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300 AREA SOLVENT EVAPORATOR CLOSURE PLAN

REVISION 3

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ACRONYMS

300 ASE	300 Area Solvent Evaporator
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy-Richland Operations Office
Ecology	Washington State Department of Ecology
EII	Westinghouse Hanford Company's Environmental Investigation and Site Characterization Manual (WHC-CM-7-7)
EPA	U.S. Environmental Protection Agency
FR	Federal Register
IRIS	Integrated Risk Information System
msl	mean sea level
OSHA	Occupational Safety and Health Administration
PNL	Pacific Northwest Laboratory
PUREX	Plutonium/Uranium Extraction (Plant)
QA/QC	Quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
UNC	United Nuclear Industries
WAC	Washington Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company (WHC)

ABBREVIATIONS

DCE	dichloroethylene
mg/kg	milligram per kilogram (1 millionth)
PCE	perchloroethylene (tetrachloroethylene)
ppm	parts per million (1 millionth)
TCA	1,1,1-trichloroethane

ABBREVIATIONS (cont)

TCE	trichloroethylene
μg/g	micrograms per gram (1 millionth)
μg/ml	microgram per milliliter (1 thousandth)

1.0 INTRODUCTION

This document describes activities for the closure of a dangerous waste treatment tank facility, owned and operated by the U.S. Department of Energy-Richland Operations Office (DOE-RL) and co-operated by the Westinghouse Hanford Company (Westinghouse Hanford). Although the U.S. Government holds legal title to this facility, the DOE-RL, for the purposes of defining *Resource Conservation and Recovery Act of 1976* (RCRA) (EPA 1982) facilities, is considered the legal owner of the facility under existing U.S. Environmental Protection Agency (EPA) interpretive regulations (51 FR 7722, March 5, 1986). This tank treatment facility is the 300 Area Solvent Evaporator (300 ASE), which was located in the 300 Area of the Hanford Site from 1975 to 1986, and was managed for the DOE-RL by UNC Nuclear Industries, Incorporated. The 300 ASE evaporator unit was a modified load lugger (dumpster) in which solvent wastes were evaporated, and the adjacent 333 East Concrete Pad, where 55-gallon barrels of waste solvents were temporarily stored while awaiting liquid transfers into the evaporator.

From the start of the Hanford Site in the early 1940's until just prior to the use of the 300 Area Process Trenches (March 1975), almost all the spent process chemicals from the 300 Area were discharged to the 300 Area Process Ponds. These ponds received degreaser solvents, waste acids, caustics, and machine sump oils. The only excluded discharges were acid solutions that contained sufficient uranium for economically practical recovery. In 1975, when the 300 Area Process Trenches replaced the 300 Area process ponds, the 300 ASE was utilized so that volatile spent solvents would not be discharged to the 300 Area Process Trenches.

Starting in January or February of 1975, the used degreaser solvents were pumped into steel 55-gallon barrels and stored on the 333 East Concrete Pad until a disposal solution could be found. There was no satisfactory disposal or treatment facility for these degreaser solvents on the Hanford Site in 1975 until the 300 ASE was installed in the spring of 1976. The amount of degreaser solvent that evaporated in the 300 ASE (an average of 600 gallons per year) represents about 17 percent of the total degreaser solvent used. The other 83 percent of the degreaser solvent entered the 333 Building air from the operating degreasers, and was discharged to the atmosphere through doors, vents, and exhaust stacks.

No formal records management system nor records of operations/ maintenance, which would have met the requirements of WAC 173-303, were maintained. However, old photographs of the 300 Area have been enlarged to reconstruct the 300 ASE locations.

Some of the 300 ASE solvents were radioactively contaminated because the solvents came from a degreaser, which processed bare uranium metal billets from the N Reactor Fuel Manufacturing facility. The typical 300 ASE waste was composed of perchloroethylene (PCE), trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), ethyl acetate/bromine solution, paint shop solvents, and possibly used oil. Small amounts of uranium and alloys of copper, zirconium, and possibly zirconium/beryllium were also present in the degreaser solvents as particulates. Although some solvents were not radioactively contaminated (i.e., originating from the degreasing of nonradioactive-bearing materials), radioactive and non-radioactive solvents were intermixed via the storage barrels, and thus, the entire mixture was regarded as radioactive waste.

In 1985, the 300 ASE was phased out and waste solvents were handled in accordance with the DOE-RL radioactive waste procedures. Shutdown of the 300 ASE began in November 1985 with the solidification of the remaining spent solvents and proceeded in accordance with UNC Nuclear Industries' procedures (see Appendix D). By the spring of 1986, the evaporator sludges had been removed and the steel surfaces thoroughly washed, and cut into pieces for burial box disposal. Because the 300 ASE treated radioactive wastes, the onsite low-level radioactive waste burial grounds were designated to receive the drummed, solidified, cleaning liquids and the dismantled evaporator. Details of these activities are described in Section 3.2.

At the time of physical closure of the 300 ASE, the regulatory authority for radioactive mixed waste was still being discussed between the EPA and the U.S. Department of Energy (DOE); therefore, operations at the 300 ASE proceeded according to existing administrative controls and internal procedures. The EPA did not issue a clarifying notice on the application of RCRA to radioactive mixed waste until July 1986, several months after the evaporator had been dismantled. During the time of operation of the 300 ASE, the RCRA requirements for temporary storage were not interpreted to apply to mixed waste. Formal regulatory approvals were not considered to be applicable prior to the dismantling of the 300 ASE due to uncertainties regarding the regulation of radioactive mixed waste.

After filing the *300 Area Solvent Evaporator Closure Plan*, Revision 0 (November 1985), it was determined that the site lay within the boundary of a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (EPA 1980) inactive radioactive waste burial ground. Subsequently, the 618-1 Burial Ground has been included in the group of radiologically contaminated sites at the 300 Area (collectively referred to as the 300 Area Operable Units) that were used to generate scoring using the Hazardous Ranking System (HRS) for submission to the EPA as part of the process. The 618-1 Burial Ground lies within Operable Unit 300-FF-2. The juxtaposition of the 300 ASE closure area and the underlying 618-1 Burial Ground is a circumstance requiring special considerations for closure of the 300 ASE site under Washington Administrative Code (WAC) 173-303 *Dangerous Waste Regulations* (Ecology 1989), EPA regulations (EPA 1989), and for remedial action of the 618-1 Burial Ground under CERCLA.

Clean closure under RCRA regulations (WAC 173-303), in accordance with the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989) is proposed for the 300 ASE. Justification for this proposal is based upon the absence of contamination from the 300 ASE as determined by random sampling of the soil and concrete (Section 3.3 presents sampling plans). The extent of operation of the 300 ASE and the 618-1 Burial Ground, and the known characteristics of the wastes associated with them are presented in Sections 1.1.2 and 1.1.3.

1.1 HANFORD SITE AND FACILITY DESCRIPTION

A general description of the Hanford Site as a dangerous waste management facility is discussed in Section 1.1.1. This section is intended to provide the permit application reviewer or permit writer with an overview of the Hanford Site. The descriptions of the 300 ASE and the 618-1 Burial Ground are discussed in Sections 1.1.2 and 1.1.3, respectively.

1.1.1 Location and General Description

The Hanford Site covers approximately 560 square miles of semiarid land that is owned by the U.S. Government and managed by the DOE-RL. For purposes of RCRA and WAC 173-303, the DOE-RL is the owner/operator and Westinghouse Hanford is the co-operator, with the DOE-RL, of certain hazardous waste management units on the Hanford Site. The Hanford Site is located northwest of the city of Richland, Washington, in the Columbia River Basin (Figure 1-1). The city of Richland lies approximately 5 miles from the southernmost portion of the Hanford Site boundary and is the nearest population center. In early 1943, the U.S. Army Corps of Engineers selected the Hanford Site as the location for reactor, chemical separation, and related facilities and activities for the production and purification of plutonium.

Activities at the Hanford Site are separated into numerically designated areas. The reactor facilities (active and deactivated) are located along the Columbia River in what are known as the 100 Areas. The reactor fuel processing and waste management facilities are located in the 200 Areas, which are on a plateau approximately 7 miles from the Columbia River.

The 300 Area, located north of Richland, contains the reactor fuel manufacturing facilities and several research and development laboratories. The 400 Area, 5 miles northwest of the 300 Area, contains the Fast Flux Test Facility used in the testing of liquid metal reactor systems. The 600 Area includes all locations not specifically given an area designation. In north Richland, the 1100 Area contains facilities associated with administration, maintenance, transportation, and materials procurement and distribution. The 3000 Area, between the 1100 and 300 Areas, contains various engineering offices and administrative offices. Administrative offices are also located in the 700 Area in downtown Richland.

1.1.2 The 300 Area Solvent Evaporator

The 300 ASE evaporator unit and associated storage barrels were located in the 300 Area of the Hanford Site from 1975 to 1985, but no longer exists since their demolition in 1985-1986 (see Section 3.2). They were situated in the northeast corner of the 300 Area near the 333 Building, the 334 Building, and the 303-M Building, as shown in Figures 1-2 and 1-3. The site for the 300 ASE was chosen for its proximity to the operations of the N Reactor Fuel Manufacturing facility in the 333 Building. The 300 ASE was a treatment tank (evaporator) which received barrel-transferred solvent wastes from degreasing operations associated with the N Reactor Fuel Manufacturing facility. While

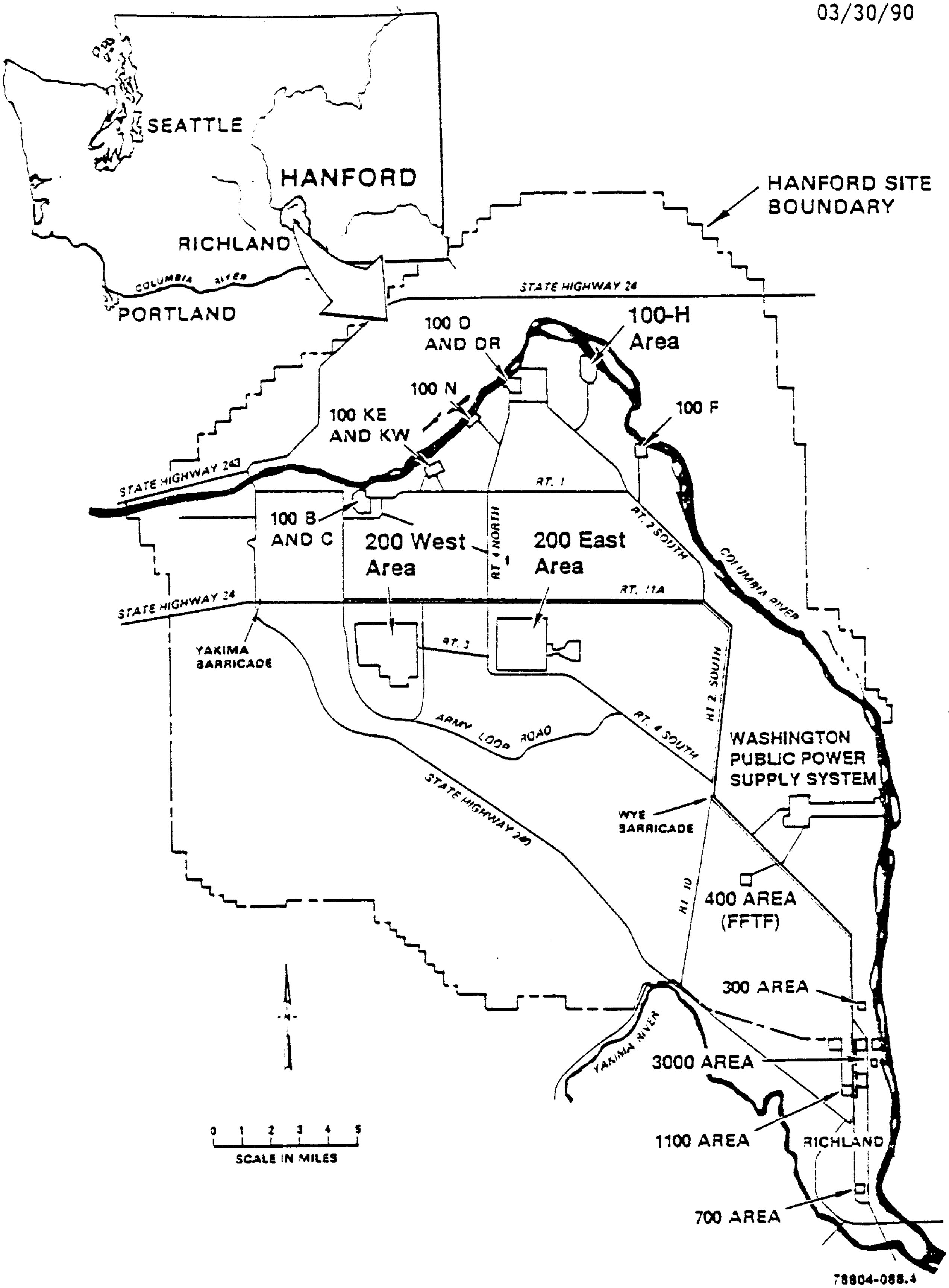
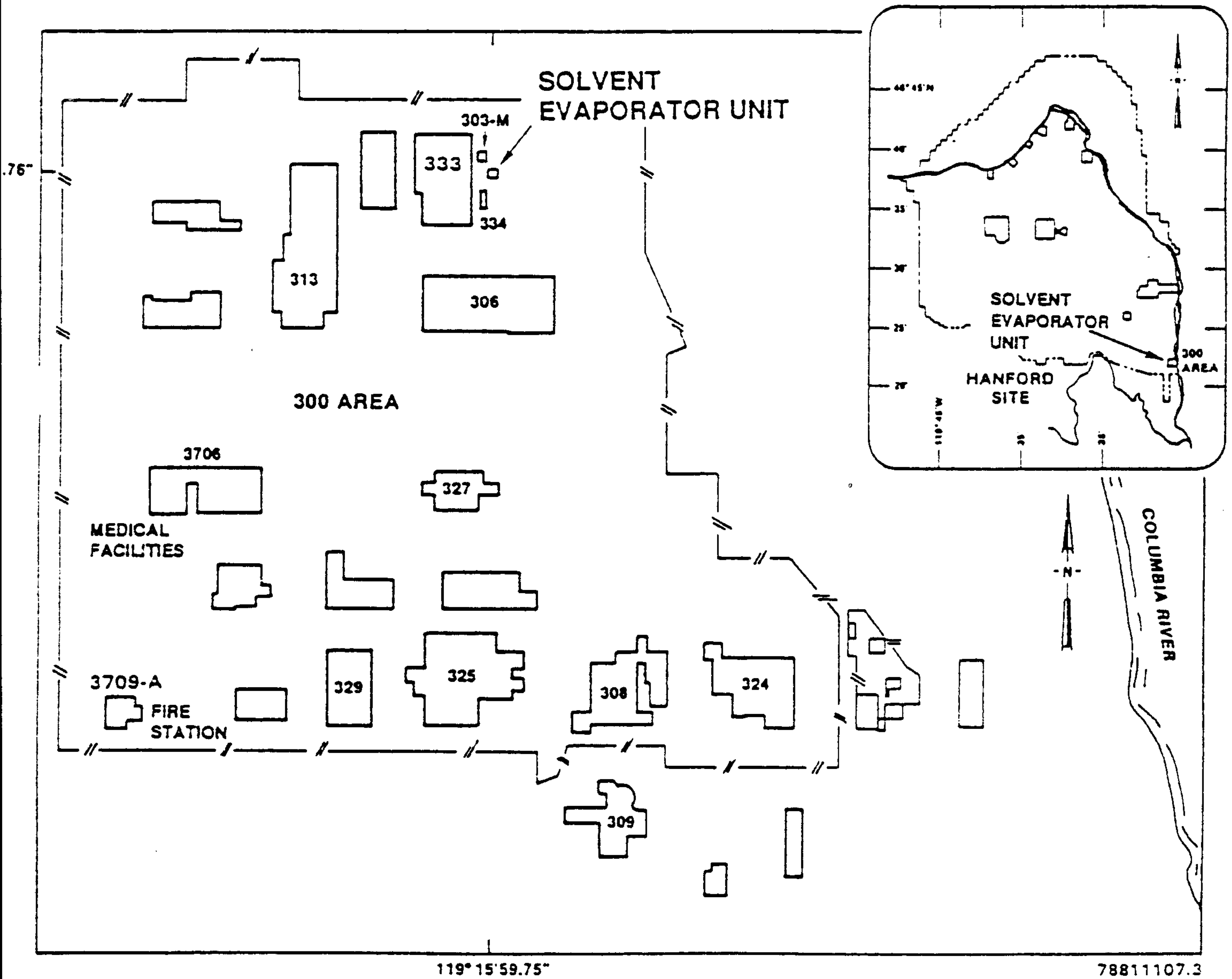
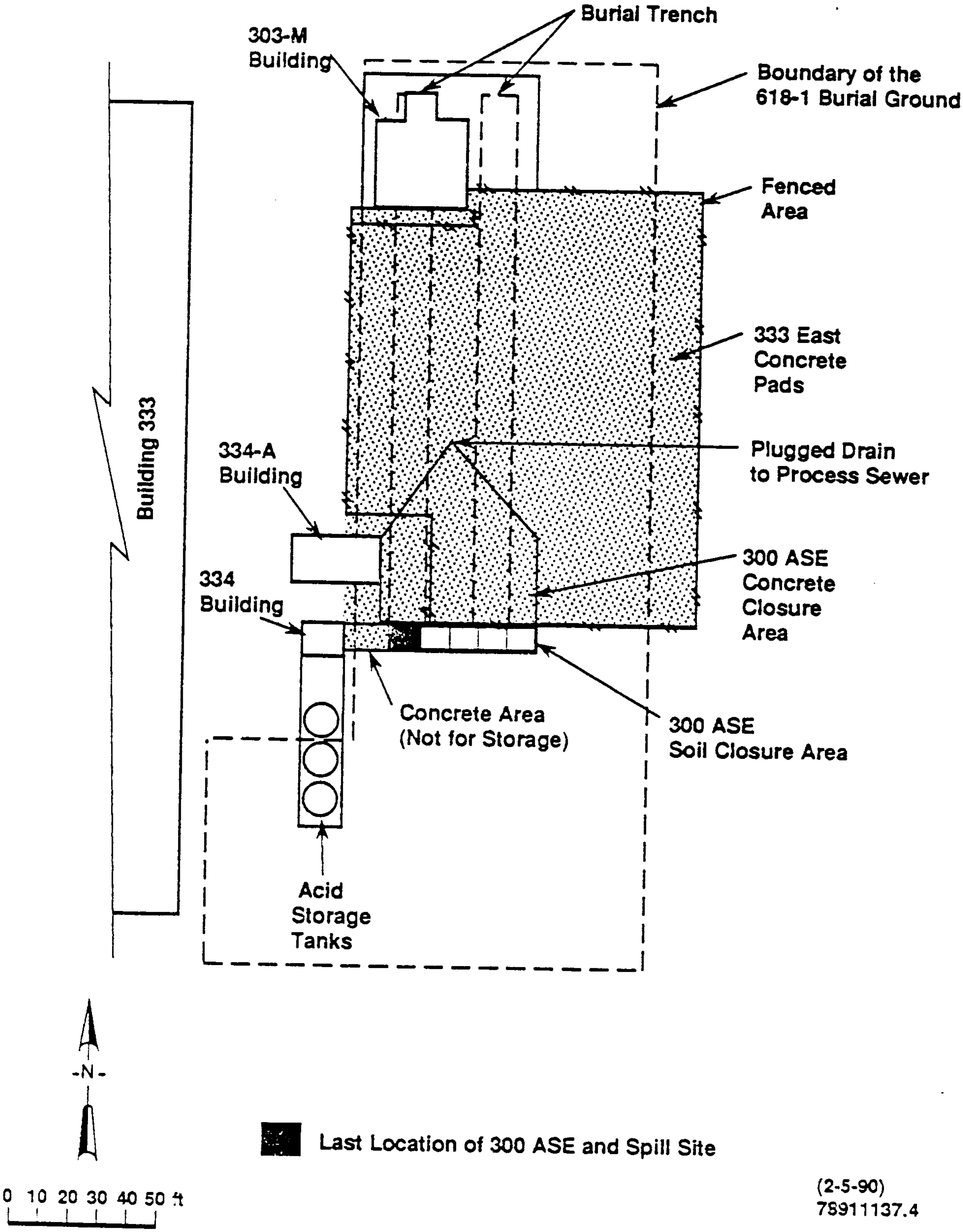


