for improvements are made.
- o Spill Response--Procedures for spill notification at the 100 Areas are outlined in the plan. Also contained are immediate steps to be taken to minimize the quantity of the spill and exposure of personnel and equipment.

Appendix A contains a summation of information related to chemical spills and their predicted destination. Also contained are proposals for

improvements on chemical systems and spill containment devices to reduce the probability of a RQ being released. In addition to these physical improvements, the preventative maintenance program (Equipment Maintenance Schedule, EMS) should be emphasized to ensure the integrity of all chemical storage tanks and transport systems.

The hazardous substances used at the 100 Areas and their RQs are listed in Table 1-1. Though some of these chemicals are not often used, the capability for their use still exists.

**Table 1-1. Hazardous Substances Used at the 100 Areas
with the Corresponding Environmental Protection
Agency Designated Reportable Quantity.**

Hazardous substances used at the 100 Areas	Reportable quantity (kg)	Reportable quantity (lb)	Reportable quantity based on concen- trations used at 100 Areas (gal)
Aluminum sulfate (alum)	2,270	5,000	1,720
Ammonium hydroxide	454	1,000	630
Calcium hypochlorite	4.54	10	--
Chlorine	4.54	10	--
Hydrazine	.454	1	0.36
Methyl ethyl ketone (2-butanone)	2,270	5,000	744
Phosphoric acid	2,270	5,000	560
Potassium permanganate	45.4	100	--
Sodium hydroxide	454	1,000	160
Sodium hypochlorite	45.4	100	36
Sulfuric acid	454	1,000	70
Hazardous wastes characteristics of substances used at 100 Areas			
Ignitability	45.4	100	--
Corrosivity	45.4	100	--
Reactivity	45.4	100	--
EP Toxicity	.454	1	--

Other chemicals that are not designated hazardous substances by the EPA are used, or the capability still exists for their use, at the 100 Areas. Although these chemicals are not specifically listed, concentrated solutions of these chemicals could pose a toxic hazard to man and wildlife. Care should be exercised in handling these chemicals to prevent accidental chemical spills. Table 1-2 compares the toxicity of these chemicals in a concentrated solution.

Table 1-2. Toxicity of Miscellaneous Chemicals
Used at the 100 Areas.

Chemical	Toxicity
Carbonate-bicarbonate	Slight
Citric acid	Slight
Diethylthiourea	Carcinogen
Hydrogen peroxide	High
Morpholine	Moderate
Oxalic acid	High
Separan (polyacrylamide)	Unknown
Sodium bisulfate	High (when combined with water)

2.0 INTERNAL DECONTAMINATION SYSTEM

2.1 CHEMICAL SYSTEM DESCRIPTION

Internal decontamination of primary cooling system piping was performed from time to time. The main purpose of the internal decontamination was to remove the radioactive oxides that had built up in the piping. The oxides in the primary loop were contaminated with activation and fission products, so reducing the amount of oxide resulted in lower radiation exposure for people working in close proximity to primary loop piping.

Internal decontamination will not be performed in the near future because of the N Reactor cold-standby status. Should an internal decontamination be required due to change in the N Reactor production mission, the detailed procedure is contained in PT-N-585, and the system description is as follows.

The chemical used to decontaminate the internal primary piping is 70% phosphoric acid with 2 g/L diethylthiourea added. Acid is stored in the 35,000-gal capacity storage tank southeast of the 109-N Building. Approximately 20,000 gal of acid are temporarily stored and consumed during an internal decontamination cycle. Diethylthiourea is stored in a solid form in containers in the 190-DR Building at the 100-D Area. A stockpile of 450 to 2,000 lb is kept on hand. The decontamination agent is transferred from the storage tank via the phosphoric acid transfer pump to the decontamination mix tank in the solution preparation room, where diethylthiourea is added. The transfer pump is located in the southeast corner of the 109-N Building at the (-)16 ft level.

The floor of the solution preparation room is at the (-)21 ft level of the 109-N Building. The mix tank in this room has a storage capacity of 15,000 gal. One of the two decontamination injection pumps in the solution preparation room pumps the acid from the mix tank to the 6-in. high-pressure injection line that transfers the chemical to the old Emergency Cooling System (ECS) manifold in Corridor 2.

Temporary piping is used to connect the 6-in. high-pressure chemical injection line with the ECS piping. A sparger introduces phosphoric acid into the ECS manifold. Acid enters the primary piping through the V-3 valves and exits through the V-4 valves. After leaving the primary loop the acid is routed to the 1310-N Chemical Waste Storage Tank until the pH of the decontamination solution is high enough (the acid flush is followed by a rinse water flush) to admit the solution into the 1325-N Liquid Waste Disposal Facility (LWDF).

A support decontamination facility is maintained in Room 307 of the 105-N Building. The facility is used to decontaminate the reactor process tube caps and inserts as well as miscellaneous hand tools. The facility is operated on a sporadic basis, depending on demand. The decontamination process consists of a "hot bath" of phosphoric acid solution (3 gal of acid to 20 gal of water) and treatment in a vibratory polisher containing one-to-one ascorbic and citric acid. Approximately once-a-month the contents of the "hot bath" and the vibratory polisher are neutralized with one gallon of sodium hydroxide and drained to the chemical waste storage tank.

Alkaline potassium permanganate followed by an inhibited citric-oxalic acid mixture has been used to decontaminate the steam generators. These chemicals are mixed in the small mix tank next to the phosphoric acid storage tank.

2.2 SPILL ASSESSMENT

The most probable locations for an accidental chemical spill are at the valves, pumps, and other connections between mix tanks and storage facilities. A low probability exists for accidental spills due to the rupture of storage tanks and transfer piping, since the decontamination equipment and facilities are normally only used for a very short time every other year. Following are the more probable sites for accidental spills in the internal decontamination system and the ultimate disposition of any spilled chemicals.

One potential area for an accidental spill of phosphoric acid is in the area surrounding the storage tank. Spills could occur due to unloading operations or leakage through the valves that connect the storage tank with transfer and drain lines. A spill directly around the storage tank would be contained in the concrete catch basin underneath the storage tank. This concrete basin has a capacity of 2,300 gal with all drains plugged. A spill larger than that capacity would overflow the basin and spill to ground. A quantity equal to or greater than 560 gal would be a CERCLA RQ. Therefore, every effort should be made to avert such an occurrence. Phosphoric acid is normally stored in this tank only before the internal decontamination of the 105-N primary piping. A leak in the tank would be detected by the routine patrol of the 100-N Area auxiliary facilities. This patrol is conducted every two hours.

Another location for a potential spill is at the phosphoric acid transfer pump in the southeast corner of 109-N at the (-)16 ft level. A spill onto the floor surrounding the transfer pump, as happened in the case reported by Unusual Occurrence (UO) 78-11, would be collected by the floor drains in the area and routed to Sump No. 9. The effluent from this sump is discharged to the river via the 66-in. raw water return (RWR) line. With operators on duty during transfer operations any leak that might occur would be quickly controlled and corrected. It is very unlikely that a CERCLA RQ would be released to the environment from this area.

The solution preparation room presents another location for potential spills. Leaks could develop from the pumps, valves, or tanks located in this room. Any spill in this room would be confined to the immediate area since the room is situated in a pit. Drains in this area are collected by the decontamination area sump located in the solution preparation room. The effluent in this sump is pumped to the chemical drain (CDR) piping which enters the 6-in. RDR line that exits the 109-N Building at the east end and discharges either to the 1310-N Chemical Waste Storage Tank or the 1325-N LWDF. Any discharge to the LWDF would be investigated to determine if a CERCLA RQ had been released.