Figure 1-1. Hanford Site and Regional Map.

300 AREA SOLVENT EVAPORATOR UNIT



1 **Figure 1-2.** Solvent Evaporator Facility, 300 Area Map.



1 Figure 1-3. Layout of the 300 Area Solvent Evaporator Closure Areas
2 and 618-1 Burial Ground.

awaiting transfers, the solvent waste barrels were typically stored adjacent to the evaporator.

The evaporator was a modified 'Brooks' load lugger; i.e., dumpster, constructed of carbon steel with a hinged aluminum sheet metal canopy over the top. The canopy (added in 1978) prevented entry of precipitation while allowing airflow across the top of the solvent, and allowed one end to be lifted for pouring the contents of solvent barrels into the north-facing cutout side of the evaporator. Dimensionally, the 300 ASE was about 96 inches long, 55 inches high, 68 inches wide across the canopy, and 53 inches long at the bottom (Figure 1-4). The evaporator had been placed in four known locations adjacent to the southwest portion of the original 333 East Concrete Pad (Figure 1-3); two locations on the pad and two on the ground immediately south of the pad. When the evaporator was on the ground, it was positioned adjacent to the 333 East Concrete Pad to facilitate the introduction of solvent by means of a forklift with barrel tilter. The evaporator was situated on timbers which elevated it slightly above the pad or ground (Figure I-5). A steam heating coil, which was added in 1978 or 1979, was situated within the 300 ASE to aid in the evaporation treatment process during the winter months. Steam condensate from the heating coil was discharged on the gravel area near the west side of the evaporator.

Since all waste degreaser solvents (uranium/radioactive and nonradioactive) were added to the 300 ASE, no segregation was made between uranium and non-uranium degreaser solvents. The same barrel pump generally was used to pump solvents from the degreasers into barrels. The degreaser solvent barrels were routinely stored (up to 1 year) within about 20 feet of the evaporator, until poured into the 300 ASE with the barrel tilter. Empty barrels were cycled back to the degreasers for refilling. Small quantities of solvents (from the paint shop and uranium-ethyl acetate-bromine solutions) were poured by hand directly into the evaporator.

Besides the degreaser solvent barrels, the 333 East Concrete Pad (built in 1965) was used to store the following:

- Uranium and non-uranium contaminated equipment
- Drums of uranium contaminated oils, acid crystals from the waste acid system, water-filled drums of Zircaloy-2*/beryllium chips, and nitric acid containing uranyl nitrate
- Water-filled drums of mixed uranium, Zircaloy-2, copper chips and fines (finely divided uranium and Zircaloy-2 are pyrophoric).

The water-filled drums of uranium chips and fines were the largest single type of material stored on the 333 East Concrete Pad. From 1965 until 1971, these drums were stored while awaiting oxidation in the adjacent 303-L Building, which was shutdown in 1971, then demolished and buried in the

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* Zircaloy-2 is a trademark for zirconium with low percentages of tin, iron, chromium, and nickel.

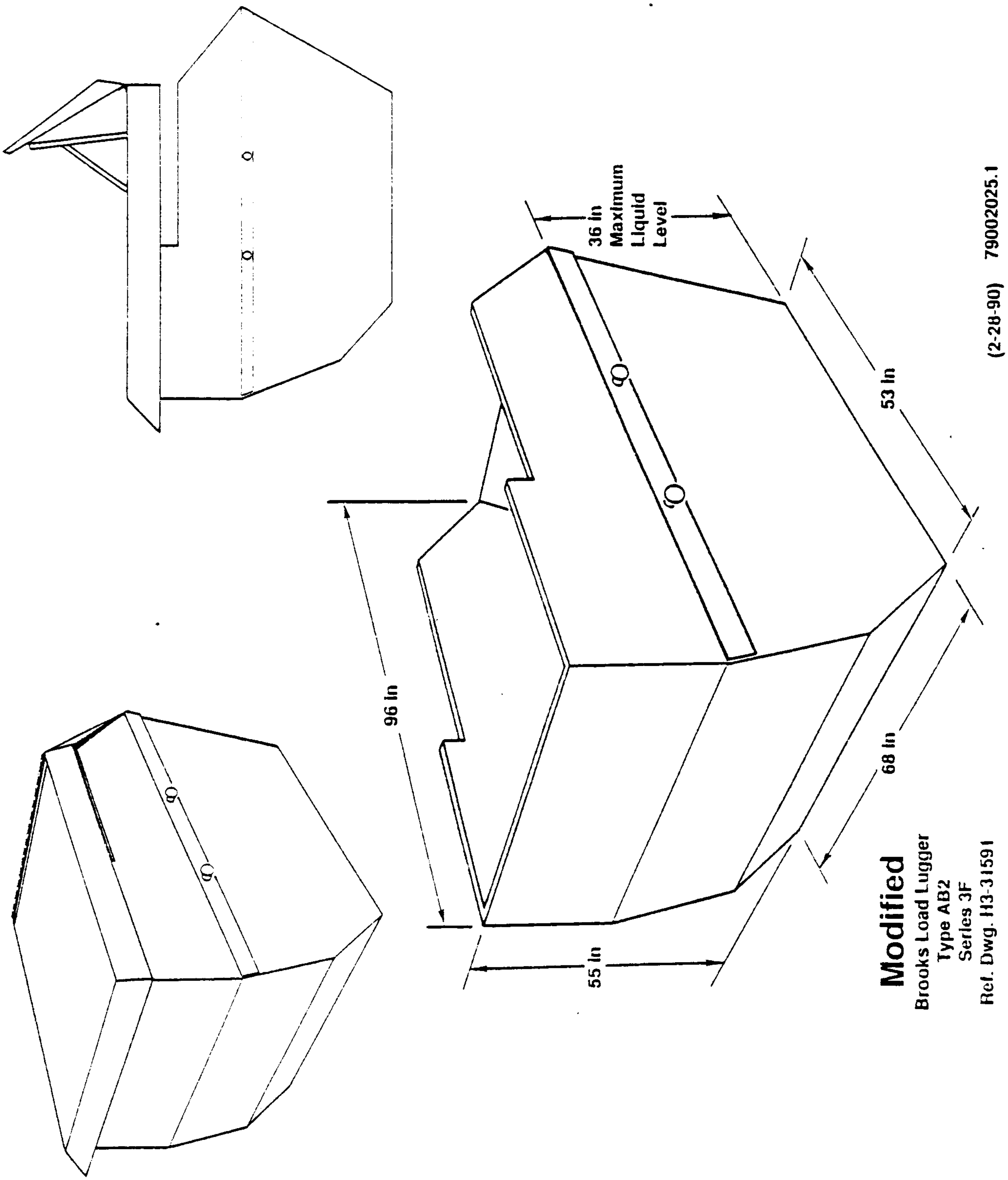

Figure 1-4. Schematic of the 300 Area Solvent Evaporator Unit.

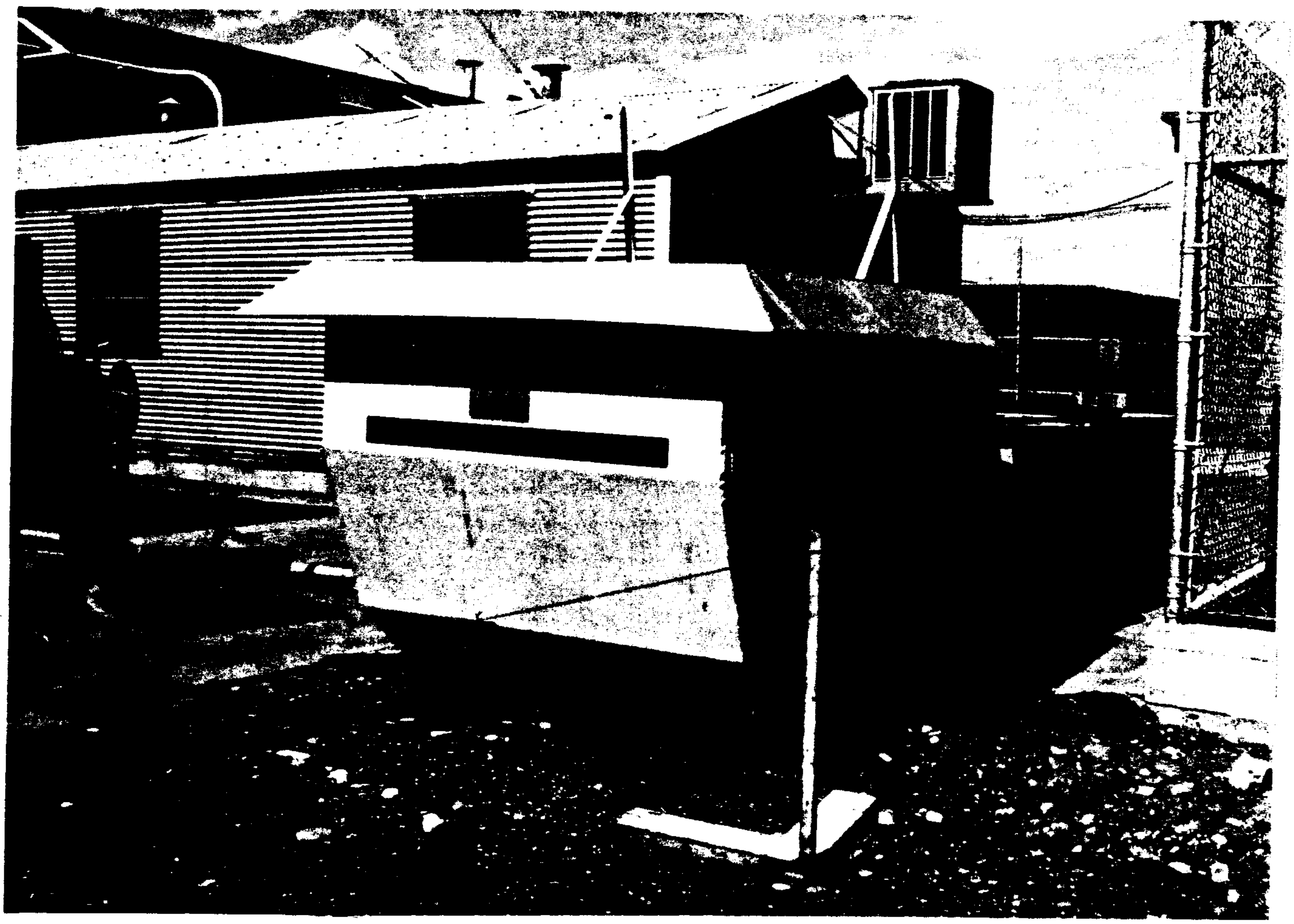

Figure 1-5. A 1985 Photograph of Solvent Evaporator.

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mid 1970's. From 1971 until the fall of 1982, up to 140 of these drums accumulated on the northwest portion of the 333 East Concrete Pad while awaiting disposal via concretion in the 304 Building. The concretion of this material was halted in the fall of 1982. Until the new 303-M Building was constructed and operational in May 1983, the drums of uranium, Zircaloy-2 and copper chips and fines were moved to the southwest portion of the 333 East Concrete Pad. By the time the 303-M Building was operable, 540 drums had accumulated. To reduce the fire hazard, these drums were placed 2 feet apart and were sprinkled with cold water when the temperature was over 80 °F. All but the eastern 25 feet of the 333 East Concrete Pad (which sloped eastward) drained into the floor drain. The drain was about 52 feet from the south and 37 feet from the west edge of the 333 East Concrete Pad (see Figure 1-3). This drain flowed into the 300 Area Process Sewer.

In early 1984, all the uranium contaminated equipment and materials were moved to the 303-K Building and its concrete and asphalt pad, except for the following items.

- Uranium chips and fines were confined to the small concrete pad (berm divided) on the west side of the 303-M Building which held about 88 drums. This pad utilized the drain to the 300 Area Process Trenches.

- The evaporator and waste solvent barrels were stored on the southwest portion of the original 333 East Concrete Pad (see Figure 1-4).

In September 1984, the west side of the present large concrete bermed fence and pad (minimum thickness of 2.5 inches) was 'poured over' the old 333 East Concrete Pad. The floor drain in the old 333 East Concrete Pad was plugged to prevent any spills from reaching the 300 Area Process Sewer. The resulting fenced-in 'overlay pad' was constructed to store nonradioactive controlled materials for less than 90 days while awaiting analysis and disposition. Prior to construction of the 'overlay' pad, there was no designated storage area for the control of nonradioactive materials.

Additionally, in the spring of 1985, another concrete overlay pad (minimum thickness of 2.5 inches) was poured on the east side of the overlay pad which enlarged the original 333 East Concrete Pad area by 16.3 feet to the east and drained eastward onto the gravel area. The east side of the overlay pad has been used by maintenance personnel for the storage of non-controlled nonradioactive equipment.

The 300 ASE closure area consists of two sub-areas (see Figure 1-3), they are as follows:

- A gravel area on the south side of the 333 East Concrete Pad (approximately 10 feet wide by 50 feet long)

- An area about 50 feet long on the south portion of the original 333 East Concrete Pad that extends about 32 feet to the north and then tapers towards the original 4-inch diameter pad drain (because of inadequate documentation, this area must be considered as part of the closure area even though there were no reported barrel or 300 ASE spills onto either the original or the overlay of the 333 East Concrete Pad).

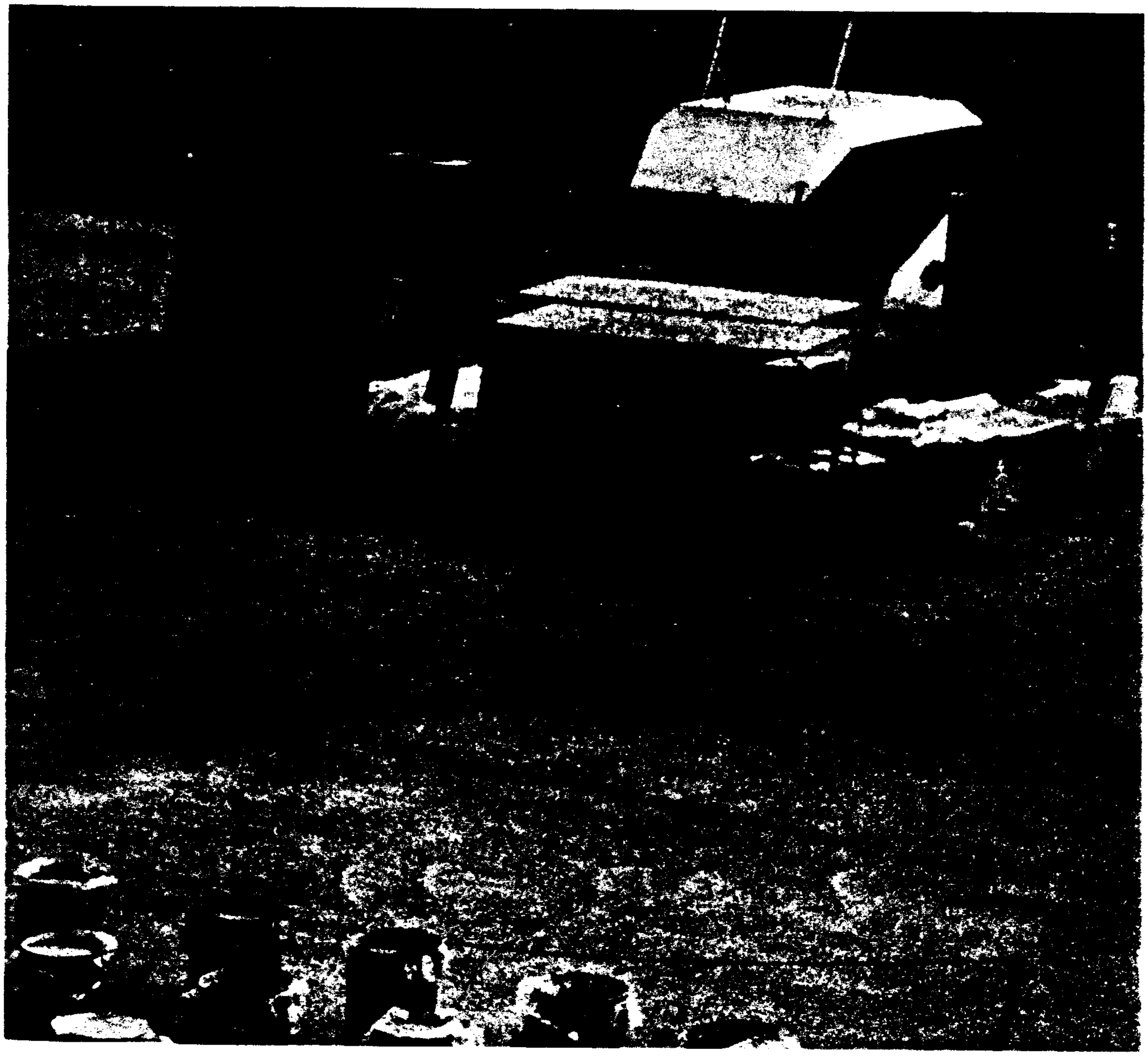
Figure 1-6, a reproduction from a 1980 photograph, shows the 300 ASE adjacent to the original 333 East Concrete Pad in the eastern most position (approximately 45 feet east of the last 300 ASE location). In this figure, three solvent barrels can be seen to reside on the pad just east of the 300 ASE. The drums in the foreground are water-filled drums of uranium, Zircaloy-2 and copper chips and fines awaiting concretion. The boxes and equipment immediately in front of the 300 ASE are uranium contaminated materials awaiting disposition or reuse.

Figure 1-7 is a photograph of the 300 ASE and vicinity while in operation in 1985. Figure 1-8 is a 1990 photograph of the closure area. Figure 1-9 is a 1990 photograph of the 300 ASE closure site and 618-1 Burial Ground.

1.1.3 The 618-1 Burial Ground Underlying the Solvent Evaporator

Underlying the entire 300 ASE closure area, at a depth of approximately 4 feet, is an inactive low-level radioactive solid waste burial ground (current Hanford Site waste management identification number 618-1). The 618-1 Burial Ground was in service from 1944 to 1951. The 618-1 Burial Ground received uranium and other metallic and non-metallic materials from the 300 Area fuel fabrication facilities, trace amounts of plutonium (less than 1 gram) and other fission products, and incidental waste from the 300 Area laboratories in operation at that time. Apart from uranium, the metallic materials associated with the fuel fabrication process included graphite, oxides of tin, copper, aluminum, silicon, lithium, magnesium, calcium, and iron; and some stainless steel. Non-metallic materials associated with the fuel fabrication process included fluoride compounds of uranium, magnesium, and calcium; and chloride fluxes of sodium, potassium, and barium. The fission products included isotopes of plutonium and strontium-90. From 1943 to 1971, it is estimated that 10 curies of uranium (16.28 tons of natural uranium) were buried in all of the 300 Area burial grounds. The vast majority of this uranium was buried in the 618-1 Burial Ground, since this burial ground was in service when high uranium loss activities were in operation. These activities included reduction of uranium tetrafluoride to metallic uranium, remelting and casting of billets, and machining of billets and fuel elements. Starting in 1951, these operations were done at the Feed Materials Production Center, Fernald, Ohio. Documentation of the types and amounts of other fission products and incidental laboratory wastes is not available.

The approximate boundaries of the 618-1 Burial Ground are shown in Figure 1-3 and in Appendix B, Figure B-1. The 618-1 Burial Ground covers a total area of 35,520 square feet. Within this total area, there are at least two trenches running north-south, which are approximately 16 feet wide by 230 feet long (at the surface) by 8 feet deep, and a series of 20 feet deep pits running east-west in the south end of the burial ground (Appendix B,



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(PHOTO TAKEN 1980)

Figure 1-6. 1980 Photograph of the Solvent Evaporator and Associated Solvent Barrels.

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Figure 1-7. A 1985 Photograph of the 300 Area Solvent Evaporator and 618-1 Burial Ground.

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(PHOTO TAKEN 1990)

Figure 1-8. A 1990 Photograph of the 300 Area Solvent Evaporator Closure Site.

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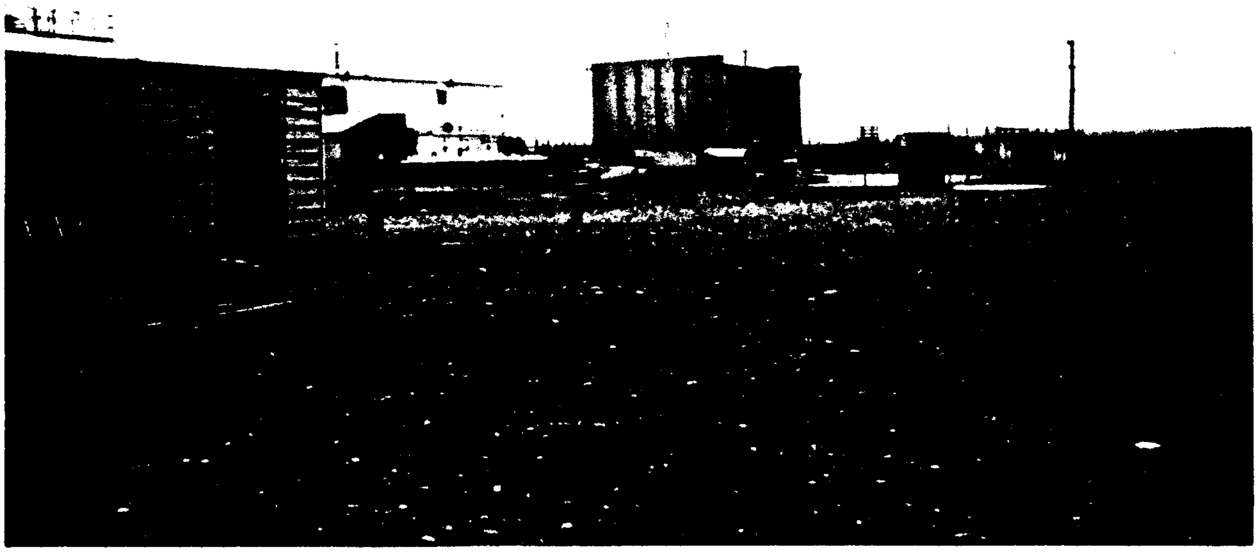

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(PHOTO TAKEN 1990)

Figure 1-9. A 1990 Photograph of 300 Area Solvent Evaporator Closure Site and 618-1 Burial Ground.

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Figure B-1). At the end of service (1951), the entire 618-1 Burial Ground typically was covered with 4 feet of fill. Supporting documentation appears in Appendix B regarding the 618-1 Burial Ground boundaries and operations.

The 618-1 Burial Ground has been included by the EPA on the National Priorities List (NPL) of federal sites requiring remedial investigation and regulation under CERCLA. Further information regarding this action is summarized in Sections 3.3 and 3.5.

1.2 SECURITY INFORMATION

The entire Hanford Site is a controlled access facility and is expected to remain so for the foreseeable future. The Hanford Site maintains around-the-clock surveillance for protection of government property, classified information, and special nuclear material. The Hanford Patrol maintains a continuous presence of armed guards to provide Hanford Site security.

Access is restricted to operational areas within the Hanford Site. The 300 Area, the location of the 300 ASE, is one such operational area. All personnel entering or leaving the 300 Area must display a DOE-issued security identification badge indicating authorization to enter the area and submit to a search of personal items carried into and out of the area. The 300 Area also has warning signs stating "DANGER--UNAUTHORIZED PERSONNEL KEEP OUT" posted at each entrance to the active portion. These signs are legible from a distance of 25 feet and visible from all angles of approach.

Hanford Site personnel receive security training in the form of required security education and on-the-job training. Procedures for ensuring personnel compliance with security requirements, provisions for security education, and personnel training are maintained at the Hanford Site. Periodic security compliance audits and inspections ensure that these procedures are being followed.

1.3 WASTE CHARACTERISTICS

The characteristics of the wastes and other materials associated with the 300 ASE, 618-1 Burial Ground, and process information are discussed in the following sections.

1.3.1 Solvent Evaporator Waste

Wastes treated through evaporation in the 300 ASE consisted of approximately 71 percent perchloroethylene, 9 percent 1,1,1-trichloroethane, and 11 percent trichloroethylene by volume (Table 1-1). The remaining 9 percent of the waste consisted primarily of a mixture of ethyl acetate/bromine solution (10 percent bromine). Small amounts of paint shop solvents such as methyl ethyl ketone, methylene chloride, and petroleum naphtha were infrequently placed in the evaporator. Uranium and fuel element metal particulates from degreasing activities were also present in the evaporator and possibly incidental amounts of oil. Insoluble materials accumulated as sludge in the bottom of the evaporator. According to dangerous waste designation criteria (WAC 173-303-070, -101, -103, -9904, -9905, -9906, and -9907), the initial waste would have the designations WP01, WC01, WT01, F001, F002, F003, F005, and D001 as Extremely Hazardous Waste, largely due to the perchloroethylene (aka tetrachloroethylene) component. A summary of the waste designation calculations is presented in Appendix C.

Table 1-1. Solvent Waste Components.

Waste component	Volume (percent)	Specific gravity
Perchloroethylene	71	1.63
1,1,1-trichloroethane	9	1.34
Trichloroethylene	11	1.46
Ethyl acetate/bromine[a]		1.12
Methyl ethyl ketone[b]		0.8
Methylene chloride[b]	9 (combined for these four components)	1.33
Petroleum naphtha[b]		0.64

[a] Principal component of the remaining 9 percent.
[b] Denotes paint shop solvents that may have been present.

These constituents had a minimal contribution to the overall amount and type of waste handled in the 300 ASE.

In January 1985, a single sample of the 300 ASE solvent was collected for an inorganic analysis, which was performed in March 1985 as part of waste form/storage compatibility activities. The sample was submitted to Pacific Northwest Laboratory (PNL), Richland, Washington, for analysis of uranium by X-ray fluorescence (XRF) and for other elements by inductively coupled plasma-atomic emission spectroscopy (ICP-AES). The lag time between sampling and analysis was the result of routine laboratory practices. The concentrations of the elements analyzed by ICP-AES are presented in Table 1-2. The concentration of uranium in the solvent was below detection limit (less than 10 micrograms per milliliter). The concentrations of beryllium, volatile organic compounds (VOC), and total organic carbon (TOC) were not determined because the Byproduct Ruling (10 CFR 962) was not in effect; therefore, this information was not required.

The ICP-AES analysis was undertaken to evaluate the potential of the solidifying agents for stabilizing the 300 ASE waste. The solidification agent evaluation was based primarily on the proportions of aqueous and organic phases in the sludge. The inorganic analysis was performed to provide general information on the waste content and was not intended to be used as a representative sample for waste characterization or designation purposes. It was already known, via process knowledge, that the waste would be designated as an Extremely Hazardous Waste. Nevertheless, the ICP-AES results indicate the metal content in the waste and are provided in this

Table 1-2. Results of the Inductively Coupled Plasma-Atomic Emission Spectroscopic Analysis on Waste Solvent (1985).

	Detection[a] Limit μg/ml	NaOH/Zr[b] μg/ml	KOH/Ni[c] μg/ml	Average μg/ml
Aluminum	0.03	6	10	8
Antimony	0.05			
Arsenic	0.08			
Barium	0.002			
Boron	0.01	5	2	4
Cadmium	0.004			
Calcium	0.01	46	52	48
Cerium	0.04			
Chromium	0.02			
Cobalt	0.01			
Copper	0.004			
Dysprosium	0.004			
Europium	0.002			
Gadolinium	0.1			
Iron	0.005	6	78	30
Lanthanum	0.008			
Lead	0.06			
Lithium	0.004	4	2	3
Magnesium	0.06			
Manganese	0.002			
Molybdenum	0.01			
Neodymium	0.02			
Nickel	0.02		ND[d]	
Phosphorus	0.1	18	25	20
Potassium	0.3		ND	
Ruthenium	0.05			
Silicon	0.02	20	28	24
Sodium	0.01	ND	46	46
Strontium	0.002			
Tellurium	0.06			
Titanium	0.02			
Zinc	0.02			
Zirconium	0.008	ND	2	2

[a] ICP-AES analysis performed for the elements listed. No results shown for concentrations below detection limit.
[b] Sodium hydroxide fusion in a zirconium crucible was performed to solubilize the sample.
[c] Potassium hydroxide fusion in a nickel crucible was performed to solubilize the sample.
[d] ND = Not determined.

closure plan as the only analytical data for the 300 ASE waste. As regulations and regulatory authority regarding mixed waste had not been established at the time the sample was taken, no formal notifications were requested or received concerning the sampling or monitoring. Because the sampling was not conducted to fulfill a regulatory requirement, a formal sampling plan was not written and the original of the laboratory analysis documentation was not retained.

Beryllium was a possible constituent of the waste, but because its concentration was not determined, its maximum concentration in the solvent was calculated. The principle source of soluble beryllium in the waste was from particulate matter derived from the degreasing of zirconium alloy braze rings. The braze alloy contained 93 percent zirconium, 4.75 to 5.25 percent beryllium, 1.2 to 1.7 percent tin, 0.07 to 0.20 percent iron, 0.05 to 0.15 percent chromium, and 0.03 to 0.08 percent nickel by weight. Based on the composition of this alloy and the amount of zirconium in the solvent (2 parts per million), the maximum amount of beryllium that could have been present was about 0.11 parts per million. The equivalent concentration of this amount of beryllium is 0.000011 percent by weight.

Steam condensate that dripped to the soil on the west side of the evaporator, contained trace amounts of the steam treatment substance (Dearborn Steamate* 2004). The Steamate contained diethylaminoethanol, morpholine, and cyclohexalamine (less than 8 percent each), but because the steam treatment process involved a mixture ratio of approximately 1 gallon of treatment mixture to 12,000 gallons of water, the combined solution (steam condensate) is not a regulated waste.

1.3.2 The 618-1 Burial Ground Waste

Because of the lack of suitable documentation, the characteristics of the wastes in the underlying 618-1 Burial Ground are not well known. The only known documented information is from the Hanford Waste Information Data System (WIDS) database. Only plutonium-239 and plutonium-240 have been reported as being in detectable concentrations within the 618-1 Burial Ground, with the total plutonium inventory calculated to be 0.077 curies decayed through December 12, 1986. According to this database, other radionuclides and inorganic and organic contaminants were either not detected or were not analyzed. However, undocumented information on utilization of the 618-1 Burial Ground indicates that it was a primary site for the disposal of large quantities of scrap uranium waste (i.e., pieces of end rods for fuel elements) for all reactor fuel manufacturing operations at the time. These fuel rods contained naturally occurring uranium. Also, other radioactive wastes associated with fuel fabrication, and other 300 Area waste activities, may be buried at this site.

Although detailed information on the total amount of waste disposed in the 618-1 Burial Ground is not available, estimates have been made on the basis of the extent of the activities during the time of operation. The 618-1 Burial Ground is estimated to have received up to 350 tons of waste

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* Steamate is a trademark of the Dearborne Division of W.R. Grace and Company.

occupying a volume of 37,000 cubic yards. The documented maximum inventory of radionuclides received is estimated to be about 16.28 tons of uranium and approximately 0.035 ounces of plutonium (Appendix B).

1.4 SOLVENT EVAPORATOR PROCESS INFORMATION

The 300 ASE was utilized for evaporation treatment with associated barrel storage of volatile spent solvents. Administrative controls were used to prevent treatment of incompatible solvents in the 300 ASE (see Procedure UNI-M-46, ECC-114, Appendix D). The evaporation treatment process was enhanced during the winter months by using a clip-on steam heating coil immersed in the 300 ASE solutions. Although the temperature of the solvent in the evaporator was not monitored, the temperature of the steam heating coil was about 100°C. Steam was delivered to the heating coil through a hose at a gage pressure of 15 pounds per square inch. The evaporator operated continuously when use. However, the steam heating coil only operated during the winter months when solvent levels were highest (see Procedure UNI-M-58, ECC-14, Appendix D).