Other possible spill sites include the temporary connection between the 6-in. high-pressure chemical injection line to the ECS manifold in Corridor 2 and the V-3 or V-4 valves. A spill in Corridor 2 would enter floor drains and be transported to the lift station via drain system No. 13. A spill in Corridor 5, where the V-3 valves are located, would also end up in the lift station from drain system No. 13. Any other leaks in primary piping between the V-3 and V-4 valves would also be routed to the lift station. The effluent from the lift station is discharged to the 1310-N Chemical Waste Storage Tank or 1325-N LWDF by the 36-in. low-pressure flush line. Any discharge to the LWDF would be investigated to determine if an EPA CERCLA RQ had been released.

The 1310-N Chemical Waste Storage Tank has a storage capacity of 900,000 gal. Phosphoric acid used in the internal decontamination, and successive rinse water, is stored in this tank. When the pH rises to approximately neutral the rinse water is valved to the 1325-N LWDF. The liquid in the chemical waste storage tank is neutralized with sodium hydroxide and then pumped to the 1314-N Waste Load-Out Facility. From there the liquid is transported to 200 Areas, via railroad tank cars, for proper disposal. Any spills of the very dilute sodium phosphate at the 1310-N Chemical Waste Storage Tank or 1314-N Waste Load-Out Station would go to ground. Any spill to ground would be investigated in relation to CERCLA RQs. Every effort should be made to minimize such occurrences.

Any large, unneutralized release of acid to the 1325-N LWDF could be very significant since a pH of 7.0 to 9.0 standard units is necessary in the soil column to retain the radionuclides present in the LWDF. The potential for large acid spill to the LWDF is limited to the times when a major decontamination is scheduled. To control this problem, the pH of the LWDF is constantly monitored during the primary loop internal decontamination. The proper pH is maintained by pumping sodium hydroxide directly to the facility from a tank truck. Neutralizing LWDF influent with sodium hydroxide must be carefully controlled to avoid the release of CERCLA RQs to the environment.

To control smaller acid spills to the LWDF, an influent monitoring system is maintained. This monitoring system includes pH and level monitoring with read out in the 105-N Control Room. Along with a continuous pH recorder, the 105-N Control Room is equipped with an annunciator to warn operators of low pH in the LWDF. A supply of caustic (approximately 55 gal) has been stored in the 109-N solution preparation room. This caustic would be admitted into the decontamination area sump to neutralize small amounts of acid discharged to the 1325-N LWDF. Depending on the pH noted by a 105-N Control Room operator, an appropriate amount of caustic would be routed to the facility to raise the pH. Although the amount of sodium hydroxide necessary to neutralize a small acid spill would conceivably be less than the CERCLA RQ, this practice must be carefully monitored to avoid CERCLA problems.

2.3 ADMINISTRATIVE CONTROLS

Currently there are five Chemical Handling Procedures (09-2, 09-8, 09-40, 09-45 and 09-47, see Appendix C) which are employed during various chemical transfer and mixing operations associated with the internal decontamination system. These procedures enhance spill control by listing, step-by-step, the various valves and pumps to be operated during a decontamination cycle. Each procedure contains or will contain applicable CERCLA implications.

Personnel from 163-N also perform a routine walk-through surveillance at eight-hour intervals, thus minimizing spill quantities through early leak detection. The surveillance includes the 35,000-gal phosphoric acid tank and associated piping at the southeast corner of 109-N.

2.4 RECOMMENDED SPILL RETENTION IMPROVEMENTS

Though the facilities associated with the internal decontamination system are manned during operation and undergo frequent surveillance and annual integrity inspections the potential still exists in some areas to release a RQ to the environment.

Because of the DOE plan to put N Reactor in the cold-standby mode, it is unlikely that any internal decontamination will be performed in the future. If for any reason that internal decontamination is required, the following recommendations are suggested:

2.4.1 Phosphoric Acid Storage Tank-Southeast of 109-N

The phosphoric acid storage tank is surrounded by a spill retention basin which is equipped with drains that drain to the LWDF or the chemical waste storage tank via the decontamination area sump in the 109-N Building. Any release to the LWDF would be a release to the environment, therefore, this circumstance poses a CERCLA liability. CERCLA liability refers to an accidental spill exceeding the CERCLA RQ. This has to be reported to the National Response Center (NRC) and if it is caused due to negligence, a civil penalty can be assessed against the facility operator. To remove this liability the drains should be sealed off.

The capacity of the phosphoric acid tank spill retention basin is approximately 2,300 gal. Approximately 20,000 gal of 70% solution is stored prior to a primary loop decontamination. Although the probability of a spill exceeding the capacity of the basin is small, a CERCLA liability still exists in that a major tank failure spilling the entire contents of the tank would overflow the basin. To completely eliminate this liability, the spill retention basin would have to be modified to contain 35,000 gal.

2.4.2 Phosphoric Acid Pumps In 109-N (-16 ft)

The phosphoric acid pump leaked and spilled approximately 10 gal of acid, documented in UO 78-11. The acid spill drained to the 66-in. RWR line and consequently, the Columbia River. As demonstrated during this UO, the quantity

of a spill in this area would typically be very small. However, since the potential exists for a spill which would exceed the CERCLA RQ, a liability does exist. Isolating the pump area from the floor drain by installing a retention basin would reduce but not completely eliminate this liability because only small spills would be contained. Also, pump and piping drains that are currently routed to the floor drain should be removed from that system.

2.4.3 Solution Preparation Room Phosphoric Acid Pumps and Piping

As indicated in Section 3.1 the internal decontamination system is large, and a leak from this system could take any one of a number of routes, all having the same final destination; the LWDF or the chemical waste storage tank. Because some of the radiological waste systems offer alternative drainage routes, the final destination would depend on which direction the waste was currently being directed. Spill containment in all probable locations for spills would be possible but not practical due to the intricacies of the facilities involved. To have the protection necessary to avoid the release of a CERCLA RQ to the LWDF, the radiological waste system should be modified to allow the option of routing waste to the chemical waste storage tank or the LWDF. This action should be coupled with a Process Standard revision which would direct operations personnel to route effluent from the affected radiological waste sump to the chemical waste storage tank in the event of a chemical spill. Necessary neutralization and disposal could then be accomplished with no CERCLA implications.

2.4.4 Chemical Waste Storage Tank

The chemical waste storage tank poses a CERCLA liability only during those times shortly after a reactor decontamination process has been completed. The tank, which is normally empty, receives from 700,000 to 800,000 gal of decontamination solution and flush water during a decontamination process. After neutralization the tank is emptied to railroad tank cars; a process that takes from eight to twelve weeks. To completely remove any CERCLA liability, secondary containment would have to be provided for the entire contents of the tank. An option to consider, since the tank is in use only for short periods of time, is to provide spill retention in those areas where spills would commonly occur (around pipe connections and valves), and ensure the integrity of the tank through a comprehensive inspection and maintenance program.

2.4.5 Acid Spills to the Liquid Waste Disposal Facility

As indicated in Section 2.2, a large acid spill to the LWDF would have an extremely adverse radiological impact. It is also indicated that controls exist to lessen this impact through pH adjustment using sodium hydroxide. In Section 2.4.2 alternatives to allowing a chemical spill to reach the LWDF are discussed. Diversion to the chemical waste storage tank would be the desired alternative from a CERCLA standpoint. But in the event that an acid spill were to reach the LWDF, the spill would have to be neutralized. The use of sodium hydroxide could compound the event in terms of CERCLA because sodium hydroxide is

a CERCLA designated hazardous substance. The use of sodium hydroxide must be carefully controlled to assure complete neutralization is accomplished and a RQ of sodium hydroxide is not released to the environment.