Perchloroethylene, trichloroethylene, and 1,1,1-trichloroethane were persent in the 300 ASE as waste degreasing solvents, which may have been contaminated with uranium, Zircaloy-2, and Zircaloy-2/beryllium from degreasing uranium metal billets, cladding, braze rings, copper, copper-silicon alloy, and miscellaneous tools and parts. The 300 ASE was established as a treatment facility (evaporator) mainly for these fuel manufacturing waste solvents. Trichloroethylene was the primary degreasing solvent treated in the 300 ASE through 1976-77. Perchloroethylene subsequently became the primary degreasing solvent. Ethyl acetate/bromine solutions from laboratories and paint solvents from maintenance facilities also were treated in the 300 ASE. Any nonvolatile components that were only soluble in the solvent (e.g., oil) would have accumulated as sludge at the bottom of the 300 ASE as the solvent was evaporated. A process procedure (UNI-M-46, ECC-114, Appendix D) stipulated that 17C-type 55-gallon drums, designed to receive sludge-type materials, were kept near the site. However, during the active life of the 300 ASE, there was not enough sludge to warrant clean out or use of the 17C-type drums.

Administrative controls limited the use of the 300 ASE to organic solvents that could not be disposed of through the onsite waste oil system, and prevented treatment of incompatible solvents (Procedure UNI-M-46, ECC-114, Appendix D). Heavy oils, greases, and aqueous solutions were disposed of in accordance with Procedure UNI-M-46, ECC-104 (Appendix D). To ensure proper operation and maintenance of the evaporator, facility management conducted inspections on an annual basis (Procedure UNI-M-46, ECC-114, Appendix D).

No special procedures or precautions existed to preclude possible leaks from the evaporator or to test its integrity. However, based upon normal procedures, it is assumed that initially, the evaporator was visually inspected for flaws, and informal inspections of the evaporator were conducted over the period of its use by personnel in adjoining buildings on an irregular basis. The evaporator was elevated off the ground on timbers to facilitate the detection of any leak. The evaporator also was isolated from normal traffic flow to minimize potential accidents.

The typical process for emptying the waste solvent barrels was to pour them through the hinged top into the evaporator with the forklift barrel tilter, while under the supervision of operations personnel. If the evaporator was at or near its maximum capacity, the barrels were temporarily stored on the 333 East Concrete Pad adjacent to the evaporator (Figure 1-3). Although no records were retained on how long the barrels were stored, it could have been from 6 months to 1 year before the waste was poured into the evaporator. Barrels were stored on pallets to elevate them above the 333 East Concrete Pad and away from possible accumulated rainwater. Forklifts, equipped with barrel-handling attachments, were used for barrel relocation and large volume solvent transfers to the evaporator.

Solvent was poured into the evaporator in one of three ways: (1) large containers (55-gallon barrels) were lifted with a forklift equipped with barrel-handling attachments (barrel tilter) and poured into the evaporator; (2) the barrels were pumped out with a portable pump; or (3) the contents of smaller containers were poured into the evaporator by hand. Internal job control procedures (Appendix D) were used in the process to prevent spills and health hazards during operation of the evaporator, because no special regulatory procedures were specifically implemented. This particular type of operation relied on the skills and experience of the operator to prevent spills and to ensure that the work was performed safely.

The empty solvent barrels generally were not rinsed as they were reused several times for the same purpose. Occasionally, empty barrels may have been temporarily stored on the 333 East Concrete Pad pending disposal or returned to the degreasers for reuse. At the end of the barrel's useful life, it was crushed and disposed of as radioactive waste.

The 333 East Concrete Pad was utilized for other non-300 ASE uses; e.g., uranium contaminated equipment and materials storage as noted in Section 1.1.2. It was primarily the other usages and expansion and subsequent fencing of the 333 East Concrete Pad that necessitated the relocation of the 300 ASE during its 10-year operating life.

Over the 10-year life of the 300 ASE, approximately 6,000 gallons of regulated waste were treated through evaporation, or an average of approximately 600 gallons per year (see Section 3.2.1 and Appendix A). The Maximum Treatment Capacity (process design capacity) has been estimated at approximately 220 gallons per day (Appendix A). The 300 ASE had a maximum fill depth of 3 feet which allowed a maximum storage capacity of about 800 gallons (overflow volumetric limit).

On two occasions, the Hanford Environmental Health Foundation performed temporary ambient air monitoring near the 300 ASE using pre-calibrated battery operated pumps and charcoal sorption tubes. Samples were analyzed by gas chromatography. The results of air monitoring are documented in two letter reports, as presented in Appendix F.

Only one spill is known to have occurred at the 300 ASE. Although no formal spill report was written, it is known that between March 1 and 14, 1985, water from steam condensate overflowed the evaporator. This water was discharged onto the soil at the last evaporator location, as shown in Figure 1-4. This spill resulted when a small hole developed in a metal fitting attached to the steam coil that allowed steam condensate (i.e., water) to slowly fill the evaporator to overflowing.

The overflow would have spilled from the cutout (north facing) side of the evaporator. Because this angled side of the evaporator overhung the northern edge of the 333 East Concrete Pad, some of the overflow could have possibly discharged onto the concrete; however, it has been estimated that little, if any, solvent was present in the overflow because the solvents have higher densities than water (Table 1-1). Thus, only very small amounts of the solvents dissolved in the water (Section 3.3), could have overflowed the evaporator. Although there have been no records of solvent leaks from the barrels stored on the concrete pad, the consequences of an undetected leak onto the concrete were evaluated together with those of evaporator spillage onto the concrete.

Worst-case scenarios of spills onto the soil and onto the concrete were developed in conjunction with the Sampling and Analysis Plan (Appendix E, Section E-2, Contamination Scenarios and Assessments) to calculate the types and amounts of residual waste materials that could be expected to remain in the soil and in the concrete. The modeling results for spillage onto the soil have indicated that no significant amount of water/solvent should remain in the soil. Similarly, the modeling results for spillage onto the concrete have indicated that no significant amount of solvent from barrel leakage should remain in the concrete.

2.0 CLOSURE PERFORMANCE ACTIVITIES

The clean closure for the 300 ASE will continue to perform the following functions.

- Protect human health and the environment by controlling, minimizing, and/or eliminating the escape of dangerous waste, dangerous waste constituents, leachate, contaminated run-off, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere.
- Restore the land to a condition that will support its intended subsequent use given the nature of the previous regulated waste activity.
- Minimize the need for further maintenance.

The closure of the 300 ASE involves the following steps.

1. Removal and solidification of the solvent waste (completed 1985).
2. Cleaning and demolition of the 300 ASE unit and associated waste barrels (completed 1986).
3. Transportation and disposal of the solvent waste and the 300 ASE facility (completed 1986).
4. Soil and concrete sampling and analysis will be initiated following Ecology's approval of the sample plan.
5. Evaluation of sampling data will start after completion of field sampling activities.
6. Closure of the facility: Clean closure if the soil and concrete are not contaminated from 300 ASE constituents; otherwise, it is proposed that final disposition of the site should be determined through the Remedial Investigation/Feasibility Study in conjunction with Operable Unit 300-FF-2.
7. Ecology's acceptance of the results/evaluation of soil and concrete sampling.

The first three steps were completed in 1985 and 1986 and are discussed in detail in Section 3.2.

The 300 ASE Closure Plan will be available in Public Reading Rooms as part of the Administrative Record for the *Hanford Federal Facility Agreement and Consent Order*.

3.0 DESCRIPTION OF CLOSURE ACTIVITIES

The primary strategy for closure of the 300 ASE is clean closure of the site. In 1985 and 1986, initial closure activities involved removing the waste inventory and dismantling the facility to minimize potential danger to onsite personnel and the environment. The closure activities that remain to be performed include (1) soil and concrete sampling and analysis to evaluate contamination of the closure area, (2) evaluation of data, and (3) closure of the facility.

Clean closure of the site is contingent on verification of an absence of soil and concrete contamination originating from the 300 ASE. This contingency is to be assessed using information obtained from implementation of the Soil and Concrete Sampling and Analysis Plan (Appendix E). In the event that more extensive remediation is required (i.e., clean closure is not possible or practical), the remaining activities necessary for final closure/post-closure monitoring are proposed to be performed in conjunction with the inactive site activities planned for Operable Unit 300-FF-2.

Because the 618-1 Burial Ground completely underlies the 300 ASE site, assessment of any potential impact on groundwater resulting separately from the 618-1 Burial Ground is not possible. Given these special conditions, groundwater sampling and analysis are not included in the closure activities associated with the 300 ASE. Clean closure of the facility will be based on information derived from implementing the soil and concrete sampling and analysis plan.

3.1 MAXIMUM EXTENT OF OPERATION

The active life of the 300 ASE facility ceased in November 1985 (Table 3-1). The maximum extent of operation is known to have been exceeded only once at the time of the steam heating coil failure that filled the evaporator with water to overflowing.

3.2 REMOVAL AND MANAGEMENT OF HAZARDOUS WASTES

Information concerning the removal and management of hazardous waste is presented in the following sections.

3.2.1 Estimate of Maximum Inventory of Hazardous Wastes

The 300 ASE received solvents used in the 300 Area reactor fuel manufacturing facilities. The maximum annual inventory of hazardous wastes treated at any time during the life of the facility was approximately 600 gallons. Thus, the maximum volume of chemicals treated in the 300 ASE over the 10-year operating term has been estimated to be 6,000 gallons. Perchloroethylene constituted approximately 71 percent (4,260 gallons), 11 percent was trichloroethylene (660 gallons) and 1,1,1-trichloroethane was approximately 9 percent (540 gallons). The remaining 9 percent (540 gallons) was composed of primarily ethyl acetate/bromine, with some paint shop solvents (see Table 1-1).

Table 3-1. Chronology of 300 Area Solvent Evaporator Closure Activities.

Date	Activity
January 1985	Water solvent sampled
March 1985	Analysis performed on waste solvent
August 1985	Deliveries to 300 ASE suspended; last solvents added
September 1985	Part A application submitted to Ecology and EPA
November 1985	Heating process terminated; final shutdown; solidification of final waste inventory initiated; demolition initiated Interim Status Closure Plan (Rev. 0) submitted to Ecology and EPA
February 1986	Disposal of solidified waste inventory at the 200 West Area Low-Level Burial Ground
March 1986	Demolition of 300 ASE facility completed
July 1986	Disposal of burial box containing the dismantled 300 ASE and equipment in 200 West Area Low-Level Burial Ground
April 1988	Submittal of revised 300 ASE Interim Status Closure Plan (Rev. 1) to Ecology
September 1988	Notice of Deficiency on Closure Plan (Rev. 1) received from Ecology
February 1989	Submittal of revised 300 ASE Closure Plan (Rev. 2) to Ecology
April 1989	Notice of Deficiency on Closure Plan (Rev. 2) received from Ecology
January 1990	Ecology accepts the NOD responses and authorizes submittal of the 300 ASE Closure Plan (Rev. 3) by March 30, 1990
March 1990	Submittal of revised 300 ASE Closure Plan (Rev. 3) to Ecology
November 1990	Notice of Deficiency on Closure Plan (Rev. 3) received from Ecology
February 1991	Ecology accepts NOD responses and authorizes submittal of page changes (Rev. 4) for 300 ASE Closure Plan
June 1991	Page changes issued to the 50 recorded document holders.

The maximum inventory of hazardous wastes (i.e., the maximum amount of waste in the unit at any one time) would have been 800-gallons volumetric overflow capacity).

3.2.2 Removal and Management of Hazardous Waste Inventory

After August 1985, spent solvents were no longer received from the operating facilities. Final shutdown was initiated in November 1985 when the treatment process was terminated. The remaining solvents staged at the nearby concrete pad and from the evaporator were stabilized with absorbent agents. Approximately 500 gallons of spent solvent remained in the 300 ASE at that time and the following steps were taken to remove and solidify the solvent waste. A copy of a sample procedure for the solidifying and packaging of waste solvents (UNI Process Work Request Number B-441 and UNI-M-57, D-411) is included in Appendix D.

1. Obtained equipment (e.g., steel pan, hand pump, shovel, air mixer, forklift truck, empty 30- and 55-gallon 17-H drums) and materials (e.g., dolomite, water, Envirostone* liquid emulsifier and cement).

2. Placed a 30-gallon drum with lid inside a 55-gallon drum and utilized the steel pan as a catch basin.

3. Filled the void between the drums with dolomite, an inert filler material, and then removed the lid from the 30-gallon drum.

4. Pumped 13 gallons of liquid solvent, 6.5 gallons of water, and 1.5 gallons of Envirostone liquid emulsifier into the 30-gallon drum.

5. Used an air operated mixer to stir contents of the 30-gallon drum for two minutes.

6. Added 160 pounds of Envirostone cement to the 30-gallon drum contents with mixer running and stirred for an additional 10 to 15 minutes.

7. Moved drums via forklift truck to the adjacent concrete storage pad and allowed cement to cure for at least 24 hours.

8. Repeated steps 2 through 7 until all of the liquid solvent and solvent sludge, which was removed with a shovel from the bottom of the 300 ASE, had been solidified.

9. Placed contaminated tools in the 300 ASE and rinsed tools, as well as the 300 ASE, and solidified the rinsate by performing steps 2 through 7.

10. Filled remaining space in the 30-gallon drums with dolomite and sealed drum with lid, lock ring, and bolt.

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* Envirostone is a trademark of the U.S. Gypsum Company.

11. Filled void space between 30- and 55-gallon drums with dolomite.

12. Sealed the 55-gallon drums, labeled, and radiologically surveyed.

13. Placed drums in the waste materials storage area east of the 333 Building until shipped for disposal.

3.2.2.1 Cleaning and Demolition of Solvent Evaporator. After the liquid and sludge were removed from the evaporator, the inside of the evaporator was covered with a residue. This residue was removed during the equipment cleaning process. Some residual perchloroethylene and 1,1,1-trichloroethane, however, may have remained in the 300 ASE. No verification samples were taken, since none were required for mixed waste at that time. The 300 ASE was rinsed thoroughly with water during the cleaning process (see step 9, Section 3.2.2), although scrubbing or pressure spraying was not utilized in the rinsing process.

After the metal dumpster was cleaned, a slight amount of oxidation was noticed; however, the dumpster appeared to be in good condition. The electric pump and tools were rinsed with water, wiped down and checked by a radiation monitor, and set aside for further use. Rinse water was solidified and disposed of together with the solidified solvent.

By the end of March 1986, the 300 ASE had been cut up using a cutting torch, which avoided contaminating mechanical cutting tools. Then the pieces were placed in a standard 4 by 4 by 8-foot (128 cubic feet) plywood burial box, designated C-39 (see Burial Checklist 3-5B-1A-1 in Appendix D). Clothing, miscellaneous paper, plastic products, cloth utilized during this operation, the heating coil, and related piping were disposed of in this box. The void space in the box was partially filled with inert absorbent material (vermiculite clay). A sample copy of a Fuels Maintenance Work Authorization for cutting up and boxing of the 300 ASE is provided in Appendix D.

3.2.2.2 Transport and Disposal of Solvents and Solvent Evaporator. The drums of solidified solvents, rinsate, and the 300 ASE burial box were transported in compliance with U.S. Department of Transportation regulations (DOT 1988). The drums and 300 ASE burial box were loaded by a forklift truck onto a semi-trailer truck and transported to the 200 West Area Low-Level Burial Grounds. Fifty-seven 55-gallon drums of solidified solvent, sludge, and rinsate were generated from the cleanup effort and buried during February 1986 (Burial Compliance Checksheets 3-1A-7G-1, 3-1A-7L-1, and Burial Record 313-UNC-80-10; Appendix D). The 300 ASE burial box had a total volume of 128 cubic feet and was buried in July 1986 (Burial Compliance Checksheet 3-5B-1A-1 and Burial Record 313-UNC-86-4).

3.2.2.3 Hazardous Waste Management Units. All hazardous waste management units at the Hanford Site are under the EPA/State Identification Number WA789008967, which provides interim operating status designation.

3.3 DECONTAMINATION AND REMOVAL OF HAZARDOUS WASTE RESIDUES

The extent to which hazardous waste residues from the 300 ASE exist or persist in the soil at the site, will be evaluated by means of a Soil and Concrete Sampling and Analysis Plan (Appendix E). Based on the spill scenario described in Section 1.4, and the nature of the wastes (i.e., specific gravities), it is likely that little, if any, waste was discharged from the 300 ASE when it was inadvertently filled with water to overflowing from the leaky steam heating coil system. The amount of primary solvents in the 300 ASE expected to have been discharged with the less dense water for a 100-gallon spill, is estimated to be a maximum of 200 milliliters for 1,1,1-trichloroethane and 50 milliliters for perchloroethylene, based on solubilities (25°C values) alone. Such small amounts of solvent evaporator volatile components (if any) also would be likely to have since evaporated from the soil (Appendix E, Section 2.4.1).

Evaluation of the type and extent of potential contamination present in the soil and concrete resulting from operation of the 300 ASE could have been affected by the possible upward migration of waste (e.g., by vapor or gas transport) from the underlying 618-1 Burial Ground, and also due to the uncertainties associated with sources of the engineered soil cover. Because of these uncertainties, soil and concrete analysis will be largely confined to those waste constituents known, and suspected to be associated with the 300 ASE (see Appendix E, Sections E-1.2.1 and E-1.2.2).