3.0 108-N CHEMICAL UNLOADING FACILITY

3.1 CHEMICAL SYSTEM DESCRIPTION

The 108-N chemical unloading facility is used for receiving, storage, and transfer of 93% sulfuric acid and 50% sodium hydroxide. These two chemicals are used to regenerate the cation and anion resins employed to demineralize water at 163-N.

The unloading facilities east of 108-N can accept chemical shipments from tank trucks or railroad cars. A pipe trench between the unloading station and the 108-N Building contains the transfer piping between these two locations. Air pressure is used to unload the acid to one of the three 10,000-gal capacity sulfuric acid storage tanks south of the building. Transfer, recirculation, and booster pumps route the caustic to the 76,800-gal capacity sodium hydroxide storage tank north of the 108-N Building. The chemicals in storage are routed to 163-N via transfer lines contained in a concrete pipe trench. The pipe trench exits the 108-N Building on the west side, runs south of the 163-N/183-N complex, and lands around to enter the 163-N Building at the west end.

The acid transfer system uses a 350-gal transfer tank located in a pit west of the 108-N Building. The transfer tank is filled with acid by gravity flow from the 10,000-gal storage tanks. After the transfer tank has been filled, air pressure is used to transfer the acid to the storage tank in the 163-N Building.

Transfer pumps located in the 108-N Building transfer sodium hydroxide directly from the 76,800-gal storage tank to the storage tank in the 163-N Building.

3.2 SPILL ASSESSMENT

Due to the corrosive nature of the chemicals, there is a potential for spills from the transfer piping. An acid or caustic spill from the transfer piping would be contained in the concrete lined pipe trench until it could be neutralized and disposed. A spill at the unloading station would go to ground. Spills around the sodium hydroxide storage tank and sulfuric acid storage tanks would also go to ground. Overflows from the sulfuric acid storage tanks are vented to limestone packed drain pit adjacent to the tanks. Leaks from the storage tanks would be detected by the routine patrol of the grounds. This patrol is made every eight hours. Though frequent routine surveillances and the use of documented chemical handling procedures would minimize a spill, any spill would be investigated in relation to the RQs.

Leaks could develop from several sources within the 108-N Building. Sodium hydroxide transfer pumps and booster pumps provide potential spill sites. Spills inside the 108-N Building would flow directly into the neutralization pit or be collected by the floor drains that lead to the pit. Spills at the acid transfer tank would collect in the pit containing the tank and also drain to the neutralization pit. The effluent from the pit is siphoned through an orificed drain line that connects with the 66-in. RWR, which drains to the Columbia River.

Any overflow of chemical from the neutralization pit to the 66-in. RWR line would be investigated in relation to CERCLA RQs.

3.3 ADMINISTRATIVE CONTROLS

Currently there are about thirteen Chemical Handling Procedures (see Appendix C) which are employed during various chemical transfer operations at the 108-N Chemical Unloading Facility. These procedures enhance spill control by listing, step-by-step, the various valves and pumps to be operated during a chemical transfer. Each procedure contains, or will contain any CERCLA implications for the particular transfer being performed.

Personnel from 163-N also perform a routine walk-through surveillance at eight-hour intervals, thus minimizing spill quantities through early leak detection. The surveillance includes all acid and caustic storage facilities associated with the 108-N Chemical Unloading Facility.

3.4 RECOMMENDED SPILL RETENTION IMPROVEMENTS

The chemical system will continue to operate even in the N Reactor cold-standby mode. Though the systems associated with the 108-N Chemical Unloading Facility are manned during transfer operations and spill control is enhanced by a number of administrative controls, deficiencies in spill containment devices in storage areas pose a considerable CERCLA liability. CERCLA liability here refers to the reporting of an accidental spill exceeding the RQ. If proven due to negligence, a civil penalty can be assessed against the facility operator. Options to contain such a spill are detailed in UNI-4499, REV 0, *Engineering Study: Improved Chemical Spill Control at 100-N, Phase I*, dated December 1987.

4.0 CHEMICAL STORAGE AT THE FILTERED AND DEMINERALIZED WATER PLANTS

4.1 CHEMICAL SYSTEM DESCRIPTION

The 181-N pump house supplies the raw water for the 183-N Filter Plant, where alum and separan are used to filter the raw water. The filtered water is then passed to the adjacent 163-N Demineralization Plant. In the demineralization plant, the water is demineralized by ion exchange with sulfuric acid and sodium hydroxide. The demineralized water is then supplied to 182-N for reactor coolant makeup and as potable water. Also from 163-N, the alum waste from the flocculating process is routed to 183-N and then piped away to the backwash pond. The waste from the 163-N ion exchange process is neutralized in the Elementary Neutralization Unit (ENU) before disposal in the 1324-NA.

Chemicals stored and used at the 183-N filter plant include liquid alum, separan, and chlorine. Liquid alum is used as a flocculent and is stored in two 8,250-gal storage tanks and one 175-gal day tank. Separan is a filter aid/coagulant that is stored in two 880-gal tanks. Chlorine gas is used as an algicide and is stored in six 2,000-lb cylinders in the chlorine room at 183-N.

Sulfuric acid and sodium hydroxide are stored in separate 10,000-gal storage tanks inside the 163-N Demineralization Plant at the west end of the building. Sulfuric acid is used to regenerate the cation resins and sodium hydroxide is used to regenerate the anion resins that are used in the demineralizing process. Sulfuric acid and sodium hydroxide are also used for the neutralization process in the ENUs in 163-N. They are also used for the regeneration waste pH adjustment before discharging to 1324-NA.

4.2 SPILL ASSESSMENT

Floor drains in the control room and office areas in the 163-N/183-N Building complex, along with the drains in the pipe gallery area of 183-N (where the alum and separan tanks are located) all drain to sump No. 2 which is on the north side of 183-N. Water collected in this sump is routed to the 66-in. RWR and drains to the river. Therefore, a spill of alum from the storage tanks could enter the Columbia River. Any spill that reaches the 66-in. RWR line would be investigated in relation to RQs. Every effort should be made to avert such an occurrence.

Should a leak develop in the chlorine storage cylinders, the chlorine gas would be vented out the roof vent in the chlorine room. Ultimately the total chlorine gas leaked would be released to the environment. Therefore, if a CERCLA RQ has escaped the chemical system, a reportable release would be unavoidable.

The sulfuric acid and sodium hydroxide storage tanks are surrounded by a catch basin that has a capacity of approximately 6,500 gal. The drains from these catch basins and the overflow drain storage tanks are routed to a french drain (drywell) west of the 163-N Building.

A series of pipe trenches is located in the process area of 163-N. Process water in 163-N, including ion regeneration waste, is routed to sump No. 1, north of 163-N. The contents of this sump are piped directly to a ground disposal pond southeast of 163-N. Also, since any spill in the process area of 163-N would also drain to sump No. 1, a spill of a hazardous substance would be investigated in relation to CERCLA RQs.

4.3 ADMINISTRATIVE CONTROLS

Currently there are thirteen Chemical Handling Procedures (see Appendix C) which are employed during various chemical transfer and mixing operations at 183-N/163-N Filtered-Demineralized Water Plants. These procedures, enhance spill control by listing the various valves and pumps to be operated and their proper sequence. They are selectively revised periodically. Each procedure contains or will contain applicable CERCLA implications.

Personnel from 163-N also perform a routine walk-through surveillance at two-hour intervals, thus minimizing spill quantities through early leak detection. The surveillance includes all chemical storage facilities associated with the 183-N/163-N Filtered-Demineralized Water Plants.

4.4 RECOMMENDED SPILL RETENTION IMPROVEMENTS

The chemical filtering and demineralization processes are needed even in the N Reactor cold-standby status. Though frequent surveillance, annual inspection and documented operating procedures of chemical systems in the 183-N/163-N Filtered-Demineralized Water Plants reduce the probability of a large chemical spill, the spill containment devices in some areas do not provide adequate protection against a CERCLA RQ being released to the environment.

4.4.1 163-N Sulfuric Acid and Sodium Hydroxide Storage

The overflow drains and the spill retention basin drains of the 163-N sulfuric acid and sodium hydroxide storage are routed to empty into the spill retention basin and the spill retention basin drains are sealed off. If accidental spills exceeding RQs are to be eliminated, the basin should be modified to contain 10,000 gal, as suggested by UNI-4499 (see Section 3.4).

4.4.2 183-N Alum Storage

Currently any spill from the alum storage tanks or transfer and recirculating pumps could enter the 66-in. RWR line via the 183-N floor drains. Since the 66-in. RWR line drains to the Columbia River there exists a considerable CERCLA liability in this scenario. To eliminate this liability, the area that the alum storage tanks and pumping network are located in should be isolated from the building floor drain system.

5.0 WATER QUALITY CONTROL

5.1 CHEMICAL SYSTEM DESCRIPTION AND SPILL ASSESSMENT

5.1.1 Ammonium Hydroxide

Ammonium hydroxide is added to the primary cooling system and the graphite and shield cooling system to control the pH of the cooling water in these systems. This chemical is stored in a 30,000-gal storage tank outside the southeast corner of the 109-N Building. Transfer pumps, located in a small pump room on the west side of the 184-N Building, pump ammonium hydroxide to process cells where it is injected into the primary cooling system or the graphite and shield cooling system.

The most probable sites for spills would be at the storage tank, the transfer pumps, and the connection point between the transfer line and the process cells. A spill at the storage tank would either be retained by the concrete catch basin under the tank or go to ground. The catch basin would contain approximately 5,000 gal of any spilled ammonium hydroxide. A spill at the transfer pumps would go to ground. All spills in either area would be investigated in relation to CERCLA RQs.

Accidental spills in the 109-N Turbine Bay would be collected by the floor drains in this area and routed to the sumps in the (-)16 ft level. These sumps discharge to the river via the 66-in. RWR. With this building continually manned by Operations personnel, a spill of ammonium hydroxide in a CERCLA RQ is unlikely. However, all spills of ammonium hydroxide in this area will be investigated in relation to CERCLA RQ.

5.1.2 Hydrazine

Hydrazine is used to reduce oxygen concentrations in the cooling water of the primary, secondary, graphite and shield, and rod cooling systems. Dilute hydrazine solution is stored in a 1,700-gal twin-compartment tank in the 184-N Building. Transfer pumps, in the small pump room also containing the ammonium hydroxide pumps, inject hydrazine into IW-2, there to be injected into the primary cooling system or graphite and shield cooling system. Transfer pumps adjacent to the hydrazine storage tank direct the chemical to the dump condenser condensate pumps in order to inject hydrazine into the secondary cooling system. Two 150-gal mix tanks in Room 2 of 105-N supply the hydrazine needed in the rod cooling system.

Should an accidental spill occur at the storage tank or the transfer pumps adjacent to the tank, approximately 1,000 gal of hydrazine could be retained within the curbed catch basin surrounding the equipment. Overflow and drains (currently tape sealed) from the basin drain into the collection sump that discharges to the river via the 66-in. RWR line. A spill at the transfer pumps in the pump room west of 184-N would be to ground. Leaks in the transfer lines within 109-N that inject the hydrazine into the primary, secondary, and graphite

and shield cooling systems would drain to one of the sumps that discharges to the river. A leak in the small storage tanks in Room 2 would drain to the lift station via drain system No. 13. A spill in any of these areas would be investigated in relation to CERCLA RQs.

5.1.3 Morpholine

Morpholine is used to control the pH of the cooling water in the secondary cooling system. A 900-gal twin compartment storage tank with adjacent transfer pumps is provided for morpholine in the 184-N Building. This water treatment chemical is injected into secondary coolant piping at the suction side of the dump condenser condensate pumps. If a spill occurs at the storage tank or transfer pumps, a catch basin surrounding this equipment will contain the chemical. This basin will hold approximately 1,000 gal, and the overflow would be collected in the 184-N sump where it could be discharged to the river. If there is any overflow from this catch basin, the amount of overflow will be very small. A spill in the transfer lines in the 109-N Building can drain to the sumps that discharge to the river.

5.1.4 Chlorine

Chlorine is stored in 2,000-lb cylinders in the 183-N chlorine room. The chemical is added to filtered water for destruction of harmful bacteria to produce potable water. Any leaks in the chlorine cylinders would escape as a gas through the roof vents in the chlorine room. Any leak of chlorine would be investigated in relation to CERCLA RQ.

5.1.5 Sodium Hypochlorite

Sodium hypochlorite is used as a treatment for the potable water supply in 182-N. The chemical comes in 5 gal containers of 25% concentration by volume. It is added to a 15 gal mix tank before being injected into the filtered water. The treated water is then distributed as potable water. Normally, there are about 10 containers of sodium hypochlorite (about 500 lb) stored in 182-N. Since the CERCLA RQ is 100 lb, and the stored solution is only 25%, it does not present a serious hazard, but any spill would still be investigated. At present, there is no curbing or drain at the sodium hypochlorite storage area.

A small amount of sodium hypochlorite is also used in 165-KW (about 10 gal) and 105-B (about 5 to 10 gal) for potable water treatment, but the total amount is less than the CERCLA RQ.

5.2 ADMINISTRATIVE CONTROLS

Currently there are nine chemical handling procedures employed during various chemical transfer and mixing operations associated with the water quality control systems. The procedures are: II-09-2, II-09-3, II-09-4, II-09-7, II-09-23, II-09-37, II-09-52, II-09-58, II-09-60, where II indicates administrative control level, 09 indicates system number, followed by the sequential procedure

number (see Appendix C). These procedures enhance spill control by listing the various valves and pumps to be operated and their proper sequence. Each procedure contains or will contain applicable CERCLA implications. Periodic tank integrity inspection and maintenance program (EMS) will minimize tank leaks, though not accidental spills.

Operations personnel also perform a routine walk-through surveillance at two-hour intervals, thus minimizing spill quantities through early leak detection. The surveillance includes all chemical systems and storage facilities associated with water quality control systems except the morpholine transport system which is on an eight-hour interval surveillance.

5.3 RECOMMENDED SPILL RETENTION IMPROVEMENTS

If N Reactor is to be restarted, the chemical tanks will be filled and re-filled more frequently. Therefore, the following improvements are recommended. Though the systems associated with water quality control are manned during operation and spill prevention is enhanced by administrative controls, deficiencies in spill containment create a CERCLA liability in some areas. CERCLA liability refers to reporting of an accidental spill exceeding the CERCLA RQ for a particular chemical. If such a spill is a result of negligence, a civil penalty can be assessed against the facility operator.

5.3.1 Ammonium Hydroxide Storage Tank

The ammonium hydroxide storage tank is surrounded by a spill retention basin which is equipped with drains that drain to the LWDF or the Chemical Waste Storage Tank via the decontamination sump in 109-N. Any release to the LWDF would be a release to the environment; therefore, this condition poses a CERCLA liability. To remove this liability, the drains should be sealed off.

The capacity of the ammonium hydroxide spill retention basin is approximately 5,000 gal. The storage tank level is maintained between 15,000 and 30,000 gal. Although the probability of a spill exceeding the capacity of the basin is small a CERCLA liability still exists in that a major tank failure would overflow the basin. To completely eliminate the CERCLA liability the spill retention basin should be modified to contain the entire contents of the tank.

5.3.2 Ammonium Hydroxide Pumping

The ammonium hydroxide transfer pumps are partially surrounded by a spill retention basin. Drains from the basin are routed to the 66-in. RWR, and run-off from the basin goes to ground. Both of these conditions create a CERCLA liability. To remove this liability the basin should be completed and the drains sealed off.