Inorganic constituents having concentrations at or below detection limits in the analysis of the raw waste (Table 1-2) have been omitted from the list of constituents to be analyzed. The elements silicon, aluminum, iron, calcium, sodium, and phosphorous also have been excluded as they are primary constituents in the native rocks and soils that occur at concentrations far in excess (1,000 to 500,000 micrograms per gram) of those in the raw waste (less than 100 micrograms per gram). The amounts of fuel fabrication related inorganic constituents in the initial solvent alone, as well as those that would remain as residue in the soil after evaporation, are below the regulated concentrations. For example, the maximum amount of beryllium in the initial solvent, is significantly below regulated concentrations (equivalent concentration of 0.000011 weight percent; WAC 173-303-9906). However, the inorganic fuel fabrication related constituents have been included in the list of analytes (Table 3-2) as a conservative measure. All organic constituents obtained by Methods 8240 and 8270 (SW-846, EPA 1986) will be analyzed because they are measured concurrently in the analysis. However, only those known and suspected to be associated with the 300 ASE will be evaluated for closure purposes. The other data will be reported for informational purposes, as Ecology has requested.

Evaluation of the 300 ASE soil will be based on the composition of the soil compared to the composition of the local background soil for the constituents listed in Table 3-2. The local background, i.e., the soil cover for the 618-1 Burial Ground, is referred to here as the baseline. This baseline material is intended to serve a special type of local or area background (Ecology 1991) because it consists of soil that was introduced to the area as a cover for the underlying burial ground that may be distinct from other natural or anthropogenic background in the area. Justification for the selection of the baseline and for baseline sample locations is provided in Appendix E, Section E-5. The constituents listed in Table 3-2.

Table 3-2. The 300 Area Solvent Evaporator Analytes and Performance Standards.

Category-Constituent	Initial action level		Alternative action level	
	Soil	Concrete	Soil	Concrete
1- 300 ASE primary organic constituents				
Perchloroethylene (PCE)	a	b	c	c
1,1,1-trichloroethane (TCA)	a	b	c	c
Trichloroethylene (TCE)	a	b	c	c
Methyl ethyl ketone (MEK)	a	b	c	c
Ethyl acetate	a	b	c	c
Dichloromethane (methylene chloride)	a	b	c	c
Petroleum naptha	c	c	-	-
2- 300 ASE secondary organic constituents (i.e., degradation products)				
1,1-dichloroethylene (DCE)	a	b	c	c
trans-1,2-dichloroethylene (DCE)	a	b	c	c
1,1-dichloroethane (DCA)	a	a	c	c
1,2-dichloroethane (DCA)	a	b	c	c
Vinyl chloride	a	b	c	c
3- Inorganic constituents (related to fuel fabrication)				
Zirconium	a	d	b	d
Beryllium	a	d	b	d
Bromine	a	d	b	d
Uranium	d	d	d	d
Copper	a	d	b	d
4- Inorganic constituents (related to paint shop solvents)				
Barium	a	d	c	d
Cadmium	a	d	c	d
Lead	a	d	c	d
Silver	a	d	c	d

a Concentrations that exceed baseline (local background) threshold levels.
b Concentrations that exceed limits of quantitation (LOQ), i.e., the level above which quantitative results may be obtained with a specified degree of confidence, is defined by the American Chemical Society (1983) as $10\sigma \pm 3\sigma$ at the 99 percent confidence level, where σ is the standard deviation of the instrumental background noise.
c Concentrations that exceed human health-based protection or safety levels (Appendix E-3); contingent on approval by Ecology.
d No action level. Concentration determined for information only.

are those known or suspected to be associated with the 300 ASE that were not excluded for reasons stated previously. These constituents comprise four categories of contaminants and specific constituents as listed in Table 3-2.

1. Solvents and organic compounds known to have been introduced to the 300 ASE.

2. Organic solvent degradation products not included in the first category.

3. Inorganic constituents from fuel element fabrication.

4. Inorganic constituents from other materials known or suspected to have been introduced into the 300 ASE (e.g., associated with paint shop solvents) that are potentially dangerous wastes (e.g., WAC-173-303-9905).

Concrete samples will be analyzed for the same constituents as soil samples (Table 3-2). The action levels for the 300 ASE solvent waste species in constituent categories (1) and (2) identified in Table 3-2 are the primary concrete performance standards for several reasons that are discussed in Appendix E-1.2.2. The main reasons are that very small amounts of inorganic constituents, if any, would have accompanied spills or leaks from the 300 ASE, and also because it would not be possible to discriminate very small amounts of 300 ASE-derived inorganic contamination from those attributable to past practice operations. Thus, inorganic constituents in the 333 East Concrete Pad will be handled in conjunction with the 300-FF-2 Operable Unit remedial actions. Ecology's final decisions regarding the closure of the 300 ASE, however, will be made on the basis of all data.

Clean closure is to be predicated on the premise that the constituents from the 300 ASE are not present in the soil or concrete in the closure area; or if present, are at concentrations statistically below baseline threshold values, or are at concentrations protective of human health and the environment. These performance standards are referred to here as action levels. The action levels are identified in Table 3-2 and are described in Section E-1.4 of Appendix E. The decision tree illustrated in Figure 3-1 describes the closure options to be followed. If the concentration of any of the constituents identified in Table 3-2 are statistically above the initial action levels, continued efforts to clean close the facility will be based on the type and extent to which an action level is exceeded and on further assessment of future activities necessary to protect human health and the environment. These assessments include evaluations of health-based risk using data from sources such as the EPA Integrated Risk Information System [IRIS (EPA 1991)], the Health Effects Assessment summary tables (EPA 1989). The DOE-RL will request approval for the use of alternative action levels from Ecology's for closure of the 300 ASE, where warranted. If clean closure conditions cannot be met, closure will be performed in conjunction with Operable Unit 300-FF-2 as identified in Section 3.4 (Figure 3-1).

Initial action levels for both organic and inorganic constituents in soil will be based on statistical variation from baseline values as described in Appendix E. Baseline values for soil in the case of the 300 ASE will be obtained from analyses of the soil covering the underlying 618-1 Burial Ground, excluding the closure area and areas of known disturbances.

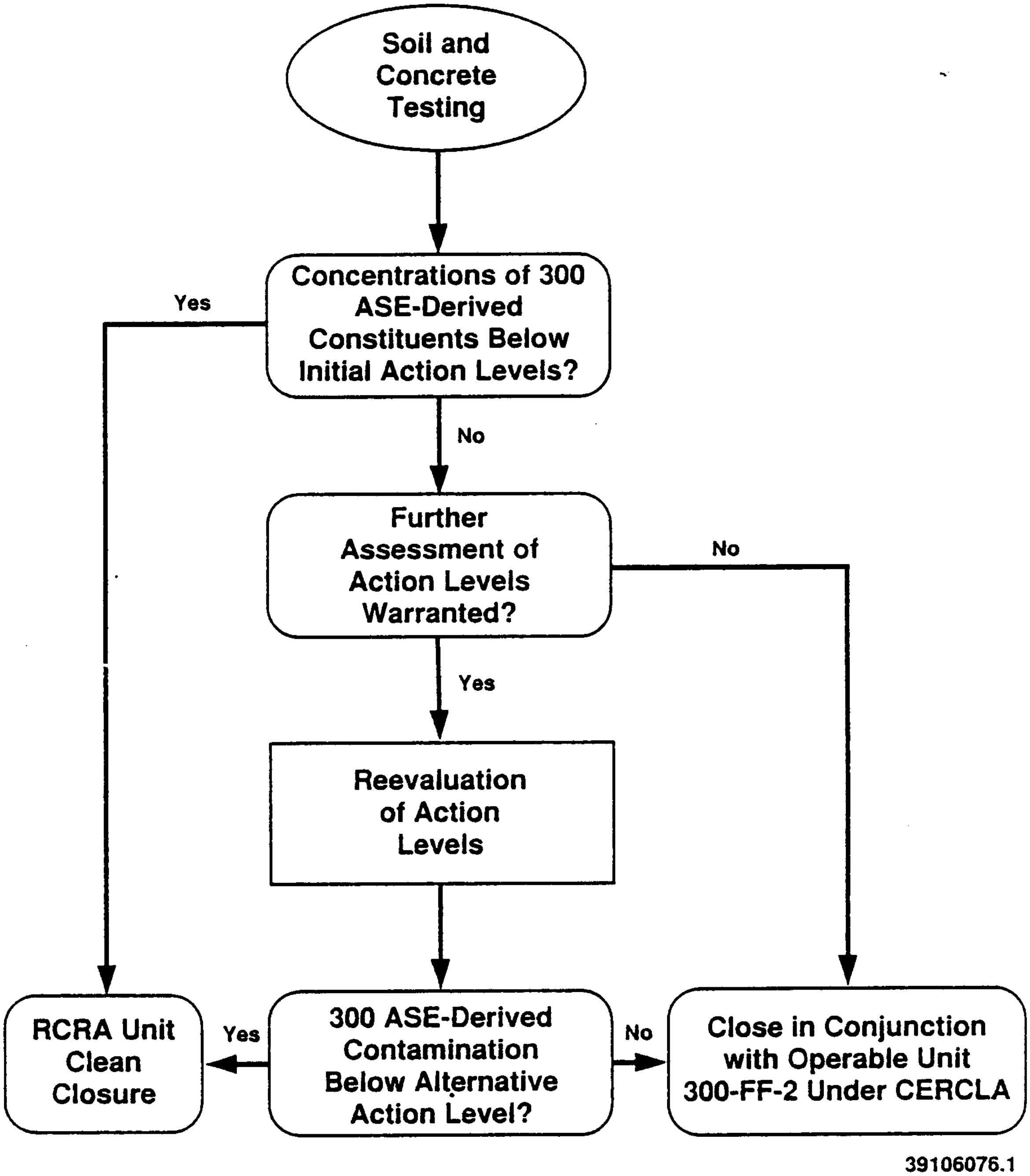


Figure 3-1. Decision Tree for Closure Options.

Alternative action levels will be based on health-based limits (Appendix E-1.4). Closure of the 300 ASE should be based primarily on the concentrations of organic constituents listed in Table 3-2 because they are the only reliable indicators of 300 ASE derived contamination. However, all data will be reviewed by Ecology in the decision process.

As described in Appendix E, a total of 15 soil samples will be taken: six samples and one duplicate from the 300 ASE soil closure area (Figure 3-2), and eight baseline samples from the 618-1 Burial Ground cover (see Figure 3-3). A total of 14 concrete samples (including one duplicate) from the concrete closure area will be collected from five concrete core sampling sites as shown in Figure 3-4 and described in Appendix E.

If concentrations of the components identified in Table 3-2 are not statistically above these action levels, it will be concluded that no contamination from the 300 ASE exists or remains in the soil or concrete. The 300 ASE will be considered clean closed under RCRA and WAC-173-303, upon Ecology's acceptance of the results and evaluation of the soil and concrete sampling and analysis plan.

The presence of organic constituents in the soil (closure area and baseline), other than those listed in Table 3-2, will be regarded as originating from the underlying 618-1 Burial Ground or other operations in the 300 Area. Elevated concentrations of inorganic constituents in baseline samples will be interpreted in the same manner. Any remedial action for such contaminants will be evaluated in conjunction with the Remedial Investigation/Feasibility Study of Operable Unit 300-FF-2.

In the event that clean closure is not possible, the facility will be subjected to remediation in conjunction with CERCLA, whereby remediation will be evaluated as part of the Remedial Investigation/Feasibility Study of Operable Unit 300-FF-2. This is proposed because the proximity of the 300 ASE site to the underlying 618-1 Burial Ground precludes other types of RCRA closure. If the decision is made to close in conjunction with CERCLA, details of any decontamination efforts that are necessary as part of the clean closure or Remedial Investigation/Feasibility Study efforts will be based on the results of soil and concrete sampling and analyses and submitted as an amendment to the closure plan.

3.4 OTHER ACTIVITIES REQUIRED FOR CLOSURE

If no soil or concrete contamination is found, no additional activities are required. If clean closure is not possible, further closure activities will be performed in conjunction with the Operable Unit 300-FF-2 remedial action.

3.5 SCHEDULE FOR CLOSURE

Upon approval of this plan, schedules for sampling and analysis of soils and concrete will be finalized. Table 3-3 is the sampling duration

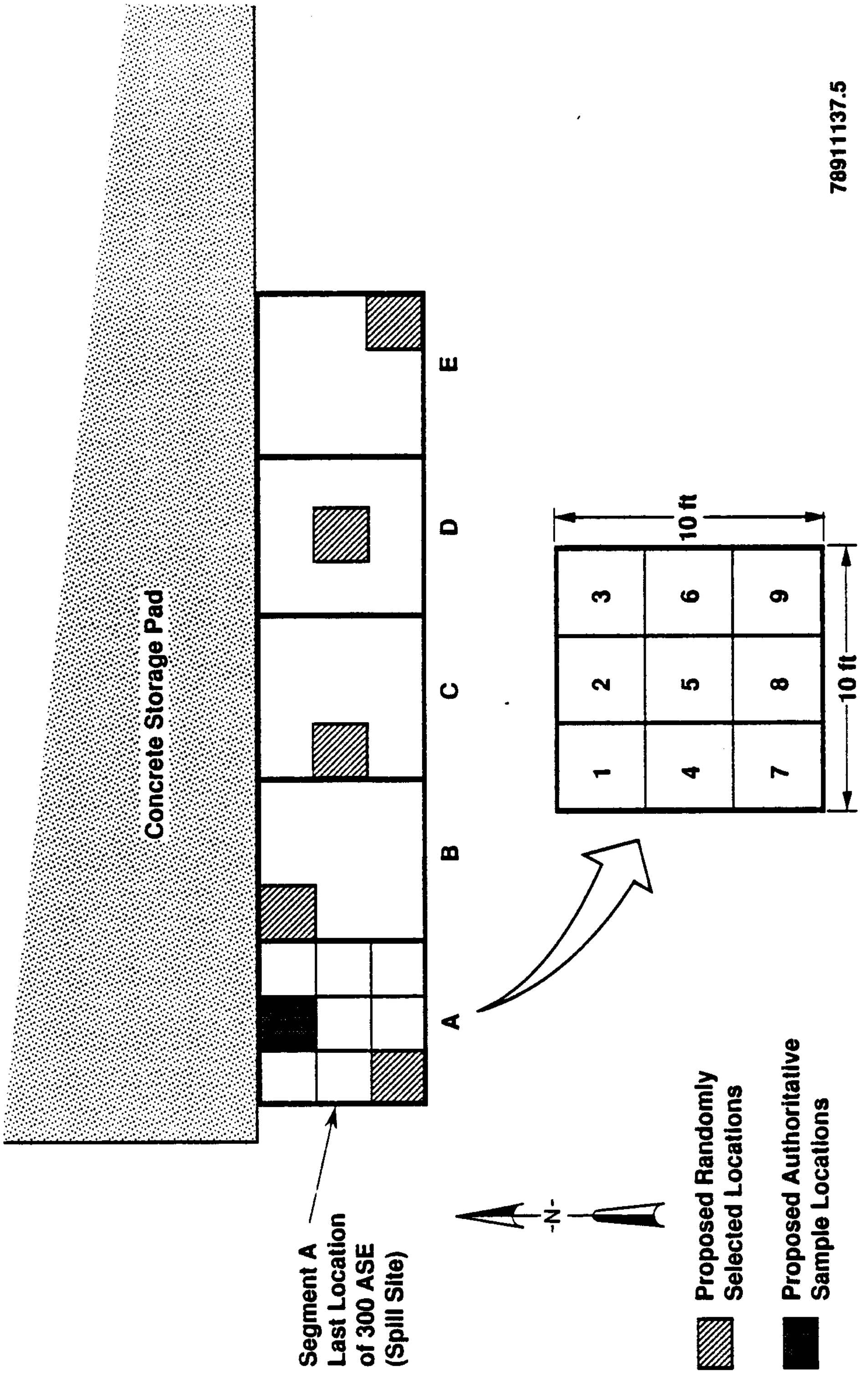


Figure 3-2. Soil Sampling Sites for the 300 Area Solvent Evaporator.