The ammonium hydroxide piping system in the 109-N building poses a CERCLA liability because any spill would drain to the river via the 66-in. RWR line. However, due to the length and complexity of the system, total spill containment is impractical. Since the flows in this system are small, the leaks would be also

be small. The CERCLA liability is also minimized by having a supply of chemical absorbent pillows on hand in 109-N to be used in keeping spills from entering the floor drains. Improvements to the 184-N transfer pumps are outlined in UNI-4499 (see Section 3.4).

5.3.3 Hydrazine Storage Tanks and Transfer Pumps

The hydrazine storage tanks and transfer pumps are surrounded by a spill retention basin with a capacity of 1,000 gal. Drains from the basin are routed to the river via the 66-in. RWR line. Since the RQ of hydrazine is one pound the drains pose a definite CERCLA liability. The drains are presently sealed off by tape as a temporary control measure. Other improvements, such as erecting a concrete curb, are also suggested in UNI-4499 (see Section 3.4).

5.3.4 Hydrazine Transfer Piping in 109-N

The concerns and spill containment problems of the hydrazine parallel those of the ammonium hydroxide system in the 109-N building. Therefore, the same spill containment described in Section 5.3.2 should be applied.

5.3.5 Hydrazine Transfer in 105-N

A leak in the hydrazine transfer system in Room 2 would drain to the LWDF via the radiological waste system, which poses a CERCLA liability. To eliminate this liability, the tanks and pumps should be isolated from the drain system. Also a supply of chemical absorbent pillows are on hand for leaks that might occur outside the containment.

6.0 FUEL STORAGE BASIN RECIRCULATING FACILITY

6.1 CHEMICAL SYSTEM DESCRIPTION AND SPILL ASSESSMENT

The 107-N Building houses the sand filter and ion exchange water treatment plant for the 105-N Fuel Storage Basin. The anion and cation resin columns require periodic regeneration. Sulfuric acid (93% concentration) and sodium hydroxide (50% concentration) are used in the regeneration cycles.

Sulfuric acid and sodium hydroxide are stored in separate 5,000-gal tanks located adjacent to the north wall of 107-N. A concrete retention basin with a capacity of approximately 9,000 gal surrounds the tanks. The chemical transport pumps are also located inside the retention basin. Any spill in this area would be contained within the basin.

Regeneration wastes are stored in a 50,000-gal tank in the basement of 107-N. When the tank reaches capacity, the wastes are transferred to railroad tank cars at the 1314-N Chemical Load-Out Facility. Spills from the waste storage tank or pumping system would be contained within the basement of 107-N as described in UO 85-13.

A CERCLA-reportable event was avoided in UO 85-13 because all of the spilled waste was contained within the basement of 107-N. During the UO, approximately 42,000 gal of anion column regeneration waste was spilled to the floor from a hole in the waste tank. The waste was neutralized in the basement, then pumped to the 1314-N Chemical Load-Out Facility for normal disposal. Evidence that the spill had not leaked through the basement walls into the ground water was obtained by sampling test wells around 107-N.

Sulfuric acid and sodium hydroxide unloading facilities pose a potential problem. Any leak in the transfer system of the delivery truck would go to ground and consequently be investigated in relation to CERCLA RQs.

6.2 RECOMMENDED SPILL RETENTION IMPROVEMENTS

The 107-N facility presents only one CERCLA liability since the chemical system is compact and spill control was addressed during construction.

The chemical unloading facility for sodium hydroxide and sulfuric acid is not equipped with spill containment devices around the delivery truck parking area or transfer piping. A curbed concrete pad with a capacity of 5,000 gal would eliminate this liability. This is discussed in more detail in UNI-4499 (see Section 3.4).

7.0 CHEMICAL STORAGE AT 100-KE AREA

7.1 CHEMICAL SYSTEM DESCRIPTION AND SPILL ASSESSMENT

7.1.1 183-KE Filtered Water Plant

Chemicals used in this building include chlorine, separan, and liquid alum. Chlorine, stored as a liquid in cylinders, is used to destroy harmful bacteria in the process of making potable water. Chlorine is also stored as a solid (calcium hypochlorite) to be used as an algicide in the settling basin. Separan, a filter aid/coagulant, is stored in two 7,500-gal capacity mix tanks. Liquid alum is used as a flocculent and is stored in a 188,000-gal capacity storage tank outside the building. The storage tank feeds either the alum injection pumps or the recirculating pumps within the building. Three recirculating pumps are provided to circulate the liquid alum through a heat exchanger to prevent crystallization of the liquid.

Although the liquid alum and separan tanks are capable of storing a large amount of chemicals, the total capacity of the three tanks is not used. Separan is stored in powdered form, and small amounts are mixed as needed. A liquid level of four feet is the maximum amount of alum stored in the alum storage tank. This tank level would allow a total liquid alum storage of approximately 32,500 gal.

Any leaks in the chlorine system or chlorinators would result in chlorine gas being vented to the atmosphere. All leaks would be investigated to determine if a RQ had been released. It is very unlikely that a spill of calcium hypochlorite would exceed the RQ of 100 lb since it is stored in individual 30-lb containers.

Spills at the liquid alum storage tank would go to ground. Consequently, any spill in this area would be investigated in relation to CERCLA RQs. The 183-KE Building is manned during the Monday through Friday day shift, which would aid in the detection of a spill. The level in the alum storage tank is recorded once per day. Accidental spills of separan or liquid alum at the pumps, heat exchangers, or mix tanks within the 183-KE Building would drain to the Columbia River. Although spilled chemicals in this building would enter the river, the quantity of any potential spill should be less than the CERCLA RQ defined in the introduction.

7.1.2 1706-KE

Outside of this building there are two 3,300-gal storage tanks, one for sulfuric acid and the other for sodium hydroxide. These chemicals are used to regenerate the cation and anion resins used in the small demineralized water plant within 1706-KE. Laboratory chemicals are discussed in Section 9.0.

The resin column regeneration wastes are routed to an 18,000-gal concrete clear well. Here the combined sodium hydroxide and sulfuric acid produce a near

neutral solution. After testing, if further neutralization is needed, the pH is adjusted using either sodium hydroxide or sulfuric acid. When the solution has been determined to be neutral, it is discharged to the Columbia River via the 1706-Building floor drains. Since the waste at this point exhibits none of the characteristics of a hazardous waste, as defined by CERCLA, the discharge has no CERCLA implications.

A spill of acid or caustic at their respective storage tanks would go to ground and consequently would be investigated in relation to CERCLA RQs.

7.1.3 165-KW

A hypochlorinator which uses sodium hypochlorite (a liquid) is located in this building. The chlorinator produces potable water and adds chlorine to the 105-KW Fuel Storage Basin influent to act as an algicide. From 50 to 100 gal are stored in individual 25-gal containers. Since the CERCLA RQ is 100 lb (about 12 gal), or about 36 gal of solution at the concentration used at 100 Areas, a RQ spill is very unlikely.

7.2 RECOMMENDED SPILL RETENTION IMPROVEMENTS

Although most chemical systems are manned during operation and the systems are low volume, a deficiency in spill containment creates a CERCLA liability in some areas.

7.2.1 Alum Storage Tank and Pumps

There is no spill containment provided for the 188,000-gal alum storage tank. This creates a CERCLA liability. CERCLA liability refers to reporting of an accidental spill exceeding the CERCLA RQ. This liability can be addressed by constructing a spill retention basin around the tank. The basin should be capable of containing the maximum quantity of alum stored.

The alum pumps in 183-KE have no spill containment around them. Since any spill would drain to the river via the floor drains a CERCLA liability exists in this area also. This liability could be removed by isolating the pump area from the floor drains.

7.2.2 1705-KE Sodium Hydroxide and Sulfuric Acid

Since any spill from these tanks would go to ground, a CERCLA liability exists. To eliminate this liability a spill retention basin capable of containing one tank volume should be constructed around the tanks.

8.0 CHEMICAL STORAGE AT 100-D AREA

8.1 POTABLE WATER CHLORINATION

A gaseous chlorinator is maintained in the 183-D Building Head House to supply potable water to the 100-D Area. Chlorine is stored in 2,000-lb cylinders located on the west side of 183-D. Any leaks in the chlorine system would vent to the atmosphere through the 183-D roof vents.

8.2 100-AREAS CHLORINE STORAGE

A rack with a capacity of sixteen 2,000-lb cylinders is located on the west side of 183-D Head House. Chlorine for all of the 100 Areas is stored here. Any leak would vent to the atmosphere. The facility is manned during day shift from Monday through Friday, and the tanks are checked daily.

8.3 190-DR BUILDING DIETHYLTHIOUREA STORAGE

Approximately 2,000 lb of diethylthiourea used in the internal decontamination system at 105-N are stored here. The solid is stored in small (approximately 50-lb) containers.

9.0 CHEMICAL LABORATORIES

9.1 100-N AND 100-K AREAS

There are currently five wet labs in use at 100-N and three in use at 1706-K, 100-K Area. Any spill contained within the labs would be cleaned up promptly and disposed of through proper methods as specified in WHC-CM-7-5, *Environmental Compliance Manual*. All lab drains are routed to ground disposal facilities or to the Columbia River. Therefore, a spill down a drain at any of the labs would potentially be CERCLA-reportable and would be investigated as such.

At 100-N current laboratory disposal practices prohibit the use of the process drains for disposing of samples that have been designated as regulated waste. Samples designated as regulated are collected and disposed of through the Hazardous and Radiological Waste Control Section.

At 1706-KE, chemical wastes are collected in DOT-34-5 approved containers located in the "O" Level laboratory and log entries are made each time a chemical solution is added. Periodic collections of these containers are made by N Area Transportation and taken to the 163-N Waste Storage Pad for proper disposal by the Hazardous and Radiological Waste Control Section.

10.0 100 AREA PAINT SHOP

The paint shop located in the 1143-N Building services all of the 100 Areas. Paints, solvents, and thinners are stored in both shops. Any spill in either shop would be contained on the floor. Since all thinners and solvents are regulated under CERCLA, either specifically or due to their ignitability, any spill will be investigated to ensure nothing exceeding a RQ is released to the environment.

Materials needed for various outside jobs are taken from the shop to the job site only in quantities equal to the amount needed for that job or days' work. Unused materials are returned to the shop at the end of each day.

Though the volumes of thinners and solvents used are small, a RQ might still be spilled because the CERCLA RQs are also small. Therefore, caution should be exercised when handling these materials. Paints, thinners, and solvents should be stored inside on a concrete floor in an area isolated from floor drains. Evaporation is a form of release (to the ambient air) and also should be guarded against. Therefore, all containers should be kept tightly closed when not in use.

To dispose of paint thinners and solvents, package them in 55-gal drums temporarily at the 163-N storage pad, then transport them to be disposed of through normal channels. Note that, under no circumstances shall the drums be stored at the 163-N pads for more than ninety days.

11.0 100 AREAS RESPONSE TO CHEMICAL SPILLS AND RELEASES

The following is a summary of actions that should be taken if a chemical spill should occur in the 100 Areas.

1. Stop the flow of chemical if possible.
2. Contain the chemical to prevent it from being released to the environment.
3. Notify 100 Areas Environmental Protection of the spill immediately.
4. Contact the Hanford Hazardous Materials Response Team.
5. 100 Areas Environmental Protection will assess the chemical spill and determine if remedial action is necessary.
6. 100 Areas Environmental Protection will follow-up and document the spill.

11.1 STOP THE FLOW OF CHEMICAL

Stopping the flow of liquid or gaseous chemicals may involve closing a valve to isolate the leak, shutting off a transfer pump, or some other similar action. The supervisor associated with the facility should decide upon the appropriate corrective action to be taken and implement that action immediately. Extreme caution should be used when dealing with chemicals that are highly toxic or corrosive. Handling procedures for these chemicals are described in WHC-CM-4-3, *Industrial Safety Manual*.

11.2 CONTAIN THE CHEMICAL SPILL

Liquid chlorine, which expands to a gas when released, is stored and used in a number of facilities in the 100 Areas. A leaking chlorine cylinder or transport system within a structure poses not only the threat of a CERCLA RQ being released, but there is also a potential threat to the lives of personnel in the area. Therefore, no effort to contain the gas should be made and entry into the affected area must be limited to personnel trained in the use of proper safety equipment.

The dispersion of chemical gasses throughout a building can be limited by shutting down building heating and cooling systems and ensuring that the roof vents in the immediate area of the gas release are open.

Liquid chemical spills in the 100 Areas in some situations would be contained within secondary containment devices. Even under these circumstances caution should be used to prevent the chemical from coming into contact with other solutions or agents which may cause a violent reaction (such as sodium hydroxide coming into contact with water, acids, or flammable liquids). Users of large portions of chemicals in the 100 Areas should be familiar with the

reactivity hazards (listed in WHC-CM-4-3, *Industrial Safety Manual*) associated with each chemical used.

In many situations a chemical spill at the 100 Areas would result in a release to the environment. In these situations, temporary barriers such as dikes or pits should be constructed to prevent the chemical from draining directly to the river, or from entering drains that lead to the river. A supply of chemical spill cleanup kits and appropriate neutralizing agents shall be on hand and available to operations personnel for these occasions. Only personnel aware of the associated hazards and trained in the precautions to be taken should be permitted to enter the area. Cautions outlined in the WHC-CM-4-3, *Industrial Safety Manual*, must be followed.

11.3 NOTIFY 100 AREAS ENVIRONMENTAL PROTECTION

After appropriate actions have been taken to stop the flow of chemical and contain the spill, the area shift manager shall be promptly notified. If a CERCLA RQ of hazardous chemical has been or is suspected to have been released to the environment, the shift manager shall immediately notify the 100 Areas Environmental Protection Section or the management representative during off-shift hours.

11.4 CONTACT THE HANFORD HAZARDOUS MATERIALS RESPONSE TEAM

Notify the Hanford Hazardous Materials Response Team as outlined in WHC-CM-4-1, *Westinghouse Hanford Emergency Plan*. The Hazardous Materials Response Team is operated through the Hanford Fire Department and is trained to respond to hazardous chemical spills. The Response Team will initiate further containment, as necessary. After the spill has been stabilized, the Response Team will direct the necessary clean up.

11.5 ASSESSING THE SEVERITY OF THE CHEMICAL SPILL

100 Areas Environmental Protection will assist operations in assessing the severity of the spill and determining what final remedial action is appropriate. Spills of chemicals in any quantity may create an adverse environmental impact due to location and require remedial action.

11.6 FOLLOW-UP ACTION

After a chemical spill has been cleaned up, 100 Areas Environmental Protection will document the extent and impact of the spill on the spill assessment form. The form will include the cause of the spill, the procedure used to clean up the spill, and the environmental impact resulting from the spill. This information will be used to determine if the event should be classified as a UO.

If a CERCLA RQ has been released the event will be reported as a UO to be prepared by personnel in whose area of responsibility the spill occurred. If the event is not classified as a UO, a plant event report shall be completed by the responsible personnel.