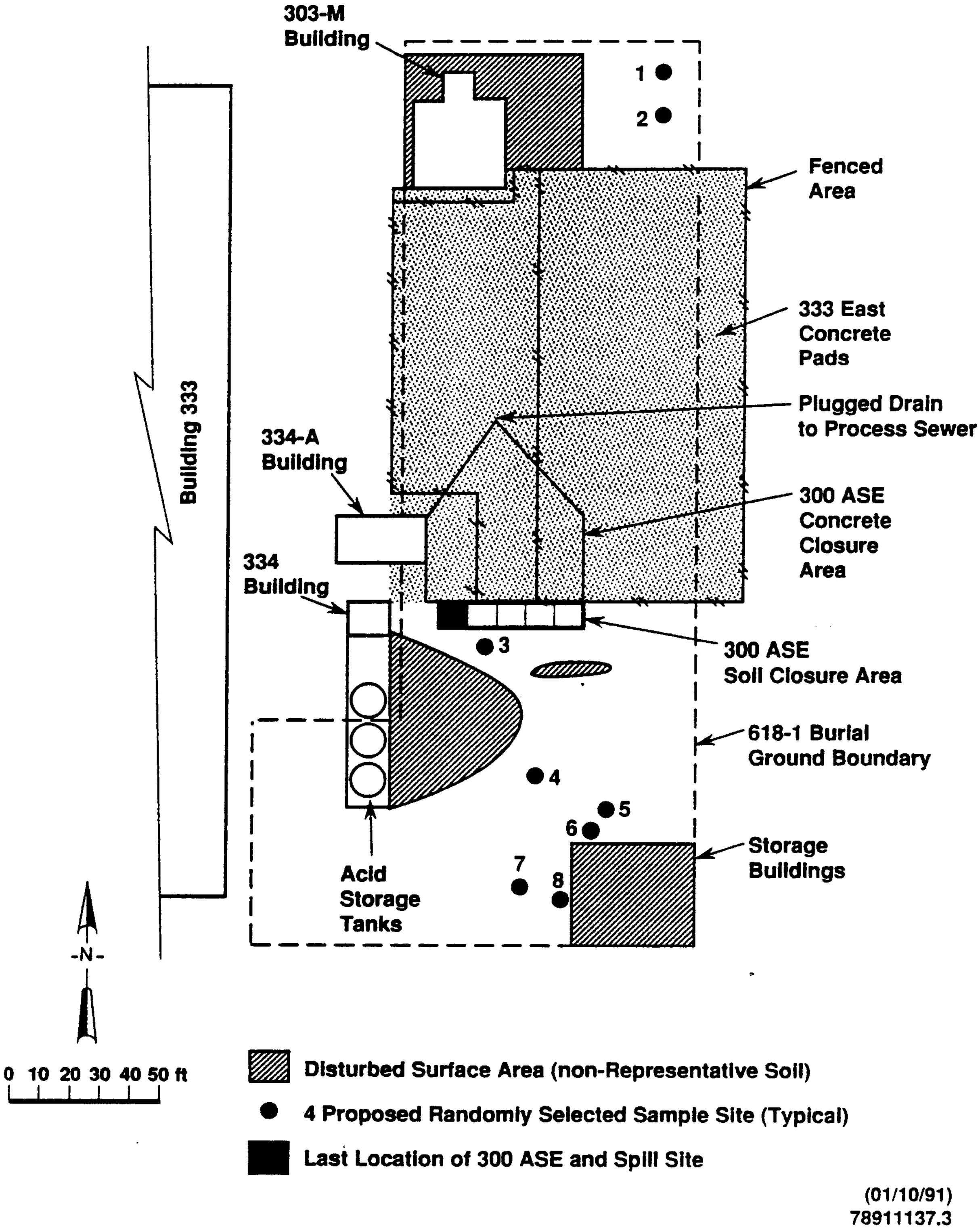


Figure 3-3. Baseline Soil Sampling Sites for the 300 Area Solvent Evaporator.

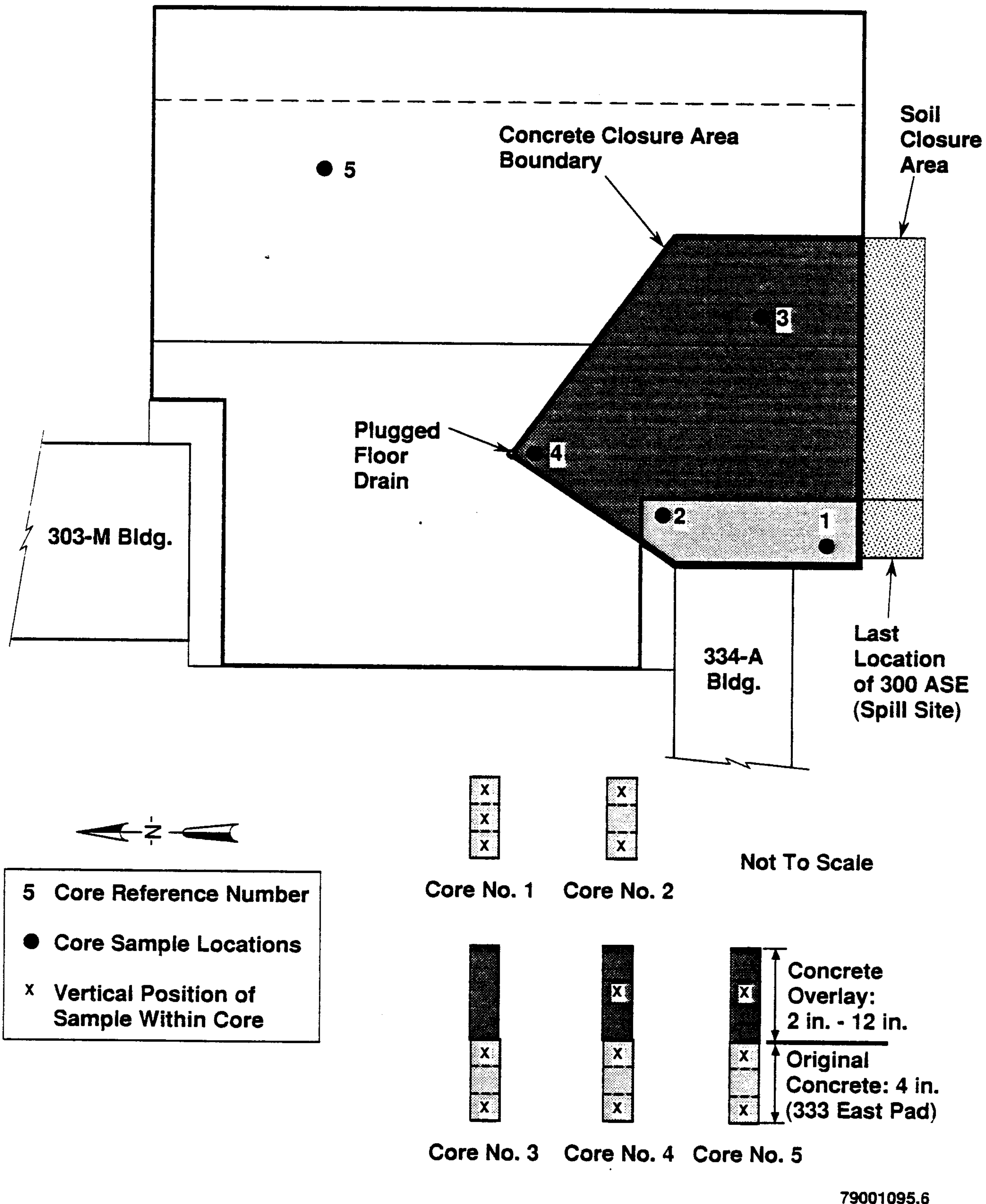


Figure 3-4. Concrete Sampling Sites for the 300 Area Solvent Evaporator.

Table 3-3. Duration Schedule for Soil and Concrete Sampling[a]

Week	Activity
0	Receipt of Ecology's written authorization to perform sampling
1-6	Mobilization for sampling; deployment of field crews, implementation of analytical laboratory's statement of work, engage independent engineer contract, etc.
7-8	Collect and transport samples from the 300 ASE and baseline locations to the laboratory
9-19	Laboratory analysis of the samples (60 days) and verification of the laboratory report (21 days)
20-23	Review of analytical results and statistical analyses; telephone notification to Ecology (following the DOE-RL briefing)
24-28[b]	Submittal to Ecology of the closure disposition and contaminant volumes (if any), based upon the soil and concrete sampling/analysis results

[a] Soil and concrete sampling and analysis may not be concurrent
[b] Ecology/EPA acceptance of the closure disposition will constitute conclusion of the closure activities.

schedule. It is anticipated that initiation of sampling and analysis and closure of the site, will be completed within 180 days after approval of the closure plan. Schedules for remedial action as part of the clean closure activities, or as part of the Remedial Investigation/Feasibility Study activities associated with Operable Unit 300-FF-2, will be provided to Ecology as amendments to this plan.

3.6 AMENDMENT OF PLAN

The original closure plan for the 300 ASE was submitted to Ecology in September 1985. This version of the closure plan has been revised to reflect the completion of the stated initial closure activities and notification to the regulating authority of the current site status. Amendment(s) to this plan regarding the results of soil and concrete sampling and analysis and impacts to the clean closure strategy will be provided to Ecology.

Amendment(s) to this plan may also be provided in the event that any CERCLA remediation activities are necessary. The DOE-RL will be responsible for all amendments to this plan.

3.7 CLOSURE HISTORY

Closure of the 300 ASE site began with suspension of solvent waste deliveries to the site in August 1985, and termination of the heating process and final shutdown of the facility in November 1985 (Table 3-1).

3.8 SCHEDULE FOR TREATMENT, REMOVAL, AND DISPOSAL OF FINAL WASTE VOLUME

Removal, solidification, and disposal of the final waste volume was initiated in November 1985, and completed in July 1986. The schedule of these activities has been summarized in Table 3-1. Following the evaluation of data obtained from the soil and concrete sampling and analysis plan, if needed, as part of the CERCLA process, a schedule for removal and disposal of any evaporator originated contaminants remaining in the soil and/or concrete will be prepared and provided to Ecology as an amendment to this plan.

3.9 CLOSURE COMPLETION AND EXTENSION OF TIME PERIOD

It is required that final closure be completed within 180 days after receipt of the final volume of waste, or within 180 days after approval of the closure plan, whichever is later, unless an extension is granted. It is anticipated that the soil and concrete sampling/verification activities will be completed within 180 days after approval of this closure plan. If the evolution of unforeseen events could necessitate an extension of this time period, then an extension from Ecology would be requested.

4.0 CERTIFICATION OF CLOSURE

Within 60 days of final closure of the 300 ASE, the DOE-RL will submit to Ecology a certification of closure. This certification will be signed by both the DOE-RL and an independent professional engineer registered in the State of Washington, stating that the facility has been closed in accordance with the approved closure plan. The certification will be submitted by registered mail. Documentation supporting the closure certification will be retained and furnished to Ecology upon request. The DOE-RL will self-certify with the following document or a document similar to it:

> "I, the undersigned, the owner and operator of the 300 Area Solvent Evaporator, hereby certify that I have reviewed the approved 300 Area Solvent Evaporator Closure Plan and, to the best of my information and belief, all closure activities were performed in accordance with the specifications identified in the approved closure plan. (Signature and date)."

Professional Engineer Closure Certification: The DOE-RL will engage an independent professional engineer registered in the State of Washington to certify that the facility has been closed in accordance with the approved closure plan. The DOE-RL will require the engineer to sign the following document or a document similar to it:

> "I, the undersigned, an independent registered professional engineer, hereby certify that I have reviewed the approved Closure Plan for the 300 Area Solvent Evaporator and, to the best of my information and belief, all closure activities were performed in accordance with the specifications identified in the approved closure plan, (Signature, date, professional engineer license number, business address, and telephone number)."

5.0 POST-CLOSURE

5.1 NOTICE IN DEED

If clean closure cannot be accomplished, within 60 days of the certification of closure of the 300 ASE site, the DOE-RL will, in accordance with the state regulations, sign, notarize, and file for recording, the following notice. The notice will be sent to the Auditor of Benton County, P.O. Box 470, Prosser, Washington, with instructions to record this notice in the General Index. This document is normally reviewed in property title searches.

TO WHOM IT MAY CONCERN

The U.S. Department of Energy-Richland Operations Office, an operations office of the U.S. Department of Energy, which is a department of the United States Government, the undersigned, whose local address is the Federal Building, 825 Jadwin Avenue, Richland, Washington, hereby gives the following notice as required by 40 CFR 265.119(b) and WAC 173-303-610(10) whichever is applicable:

(a) The United States of America is, and since April 1943, has been in possession in fee simple of the following described lands (legal description of the 300 ASE closure site).

(b) The U.S. Department of Energy-Richland Operations Office, by operation of the 300 Area Solvent Evaporator, has disposed of hazardous and/or dangerous waste under the terms of regulations promulgated by the U.S. Environmental Protection Agency and Washington State Department of Ecology (whichever is applicable) at the above described land.

(c) The future use of the above-described land is restricted under the terms of 40 CFR 264.117(c) and WAC 173-303-610(7)(d) (whichever is applicable).

(d) Any and all future purchasers of the this land should inform themselves of the requirements of the regulations and ascertain the amount and nature of wastes disposed on the above-described property.

(e) The U.S. Department of Energy-Richland Operations Office has filed a survey plat with the Benton County Planning Department and with the U.S. Environmental Protection Agency Region 10 and Washington State Department of Ecology (whichever are applicable) showing the location and dimensions of the 300 Area Solvent Evaporator site and a record of the type, location, and quantity of waste treated.

5.2 CLOSURE COST ESTIMATE

It is DOE-RL's understanding that federal facilities are not required to comply with WAC 173-303-620. However, projections of anticipated closure costs will be provided annually during the closure activities (starting October 1991).

6.0 PROCEDURES TO PREVENT HAZARDS

The procedures applicable to normal Hanford Site activities (including soil and concrete sampling) are described in the following sections.

6.1 SECURITY

Security is addressed in Chapter 1.0, Section 1.2.

6.2 INSPECTION SCHEDULE

Clean closure is anticipated; therefore, this section is not applicable to the 300 ASE. The alternative, if implemented, is to follow the CERCLA process (300-FF-2 Operable Unit) and the emergency remedial action may be an epoxy-asphalt cover with suitable engineered thickness to preclude any RCRA monitoring/inspection requirements.

6.3 DOCUMENTATION OF PREPAREDNESS AND PREVENTION REQUIREMENTS OR WAIVER

The Hanford Site normal emergency facilities/equipment are adequate for all emergencies, if needed. Figure 1-2 shows the close proximity of medical and fire station facilities. Section 6.5 addresses the relevant scenarios associated with closure activities and includes documentation requirements.

6.4 PREVENTIVE PROCEDURES, STRUCTURES, AND EQUIPMENT

No closure activities are anticipated beyond the collection of soil and concrete samples; therefore, this section is not applicable to the 300 ASE.

6.5 SPILLS AND DISCHARGES TO THE ENVIRONMENT

Because the facility no longer exists, there is no possibility of spills and discharges to the environment resulting from the 300 ASE. The only other types of impact to the environment from the 300 ASE are those associated with soil and concrete sampling activities, and there are no dangerous materials used in this effort. The following information is provided as an additional safety measure to cover unanticipated contingencies.

6.5.1 Notifications

Three types of notifications are described in this section: (1) emergency signals, (2) notification of emergency response organizations, and (3) notification of authorities.

6.5.1.1 Emergency Signals. Several communication systems exist on the Hanford Site to notify personnel of emergency incidents and to disseminate information about events affecting Hanford Site activities. Three of these systems are as follows:

- Priority message system (management bulletin)--a network of telefax machines used to transmit important messages rapidly across the Hanford Site
- The DOE-RL radio system--links the Hanford Patrol, Hanford Fire Department, safety, and engineering representatives at a network of base stations, mobile units, and portable radios
- Hanford Site emergency signals--emergency signals used to alert personnel in an emergency event are listed in Table 6-1.

Table 6-1. Hanford Site Emergency Signals.

Signal	Incident/Alarm Type	Response
Gong or bell	Fire	Nonprocess personnel will evacuate Process personnel will wait for directions
Steady siren	Evacuation	Get car keys if time permits and vacate building; report to staging area[a]
Wailing siren	Take cover	Seek shelter indoors Shut windows and doors Await instructions
Ringing bell	CAM[b] alarm	Evacuate immediate area Call for help Remain in one location
CRASH alarm	Emergency communications	Pick up phone and listen Relay message to building emergency director

[a] Area where facility personnel gather following notification of incident.
[b] Continuous air monitor.

6.5.1.2 Notification of Emergency Response Organizations. The building emergency director will be responsible for initially assessing any facility emergency situation. Notification of the Hanford Site emergency response organizations will be carried out as follows.

- If the situation requires assistance from the Hanford Fire Department, ambulance, or the Hanford Patrol, notification of the Patrol Operations Center will be made via the Hanford emergency response number (811).

- For lesser emergencies necessitating assistance from outside the facility (but not requiring fire, ambulance, or patrol personnel) notification will be given to the emergency duty officer at the Patrol Operations Center business number (373-3800).

- In the case of a relatively minor abnormal occurrence, the situation will be handled by facility personnel (the building emergency director and line management).

6.5.1.3 Notification of Authorities. Notification of the DOE-RL, Ecology, and the National Response Center will be carried out as follows.

- The building emergency director or line management will document all emergencies on an Event Fact Sheet (Figure 6-1), which must be completed within 24 hours. The Event Fact Sheet will be used to provide Westinghouse Hanford management with facts about an unplanned event and to disseminate information to those responsible for preventing recurrence of similar events. The DOE-RL will be notified by Westinghouse Hanford line management or the assigned overview organization depending on the consequences of the event. A copy of the Event Fact Sheet will be retained by the DOE/RL.

- The Patrol Operations Center will immediately notify the DOE-RL of all emergency incidents (fires, explosions, releases, etc.) reported via the Hanford Site emergency number (811).

- In the case of any release of dangerous waste, the building emergency director will immediately notify Westinghouse Hanford Environmental Protection. All releases of dangerous waste to the environment will be reported immediately to the DOE-RL by Environmental Protection. The DOE-RL then will notify Ecology of the release.

- In addition, if a spill exceeds the reportable quantities established under CERCLA, according to 40 CFR 302, the DOE-RL will notify the National Response Center at (800) 424-8802.

- The DOE-RL report to Ecology and the National Response Center will contain the following information:
  - Name and telephone number of reporter
  - Name and address of facility
  - Time and type of incident

- Name and quantity of material(s) involved to the extent known
- Extent of injuries, if any
- Possible hazards to human health and the environment outside the facility
- Actions taken to mitigate the situation.

- All environmental releases of hazardous materials, including those that do not exceed a CERCLA or Ecology reporting limit, will be included in a monthly spill report. Facility managers provide information on environmental hazardous material spills to Environmental Protection. Environmental Protection compiles the monthly spill report for submittal to DOE-RL.