WHC-SP-0460

APPENDIX A
100 AREAS CHEMICAL SYSTEMS

A-1/A-2

100 AREAS CHEMICAL SYSTEMS (Sheet 1 of 5)

Chemical system or storage facility	Predicted direction of spill, rate of flow, and probable spill quantity	Spill containment and proposed improvements	Surveillance frequency
Internal Decontamination System			
Phosphoric acid tank (one 35,000-gal above-ground tank)	Retention basin with overflow to ground. Rate of flow depends on type of leak. Probable quantity is less than 1,000 gal.	Retention basin with overflow to ground. <u>Modify basin to contain 34,000 gal and seal off drains.</u>	Routine inspection at 8-h intervals.
Phosphoric acid transfer pump and piping	Columbia River via the 66-in. RWR ^a line. Rate of flow depends on type of leak. Probable quantity is less than 100 gal.	Pump: None. <u>Isolate pump area from floor drain.</u> Piping: <u>Routine spills to 1310-N Chemical Waste Storage Tank.</u>	Manned during decontamination operation.
Chemical injection piping in Corridor 2 and solution preparation room	1325-N LWDF ^b . Rate of flow depends on type of leak. Probable quantity is less than 100 gal.	<u>Route spills to 1310-N Chemical Waste Storage Tank.</u>	Manned during decontamination operation.
1310-N Waste Chemical Storage Tank (One 900,000-gal partially-buried tank)	To ground. Rate of flow and quantity depends on type of leak.	Earthen retention basin. <u>Provide leak-proof secondary containment.</u>	
1314-N Waste Load-Out Facility	1,000-gal retention basin with overflow to ground. Rate of flow and quantity depends on type of leak.	Concrete retention basin.	Manned during load-out.
108-N Chemical Unloading Facility			
Unloading station	To ground. Rate of flow and quantity depends on type of leak.	None. <u>See UNI-4499 for improvements.</u>	Manned during unloading.
Sodium hydroxide storage tank (one 76,800-gal above-ground tank)	To ground. Rate of flow and quantity depends on type of leak.	None. <u>See UNI-4499.</u>	Routine inspection at 8-h intervals.

^aRaw water return (RWR) line.^bLiquid waste disposal facility (LWDF).

100 AREAS CHEMICAL SYSTEMS (Sheet 2 of 5)

Chemical system or storage facility	Predicted direction of spill, rate of flow, and probable spill quantity	Spill containment and <u>proposed improvements</u>	Surveillance frequency
108-N Chemical Unloading Facility (continued)			
Sulfuric acid storage tanks (three 10,000-gal above-ground tanks)	To ground. Rate of flow depends on type of leak. Probable quantity is less than 1,000 gal.	None. <u>See UNI-4499.</u>	Routine inspection at 8-h intervals.
Sodium hydroxide transfer pumps (located in 108-N)	Columbia River via the 66-in. RWR ^a line. Rate of flow depends on type of leak. Probable quantity is less than 200 gal.	Contained with 108-N drains reporting to a neutralization pit. <u>See UNI-4499.</u>	Manned during transfer. Routine inspection at 8-h intervals.
Sulfuric acid transfer system (gravity fed 1,000-gal tank with air evacuation to 163-N)	Columbia River via the 66-in. RWR line, also to ground. Rate of flow depends on type of leak. Probable quantity is less than 350 gal.	Retention basin with drain to neutralization pit. <u>Drain has been eliminated.</u>	Routine inspection at 8-h intervals. Manned during acid transfer.
Filtered and Demineralized Water Plants			
Sulfuric acid storage tank (one 10,000-gal tank inside 163-N)	Retention basin that drains to a drywell. Rate of flow and quantity depends on type of leak.	Retention basin. <u>Modify retention basin to contain 10,000 gal. Seal off drains and reroute overflow.</u>	Routine inspection at 2-h intervals.
Sodium hydroxide storage tank (one 10,000 gal tank inside 163-N)	Retention Basin that drains to a drywell. Rate of flow and quantity depends on type of leak.	Retention basin. <u>Modify retention basin to contain 10,000 gal; seal off drains and reroute overflow.</u>	Routine inspection at 2-h intervals.
Resin columns chemical transport piping (in 163-N)	Ground disposal pond via building trenches. Rate of flow and quantity depends on type of leak.	Contained within 163-N trenches.	Manned during regeneration cycle.

^aRaw water return (RWR) line.

100 AREAS CHEMICAL SYSTEMS (Sheet 3 of 5)

Chemical system or storage facility	Predicted direction of spill, rate of flow, and probable spill quantity	Spill containment and <u>proposed improvements</u>	Surveillance frequency
Filtered and Demineralized Water Plants (continued)			
Liquid alum storage tanks (two 8,250-gal tanks inside 183-N)	Columbia River via the 66-in. RWR ^a line. Rate of flow and quantity depends on type of leak.	Contained within 183-N.	Routine inspection at 4-h intervals.
Separan storage tanks (two 880-gal tanks inside 183-N)	Columbia River via the 66-in. RWR line. Rate of flow and quantity depends on type of leak.	Contained within 183-N drains.	Routine inspection at 4-h intervals.
Chlorine storage tanks (six 2,000 lb cylinders inside 183-N)	To atmosphere. Rate of discharge and quantity depends on type of leak.	None. Leak detection monitoring system installed. <u>None recommended.</u>	Routine inspection at 8-h intervals.
Water Quality Control			
Ammonium hydroxide storage tank (one 30,000-gal above-ground tank)	Retention basin with overflow to ground. Rate of flow and quantity depends on type of leak.	Retention basin with overflow to ground. <u>Modify basin to contain one tank volume and seal off drains.</u>	Routine inspection at 8-h intervals.
Ammonium hydroxide and hydrazine transfer pumps (inside 184-N Annex)	To ground. Rate of flow depends on type of leak. Probable quantity is less than 100 gal.	Partial retention basin. <u>Drains to the 66-in. RWR line had been disabled.</u>	Routine inspection at 2-h intervals.
Hydrazine storage tank (one 1,700-gal tank inside 184-N)	Retention Basin with overflow to Columbia River via the 66-in. RWR line. Rate of flow and quantity depends on type of leak.	Retention basin. <u>Disable drains to 66-in. RWR line.</u>	Routine inspection at 2-h intervals.
Morpholine storage tank (one 900-gal tank inside 184-N)	Retention basin with overflow to Columbia River via the 66-in. RWR line. Rate of flow and quantity depends on type of leak.	Retention basin. <u>Disable drains to 66-in. RWR line.</u>	Routine inspection at 2-h intervals.

^aRaw water return (RWR) line.

100 AREAS CHEMICAL SYSTEMS (Sheet 4 of 5)

Chemical system or storage facility	Predicted direction of spill, rate of flow, and probable spill quantity	Spill containment and <u>proposed improvements</u>	Surveillance frequency
Water Quality Control (continued)			
Morpholine transport piping (109-N turbine bay)	Columbia River via the 66-in. RWR ^a line. Rate of flow depends on type of leak. Probable quantity is less than 100 gal.	Contained within 109-N drains.	Routine inspection at 8-h intervals.
Chlorine (hypochlorination unit 182-N, one 75 gal mix tank)	Columbia River via the 42-in. RWR line. Rate of flow depends on type of leak. Probable quantity is less than 50 gal.	Contained within 182-N drains.	Routine inspection at 2-h intervals.
Fuel Storage Basin Recirculation Facility			
Sodium hydroxide storage tank, 107-N (one 5,000-gal above-ground tank)	Retention basin. Rate of flow and quantity depends on type of leak.	Retention basin.	Routine inspections at 8-h intervals.
Sulfuric acid storage tank, 107-N (one 5,000-gal above-ground tank)	Retention basin. Rate of flow and quantity depends on type of leak.	Retention basin.	Routine inspection at 8-h intervals.
Chemical unloading, 107-N	To ground.	None. <u>Curbed truck pad to contain 5,000 gal.</u>	Manned during unloading.
Resin columns chemical transport piping and regeneration wastes	1314-N Chemical Load-out Facility. Rate of flow and quantity depends on type of leak.	Contained within basement of 107-N.	Routine inspection at 2-h intervals.