- All spills or releases that occur during transportation will be reported by the transporter to the DOE-RL and Ecology. In addition, a written report will be submitted to:

  Director, Office of Hazardous Material Regulations
  Materials Transport Bureau
  Department of Transportation
  Washington, DC 20990.

6.5.2 Mitigation and Control

Any waste remediation will be addressed as part of the 300-FF-2 Operable Unit, therefore, this section does not apply.

Contractor :	EVENT FACT SHEET	Page 1 of ____

1. Title ____________________
2. Reporting Organization ____________________
3. Division/Department/Project ____________________
4. Number ____________________
5. Rev. ____________
6. Date of Event/Time ________/________

7. Event Identification

A) Location of Event:

B) Plant/Facility Status:

C) Event Type:

8. Apparent Cause(s) of Event

☐ Design ☐ Material ☐ Procedure
☐ Personnel Error ☐ Administrative Control ☐ Other

9. Description of Event

10. Consequences of Event

11. Actions Taken (A) or Planned (B)

12. Tentative Disposition

☐ Event meets criteria for a UOR
☐ Event meets criteria for a Critique
☐ Undetermined: Revised EFS will be issued in 3 working days
☐ Above criteria not met: no further report

13. Signatures

____
Originator/Date

____
Approver/Date

____
ADC/UCNI Review Official Review Date

Figure 6-1. Event Fact Sheet.

7.0 CONTINGENCY PLAN

The 300 ASE sampling plan and the *Environmental Investigations and Site Characterization Manual* (WHC 1989) contain contingency plan information for specific field sampling operations.

8.0 PERSONNEL TRAINING

All personnel involved with the closure activities of the 300-ASE will receive a minimum level of dangerous waste training.

- Managers and supervisors (M & S) are responsible for supervising, coordinating, and directing the closure activities and personnel.

- Nuclear Process Operators and Decommissioning and Decontamination workers (NPO) are responsible for sampling, packaging, and handling of dangerous waste, nonradioactive, and radioactive material.

- Health Physics Technicians (HPT) are responsible for surveying for radiological and dangerous waste contamination.

- Crafts (CR) personnel are responsible for specialized work. The various crafts include carpenters, electricians, ironworkers/riggers, heavy equipment operators, crane operators, millwrights, pipefitters, and painters.

In addition to the personnel mentioned, any person entering a TSD unit during closure must have the 40 hour hazardous workers training.

Table 8-1 contains a matrix that relates job categories to the individual training course. Appendix N contains brief descriptions of the training courses, including descriptions of the target audience, instructional technique, evaluation method, length of course, and frequency of retraining.

Table 8-1. Company-General Training Matrix.

Course title	Type	Target/Audience			
		MS	NPO	HPT	CR
Generator Hazards Safety Training	I	X	X	X	X
Hazardous Waste Worker Safety Training	I	X	X	X	X
Hazardous Waste Worker Safety Training, Refresher	C	X	X	X	X
Hazardous Materials/Waste Job Specific Training	I	X	X	X	X
Scott SKAPAK* MSA PAPR	C	X	X	X	X
Self-Contained Breathing Apparatus (SCBA) Training (optional)	C	X	X	X	X
Radiation Safety Training	C	X	X	X	X
On-the-Job Training	C	X	X	X	X
Cardiopulmonary Resuscitation	C	X	X	X	X
Noise Control (optional)	C	X	X	X	X

*Scott SKAPAK is a trademark of Figgie International, Incorporated.

Title:	Generator Hazards Safety Training
Description:	Provides the dangerous material/waste worker with the fundamentals for safe use and disposal of dangerous materials.
Target Audience:	Dangerous material and waste workers
Technique:	Classroom
Evaluation:	Written test
Length:	4 hours
Frequency:	24 months

Title:	Hazardous Waste Worker Safety Training
Description:	Provides the dangerous waste worker with the fundamentals of safety when working with dangerous waste.
	Note: This course fulfills training requirements of 29 CFR 1910.120 requiring dangerous waste training of workers at all treatment, storage, and/or disposal facilities regulated under RCRA.
Target Audience:	Dangerous material and waste workers
Technique:	Classroom and on-the-job training
Evaluation:	Written test
Length:	24 hours
Frequency:	Not applicable

Title:	Hazardous Waste Worker Safety Training Refresher
Description:	Provides the dangerous waste worker with a refresher in the fundamentals of safety when working with dangerous waste.
	Note: This course fulfills training requirements of 29 CFR 1910.120 requiring dangerous waste training of workers at all treatment, storage, and/or disposal facilities regulated under RCRA.
Target Audience:	Dangerous material and waste workers
Technique:	Classroom
Evaluation:	Written test
Length:	8 hours
Frequency:	12 months

Title:	Hazardous Material/Waste Job-Specific Training
Description:	Provides job-specific dangerous material/waste information. Two checklists may be obtained from safety training to help the supervisor/manager through this session with each employee.
	Note: Not a classroom presentation--supervisor conducts this exercise with each employee using the checklists.
Target Audience:	Employees who complete generator hazards safety training
Technique:	On-the-job training
Evaluation:	On-the-job training checklist
Length:	Average - 2 hours
Frequency:	12 months

Title:	Scott SKAPAK MSA PAPR
Description:	This class is designed to instruct employees in the proper use of the Scott "SKAPAK" for entry, exit or work in conditions immediately dangerous to life and health and to instruct employees to recognize and handle emergencies. This class also includes instructions in the use of MSA PAPR.
Target Audience:	General, Safety, QA, OPS/OPRS, Management, Maintenance Engineering
Technique:	Classroom
Evaluation:	Practical exam
Length:	Approximately 2 hours
Frequency:	12 months

Title:	Self-Contained Breathing Apparatus (SCBA) Annual Qualification
Description:	Provides instructions in the proper use of a pressure-demand respirator in which breathing air is supplied from a cylinder carried on the user's back. The SCBA are typically used for emergency response situations in an atmosphere that is immediately dangerous to life or health.
Target Audience:	General, Safety, OPS/OPRS, Maintenance
Technique:	Taught in a classroom using a slide projector and overhead
Evaluation:	Written and practical test
Length:	Approximately 4 hours
Frequency:	12 months

1 Title: Radiation Safety Training

2 Description: A practical dress/undress demonstration is also required. Instructs radiation workers in the fundamentals of radiation protection and the proper procedures for monitoring exposures (ALARA). Training includes knowledge of the acute and chronic effects of exposure to radiation risks associated with occupational radiation exposure, mode of exposure, protective measures, instrumentation, monitoring programs, contamination control, personnel decontamination, warning signs and alarms, and responsibilities of employees and managers.

3 Target Audience: Radiation workers as defined in WHC-CM-4-10

4 Technique: Taught in a classroom using a white board, appropriate audio/visual equipment

5 Evaluation: Written exam and practical dress/undress

6 Length: Approximately 7 hours

7 Frequency: 24 months (Retraining under Course Number 020003)

8

9

10 Title: On-The-Job Training

11 Description: On-the-job training session under the supervision of an experienced person before full responsibilities may be assumed. In addition, all personnel on the hazardous waste site are required to have reviewed this Waste Sampling and Analysis Plan.

12 Target Audience: Dangerous Material and Waste Workers

13 Technique: Classroom and on-the-job training

14 Evaluation: Practical exercise and on-the-job training checklist

15 Length: 40 hours

16 Frequency: 12 months

Title:	Cardiopulmonary Resuscitation (CPR)
Description:	Provide cardiopulmonary Resuscitation training to the American Heart Association standards.
Target Audience:	All employees
Technique:	Classroom and active participation.
Evaluation:	Practical exam and written test.
Length:	4 hours
Frequency:	24 months (recertification)

Title:	Noise Control (Noise-Hearing Conservation)
Description:	Provide employees with information conducive to hearing conservation. Supervisors and employees responsibility, exposure limits, hearing conservation requirements, protection devices, diagnosis of noise, induced hearing loss.
Target Audience:	All employees exposed to an 8 hour time weighted average sound level of 85 dBA or greater.
Technique:	Classroom
Evaluation:	None
Length:	Approximately 1 hour
Frequency:	12 months

9.0 OTHER RELEVANT LAWS

As discussed in Sections 3.3 and 3.5, the CERCLA process could become significant in remediating this RCRA site. Applicable RCRA requirements will be included within the CERCLA processes, if clean closure is not possible.

This section provides a summary of the regulatory review performed to assist Ecology in determining that the 300 ASE has met its obligations with respect to other federal or state laws. The major environmental laws evaluated include the following:

- *The Clean Air Act of 1977*, as amended
- *The Clean Water Act of 1977*, as amended
- *The Coastal Zone Management Act of 1972*, as amended
- *The Endangered Species Act of 1973*, as amended
- *The Fish and Wildlife Coordination Act of 1934*, as amended
- *The National Historic Preservation Act of 1966*, as amended
- *The Wild and Scenic Rivers Act of 1968*, as amended.

In addition, a summary of other requirements that may apply is provided. Full references for each of these acts are included in Chapter 10.0.

9.1 THE CLEAN AIR ACT OF 1977

No active processing will occur at the 300 ASE to provide routine emissions. No radioactive material will be stored at the facility. Storage will involve sealed dangerous waste with possibly some occasional sampling activities. Other than a catastrophic event, no upset conditions internal or external to the facility would result in release concentrations outside the facility exceeding levels the Occupational Safety and Health Administration (OSHA) (OSHA 1989) defines as immediately dangerous to life and health. Airborne releases from upset conditions would only continue until recovery actions were taken. Based on this scenario, airborne emissions from the facility will not include contaminants at concentrations or in sufficient amounts that currently require an air quality permit from any agency.

9.2 THE CLEAN WATER ACT OF 1977

Because the 300 ASE no longer exists, operation of the 300 ASE can no longer result in the discharge of any liquid effluents that would require a National Pollutant Discharge Elimination System (NPDES) permit; therefore, no permits or reviews pursuant to the *Clean Water Act of 1977* are applicable.

9.3 THE COASTAL ZONE MANAGEMENT ACT OF 1972

The 300 ASE site is not located in a coastal zone or shoreline area as defined by this statute; therefore, no permits or reviews pursuant to the *Coastal Zone Management Act of 1982* are applicable.

9.4 THE ENDANGERED SPECIES ACT OF 1973

The site for the 300 ASE cannot be considered an undisturbed area or a major habitat for native plant and animal species. Also, this area constitutes a very small fraction of the Hanford Site and, hence, would not play a significant role in the ecology of the Hanford Site. No listed or proposed endangered or threatened species or their habitats are expected to be affected by 300 ASE activities.

9.5 THE FISH AND WILDLIFE COORDINATION ACT OF 1934

The 300 ASE will not involve the impoundment, diversion, or other control or modification of any body of water; therefore, no permits or reviews pursuant to the *Fish and Wildlife Coordination Act of 1934* are applicable.

9.6 THE NATIONAL HISTORIC PRESERVATION ACT OF 1966

The 300 ASE affects no areas that are eligible for nomination to the National Register of Historic Places. In addition, the area was reviewed for cultural resources.

Sites used as material 'borrow areas' for the 300 ASE have been reviewed for the presence of archaeological resources in accordance with regulations issued pursuant to, or other requirements of, the *American Antiquities Preservation Act of 1906*; the American Indian Religious Freedom Act of 1978; the Historic Sites, Buildings and Antiquities Act of 1935; the Archaeological and Historic Preservation Act of 1960; and the *Archaeological Resources Protection Act of 1979*. No known cultural resource impacts have occurred from 300 ASE activities.

9.7 THE WILD AND SCENIC RIVERS ACT OF 1968

The 300 ASE site does not affect any rivers presently designated under the *Wild and Scenic Rivers Act of 1968*.

9.8 OTHER REQUIREMENTS

The application of insecticides and herbicides on or in the immediate vicinity of the 300 ASE will be conducted in compliance with the *Federal Insecticide, Fungicide, and Rodenticide Act of 1975*, the *Toxic Substances Control Act of 1976*, and the applicable provisions of the *Water Quality Standards for Surface Waters of the State of Washington* (Ecology 1988).

10.0 REFERENCES

American Antiquities Preservation Act, 1906, 16 USC 432.

American Chemical Society, 1983, *Principles of Environmental Analysis, Analytical Chemistry*, Vol. 55, pp. 2210-2218.y

American Indian Religious Freedom Act, 1978, Public Law 95-341, 92 Stat. 469, 42 USC 1996.

Archaeological Resources Protection Act of 1979, Public Law 96-95, 93 Stat. 721, 16 USC 470aa.

Clean Air Act of 1977, as amended, Public Law 95-95, 91 Stat. 685, 42 USC 7401.

Clean Water Act of 1977, as amended, Public Law 95-217, 92 Stat. 1566, 33 USC 1251.

Coastal Zone Management Act of 1972, as amended, Public Law 92-583, 86 Stat. 1280, 16 USC 1451 et seq.

Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, Public Law 96-510, 94 Stat. 2767, 42 USC 9601 et seq.

DOT, 1988, *Shipping Container Specification*, Title 49, Code of Federal Regulations, Part 178, U.S. Department of Transportation, Washington, D.C.

Ecology, 1988, *Water Quality Standards for Surface Water of the State of Washington*, WAC 173-201, Washington State Department of Ecology, Olympia, Washington.

Ecology, 1989, *Dangerous Waste Regulations*, WAC 173-303, Washington State Department of Ecology, Olympia, Washington.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, U.S. Department of Energy, Olympia, Washington.

Endangered Species Act of 1973, as amended, Public Law 93-205, 87 Stat. 884, 16 USC 1531, et seq.

EPA, 1982, *RCRA (Resource Conservation and Recover Act) Guidance Document: Landfill Design, Liner Systems and Final Cover*, PB87-157657, National Technical Information Service, U.S. Environmental Protection Agency, Springfield, Virginia.

EPA, 1989, *Environmental Protection Agency*, Code of Federal Regulations, Title 40, Parts 1-399, as amended, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989a, *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A, Chapter 6, Exposure Assessment*, U.S. Environemtal Protection Agency, Washington, D.C.

EPA, 1989b, *Health Effects Assessment Summary Tables*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1991, *Integrated Risk Information System* (IRIS), U.S. Environmental Protection Agency, Washington, D.C.

Federal Insecticide, Fungicide, and Rodenticide Act, 1975, as amended, Public Law 92-516, 86 Stat. 973, 7 USC 136 et seq.

Fish and Wildlife Coordination Act of 1934, as amended, c. 55 S1, 8 Stat. 401, 16 USC 661.

Historic Sites, Buildings and Antiquities Act of 1935, 49 Stat. 666, 16 USC 461-467.

National Historic Preservation Act of 1966, as amended, Public Law 89-665, 80 Stat. 915-919, 16 USC 470 et seq.

OSHA, 1989, *Hazardous Waste Operations and Emergency Response*, Title 29 Code of Federal Regulations, Part 1910.120, as amended, *Federal Register*, 54 FR 12792, March 28, 1989, Occupational Safety and Heath Administration, Washington, DC.

Resource Conservation and Recovery Act of 1976, as amended, Public Law 94-580, 90 Stat. 2795, 42 USC 6901 et seq.

Sax, N.I. and Lewis, R.J., 1987, *Hawley's Condensed Chemical Dictionary*, 11th ed., Van Nostrand Reinhold Company, New York, p. 806.

Toxic Substances Control Act of 1976, Public Law 94-469, 90 Stat. 2003, 15 USC 2601 et seq.

WHC, 1989, *Environmental Investigation and Site Characterization Manual* (EII), WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

Wild and Scenic Rivers Act of 1968, as amended, Public Law 90-542, 82 Stat. 906, 16 USC 1271.