^aRaw water return (RWR) line.

100 AREAS CHEMICAL SYSTEMS (Sheet 5 of 5)

Chemical system or storage facility	Predicted direction of spill, rate of flow, and probable spill quantity	Spill containment and <u>proposed improvements</u>	Surveillance frequency
Chemicals at 100-KE Area			
Liquid alum storage tank (one 188,000-gal above-ground tank at 183-KE)	To ground. rate of flow and quantity depends on type of leak.	None.	Routine inspection at 24-h intervals. Manned on day shift.
Separan storage tank (one 7,500-gal tank inside 183-KE)	To Columbia River via the 1904 Outfall.	Contained within drains in 183-KE.	Routine inspection at 24-h intervals. Manned on day shift.
Liquid alum and separan transport pumps (inside 183-KE)	To Columbia River via the 1904 Outfall.	Contained within drains in 183-KE.	Manned on day shift.
Chlorine storage tanks (six 2,000-lb cylinders)	To atmosphere. Rate of discharge and quantity depends on type of leak.	None. <u>None recommended.</u>	Routine inspection at 24-h intervals.
Sulfuric acid and sodium hydroxide storage tanks	To ground. Rate of flow and quantity depends on type of leak.	None. <u>Retention basin to contain one tank volume.</u>	Routine inspection at 24-h intervals.
Calcium hypochlorite (183-KE, 500 lb)	To floor. Probable quantity is less than 25 lb.	None.	Manned on day shift.
Sodium hypochlorite (165-KW, 100 gal)	To floor. Probable quantity is less than 25 gal.	None.	Manned on day shift.
Chemicals at 100-D Area			
Chlorine storage tanks (fourteen 2,000-lb cylinders at 182-D)	To atmosphere. Rate of discharge and quantity depends on type of leak.	None. <u>None recommended.</u>	Routine inspection at 24-h intervals. Manned on day shift.
Diethylthiourea (190-DR, 2,000 lb)	To floor. Probable quantity is less than 50 lb.	None.	Monthly.

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APPENDIX B
CHEMICAL STORAGE FACILITIES MAPS

KEY TO CHEMICAL STORAGE FACILITIES

A	PHOSPHORIC ACID STORAGE TANK
B	SODIUM HYDROXIDE STORAGE TANK
C	BROKEN PEROXIDE STORAGE TANK
D	POTASSIUM PERMANGANATE STORAGE BN
E	SODIUM BISULFATE/CARBONATE-CARBONATE STORAGE BN
F	DECONTAMINATING WASH ACID TANK
G	SULFURIC ACID STORAGE TANKS (108-H)
H	SODIUM HYDROXIDE STORAGE TANK (108-N)
I	SULFURIC ACID STORAGE TANK (103-H)
J	SODIUM HYDROXIDE STORAGE TANK (103-N)
K	ALUM STORAGE TANKS
L	SEPERAN STORAGE TANKS
M	AMMONIUM HYDROXIDE STORAGE TANK
N	HYDRAZINE STORAGE TANK
O	MORPHOLINE STORAGE TANK
P	HYDRAZINE TANKS (ROOM 2)
Q	RUPTURE MONITOR WATER TREATMENT-ROOM 7
R	CHLORINE CYLINDERS
S	PHOSPHORIC ACID TRANSFER PUMPS
T	SULFURIC ACID TRANSFER TANK
U	SODIUM HYDROXIDE PUMPS
V	AMMONIUM HYDROXIDE AND HYDRAZINE TRANSFER PUMPS
W	HYDRAZINE AND MORPHOLINE TRANSFER PUMPS
X	108-N SOLUTION PREPARATION ROOM
Y	108-N UNLOADING STATION
Z	UNDERGROUND PHOSPHORIC ACID PIPING
aa	UNDERGROUND AMMONIUM HYDROXIDE AND MORPHOLINE PIPING
ab	SODIUM HYDROXIDE STORAGE TANK
ac	SULFURIC ACID STORAGE TANK

100-N AREA MAP OF CHEMICAL STORAGE FACILITIES

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APPENDIX C
CHEMICAL HANDLING PROCEDURES

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CHEMICAL HANDLING PROCEDURES (Sheet 1 of 2)

Procedure No.	Procedure title
II-09-2	Unload Acid Tank Truck
II-09-3	Transfer Sulfuric Acid to 163-N Day Tank
II-09-4	Unload Caustic Tank Truck to 163-N Tank
II-09-5	Transfer Caustic to 163-N Day Tank
II-09-7	Unload Alum Truck
II-09-8	Unload Acid Tank Cars
II-09-9	Unload Caustic Tank Cars with Double Valves on Bottom Unloading Line
II-09-12	Isolate and Return to Normal Duplex Chemical Injection Pumps Nos. 1, 2, & 3
II-09-13	Isolate, Return to Normal and Operate Chemical Injection Pumps Nos. 7, 8, and 9 -- 184-N
II-09-14	Isolate 108-N Sodium Hydroxide Booster Pumps and Return to Normal
II-09-15	Isolate 108-N Sodium Hydroxide Transfer Pumps and Return to Normal
II-09-17	Transfer Caustic from 108-N Storage to Truck for Use in 1310-N Facility
II-09-18	Isolate 163-N Acid Pumps and Return to Normal
II-09-19	Isolate 163-N Caustic Pump and Return to Normal
III-09-21	Instructions for Mixing Separan
II-09-23	Mixing Hydrazine and Morpholine Solutions - 184-N
III-09-24	Operate 183-N Chlorinators
III-09-25	Operate Alum Metering Pumps
II-09-26	Operate Coagulant Feed Pump
II-09-36	Isolate and Return to Service Alum Mix Pumps

CHEMICAL HANDLING PROCEDURES (Sheet 2 of 2)

Procedure No.	Procedure title
II-09-37	Receive and Unload Ammonium Hydroxide (Aqua Ammonia - 25% NH_3)
II-09-39	Unload Caustic from Truck to 1310-N Facility
I-09-40	TURCO Transfer from Truck Tankers to Storage Tank - 109-N - TURCO 4512-A
II-09-42	Caustic Tank Cars Without Double Valves on Bottom Unloading Line
II-09-45	TURCO 4512-A Heatup and Recirculate
II-09-46	Isolate and Return to Normal Sulfuric Acid Transfer Header Between 108-N Loading Tank and 163-N Day Tank
II-09-47	Operate Duplex Chemical Injection Pumps No. 1, 2, & 3
II-09-49	Mix Sodium Hypochlorite Solution for Potable Water
II-09-50	Isolate and Return to Normal Alum Metering Pumps - 183-N
II-09-51	Isolate, Return to Normal and Operate Chemical Injection Pumps Nos. 4, 5, 6, and 10 - 184-N
II-09-52	Change Chlorine Cylinders in 183-N Building
II-09-53	Isolate and Return to Normal Acid Header at 108-N Building
II-09-54	Isolate and Return to Normal Primary Acid Dilution System
II-09-58	Unloading Caustic Tank Car to 108-N Storage Tank
II-09-60	Transfer Caustic from 108-N Storage Tank to 163-N Day Tank
II-09-63	Operate Elementary Neutralization Unit 163-N
IV-02-163-ENU	Annunciator Response, 163-N ENU
UNI-4222	Production Test N-585: N Reactor Internal Decontamination (3 Vols.), by R. D. Morrison and R. H. Steach, February 6, 1987

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