APPENDIX TABLE OF CONTENTS

APPENDIX A

PART A APPLICATION

CONTENTS

FORM 1

State of Washington Department of Ecology

WASHINGTON STATE

DANGEROUS WASTE PERMIT GENERAL INFORMATION

(Read "Form 1 Instructions" before starting)

I. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

II. NAME OF FACILITY

U.S. DEPARTMENT OF ENERGY-HANFORD SITE

III. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)	B. PHONE (area code & no.)
LAWRENCE, MICHAEL J.., MANAGER	509 376 7395

IV. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX: P.O. BOX 550

B. CITY OR TOWN	C. STATE	D. ZIP CODE
RICHLAND	WA	99352

V. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER: HANFORD SITE

B. COUNTY NAME: BENTON

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
RICHLAND	WA	99352	005

IV. SIC CODES *(4-digit, in order of priority)*

A. FIRST	(specify)	B. SECOND	(specify)
9711	NATIONAL SECURITY	8922	NUCLEAR NONCOMMERCIAL DEVELOPMENT AND EDUCATION

C. THIRD	(specify)	D. FOURTH	(specify)
9611	ADMINISTRATION AND GENERAL ECONOMICS PROGRAM	4911	STEAM-ELECTRIC GENERATION

VII. OPERATOR INFORMATION

A. NAME: DEPARTMENT OF ENERGY-RICHLAND OPERATIONS (DOE-RL)
WESTINGHOUSE HANFORD COMPANY (WHC)

B. Is the name listed in Item VII-A also the owner? [X] YES [ ] NO **

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)
F = FEDERAL; S = STATE; P = PRIVATE; M = PUBLIC (other than federal or state); O = OTHER (specify)

F

D. PHONE (area code & no.): 509 376 7395
509 376 7803

E. STREET OR P.O. BOX: PO BOX 550/PO BOX 1970

F. CITY OR TOWN	G. STATE	H. ZIP CODE
RICHLAND	WA	99352

VIII. INDIAN LAND

Is the facility located on Indian lands? [ ] YES [X] NO

**DOE-RL: OWNER/CO-OPERATOR; WHC: CO-OPERATOR FOR CERTAIN UNITS ON THE HANFORD SITE.

COMPLETE BACK PAGE

ECY 030-31

IX. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids undergound. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

X. NATURE OF BUSINESS *(provide a brief description)*

- NATIONAL DEFENSE NUCLEAR MATERIAL PRODUCTION
- ENERGY RESEARCH AND TECHNOLOGY DEVELOPMENT
- DEFENSE NUCLEAR WASTE MANAGEMENT
- BYPRODUCT STEAM, SOLD FOR ELECTRIC POWER GENERATION

AND SIC 15: BUILDING CONSTRUCTION - GENERAL CONTRACTORS AND OPERATIVE BUILDERS

XI. CERTIFICATION *(see instructions)*

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
SEE ATTACHMENT		

ECY 030-31 Reverse

WA7890008967

FORM 1

DANGEROUS WASTE PERMIT GENERAL INFORMATION

XI. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

Michael J. Lawrence
Manager, Richland Operations
United States Department of Energy

5-19-88
Date

W. M. Jacobi
William M. Jacobi
President
Westinghouse Hanford Company
Co-operator

5/13/88
Date

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED	COMMENTS

II. FIRST OR REVISED APPLICATION

[illegible]

A. FIRST APPLICATION [illegible]

☐ 1. EXISTING FACILITY [illegible]

☐ 2. NEW FACILITY [illegible]

* MO. __ DAY __ YR. 75 — FOR EXISTING FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED

MO. __ DAY __ YR. __ — FOR NEW FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION [illegible]

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES — CODES AND DESIGN CAPACITIES

A. PROCESS CODE — [illegible]

B. PROCESS DESIGN CAPACITY — [illegible]
1. AMOUNT — [illegible]
2. UNIT OF MEASURE — [illegible]

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc.)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET [illegible] OR HECTARE-METER
LAND APPLICATION	D82	ACRES OR HECTARES
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE	B.1. AMOUNT	B.2. UNIT OF MEASURE	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE	B.1. AMOUNT	B.2. UNIT OF MEASURE	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
1	T 0 1	220	U		7				
2	S 0 1	220	G		8				
3					9				
4					10				

* Information concerning the date of initial operation of this unit is not available.

Continued from the front

III. PROCESSES (continued)

C. SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY

T01, S01 - The 300 Area Solvent Evaporator was a treatment tank that was used to treat radioactively contaminated spent solvents. These solvents were generated in the fuel fabrication process at the 300 Area. The solvents consisted mainly of spent trichloroethylene, perchloroethylene, 1,1,1-trichloroethane and an ethyl acetate-bromine solution. Non-radioactive paint shop solvents that were potentially treated include methyl ethyl ketone, methylene chloride and petroleum naphtha. Treatment of the wastes occurred by evaporation in a Brooks Load Lugger tank with steam coils located on the side of the tank (T01). The unit was used to treat approximately 600 gallons of dangerous wastes per year. This unit has not received dangerous wastes since November 1985 and the site will be closed under interim status.

A portion of the open air concrete pad adjacent to the 334-A Building (333 East Pad) was used periodically for storage of the Solvent Evaporator and radioactively contaminated spent solvents in DOT-specification 55 gallon steel drums (S01). The drums were temporarily stored on the concrete pad north of the Solvent Evaporator sites until the waste solvents were placed in the Solvent Evaporator. No part of the overlying concrete that was placed above most of the 333 East Pad in 1984 was used for storage or treatment of the 300 Area Solvent Evaporator wastes.

IV. DESCRIPTION OF DANGEROUS WASTES

A. **DANGEROUS WASTE NUMBER** — Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. **ESTIMATED ANNUAL QUANTITY** — For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non—listed waste(s) that will be handled which possess that characteristic or contaminant.

C. **UNIT OF MEASURE** — For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. **PROCESSES**

1. **PROCESS CODES:**

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non—listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non—listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. **PROCESS DESCRIPTION:** If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER — Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* — A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non—listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2			T 0 3 D 8 0	included with above

CONTINUE ON PAGE 3

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

I.D. NUMBER (enter from page 1)

W A 7 8 9 0 0 0 8 9 6 7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	F001	7700	P	T01	S01			Evaporation/Container Storage
2	F002	↓	↓	↓	↓			↓
3	F003	↓	↓	↓	↓			↓
4	F005	↓	↓	↓	↓			↓
5	WP01	↓	↓	↓	↓			↓
6	WC01	↓	↓	↓	↓			↓
7	WT01	↓	↓	↓	↓			↓
8	D001	↓	↓	↓	↓			Included With Above
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

Continued from the front

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The 300 Area Solvent Evaporator was used for the treatment of radioactively contaminated solvents generated during the fuel fabrication efforts and associated processes. Approximately 7700 pounds of waste were treated in the Solvent Evaporator each year.

The storage pad was used to temporarily store radioactively contaminated solvent waste until the solvent could be treated in the Solvent Evaporator.

V. FACILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility (see instructions for more detail).

VI. PHOTOGRAPHS

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on attached drawings and photographs

LATITUDE (degrees, minutes, & seconds)	LONGITUDE (degrees, minutes, & seconds)

VIII. FACILITY OWNER

[X] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. (area code & no.)

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME (print or type)	SIGNATURE	DATE SIGNED
Michael J. Lawrence Manager, Richland Operations United States Department of Energy	[signature]	3-27-90

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME (print or type)	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

John E. Nolan | 3/5/90

Co-operator
John E. Nolan, President
Westinghouse Hanford Company

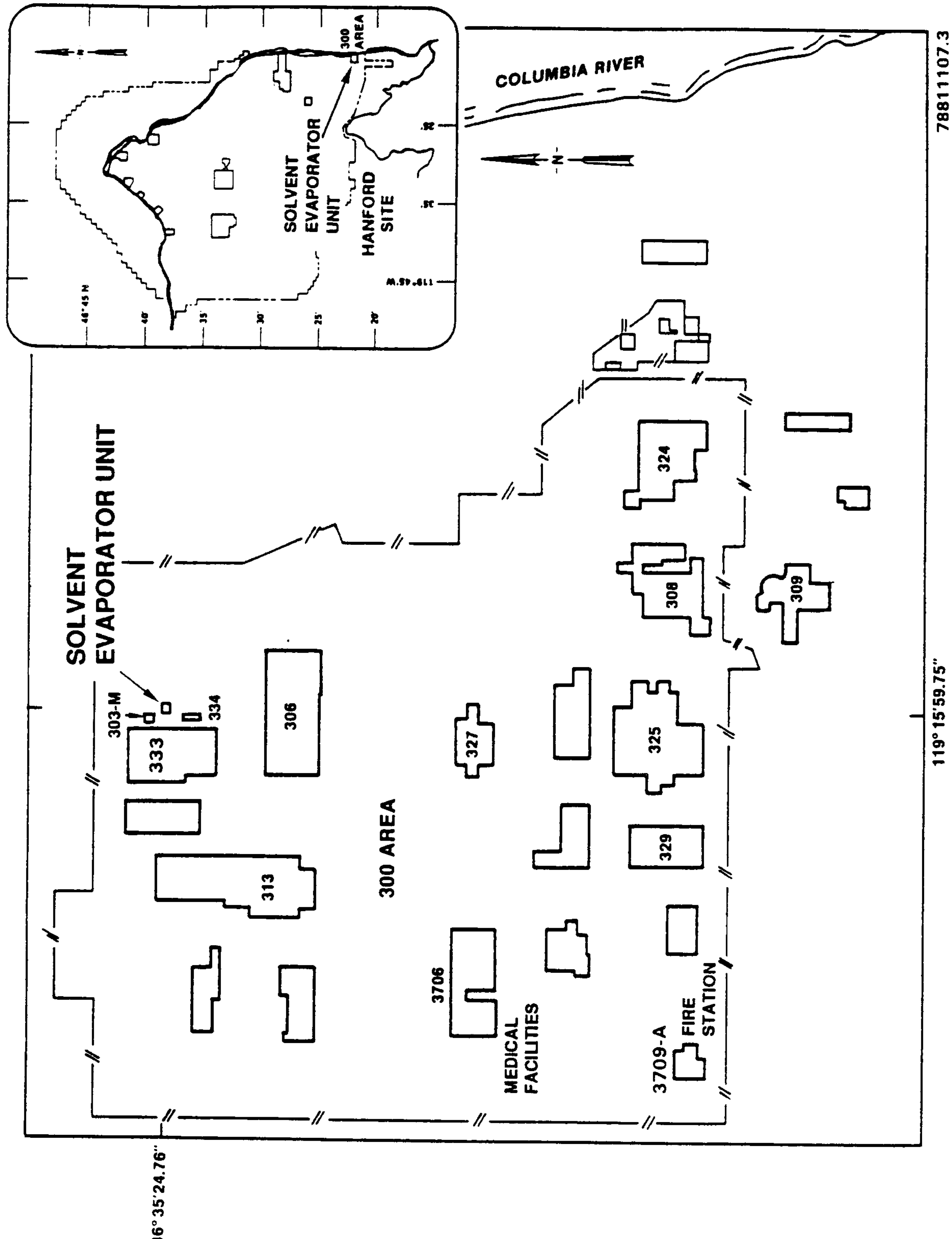
Date

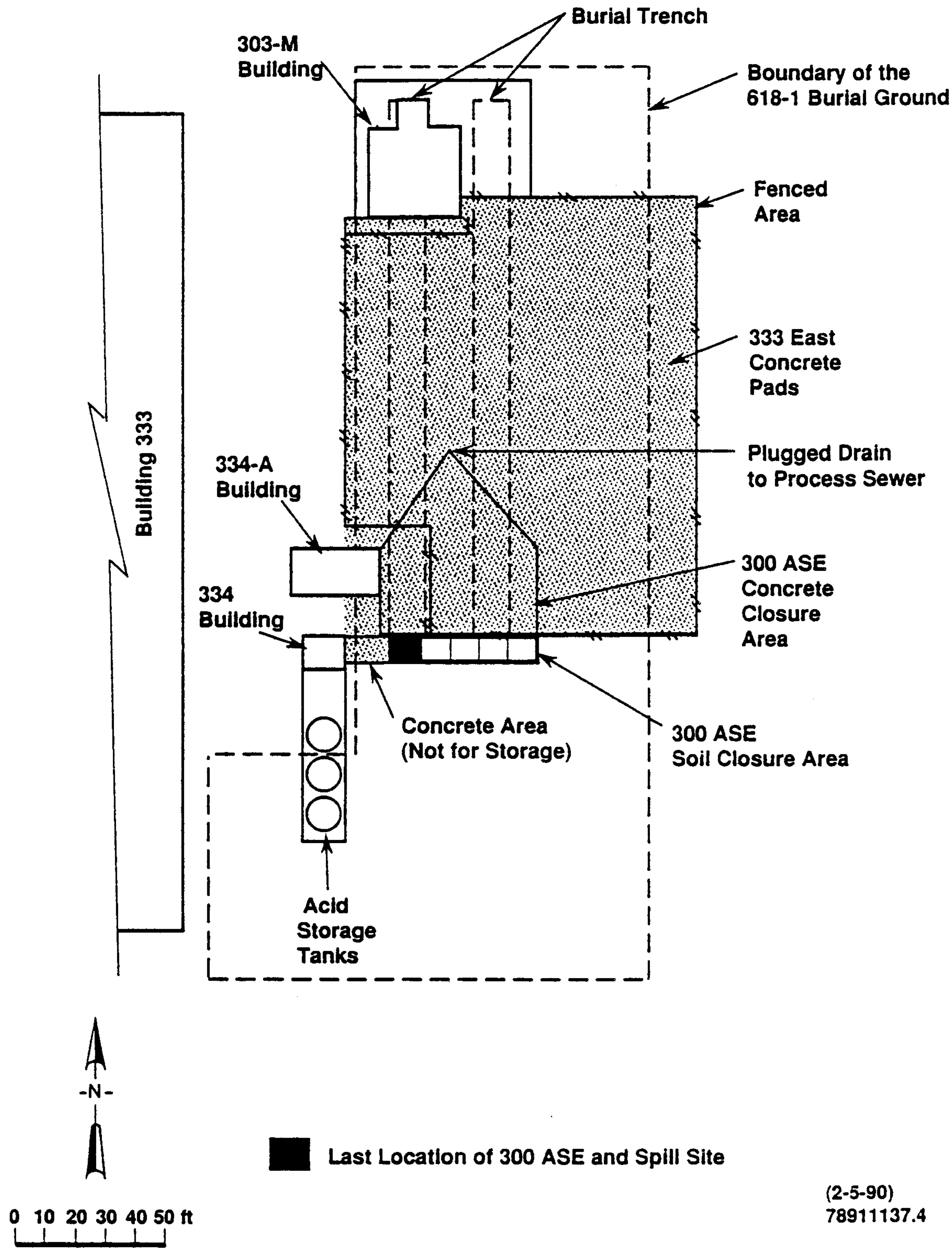
Michael J. Lawrence | 3-27-90

Owner/Operator
Michael J. Lawrence, Manager
U.S. Department of Energy
Richland Operations Office

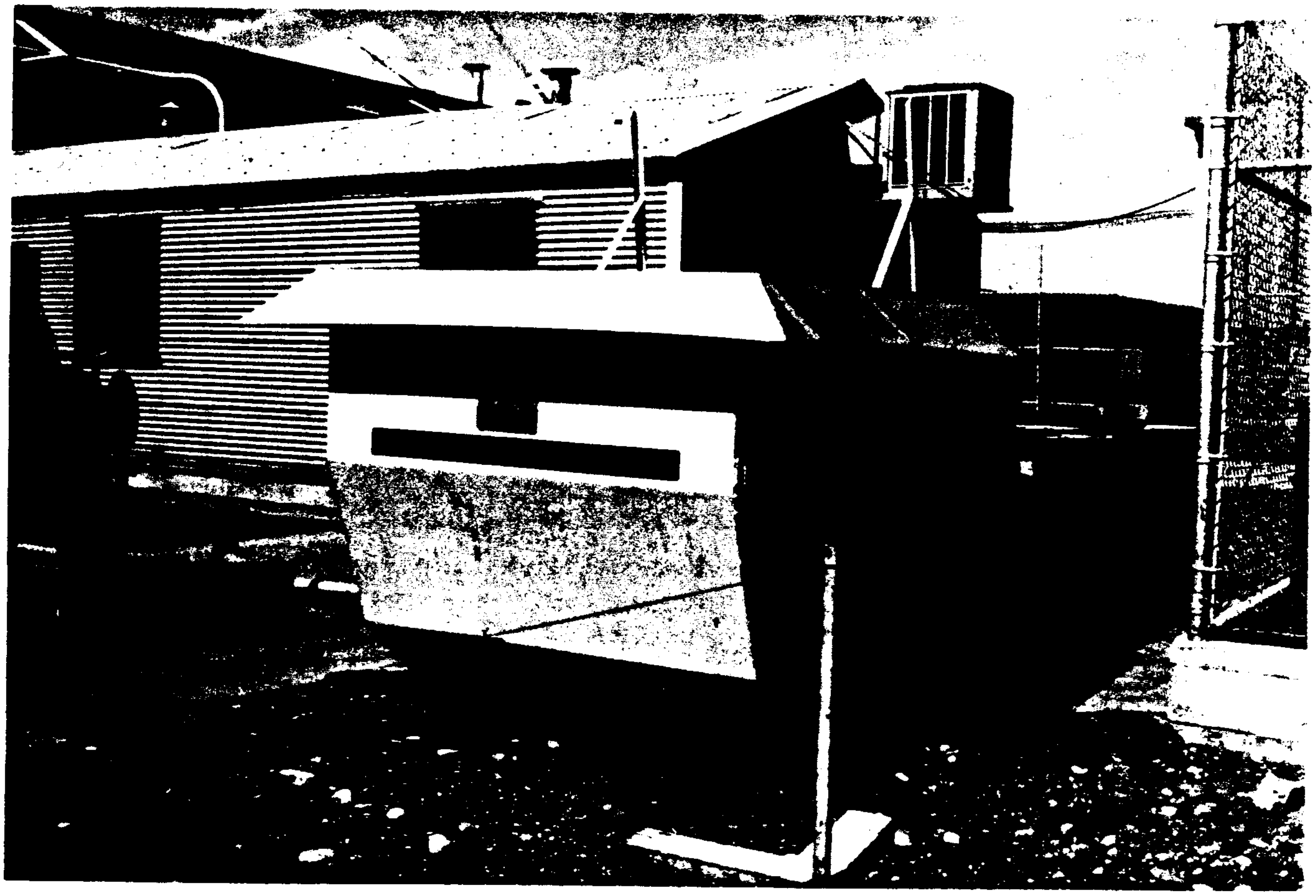
Date

300 AREA SOLVENT EVAPORATOR UNIT




Burial Trench
303-M
Building
Boundary of the
618-1 Burial Ground
Fenced
Area
333 East
Concrete
Pads
Building 333
Plugged Drain
to Process Sewer
334-A
Building
300 ASE
Concrete
Closure
Area
334
Building
Concrete Area
(Not for Storage)
300 ASE
Soil Closure Area
Acid
Storage
Tanks
-N-
Last Location of 300 ASE and Spill Site
0 10 20 30 40 50 ft
(2-5-90)
78911137.4

300 AREA SOLVENT EVAPORATOR UNIT



46°35'24.76"
119°15'59.75"

8507636-3CN
(PHOTO TAKEN 1985)
78901124.5M

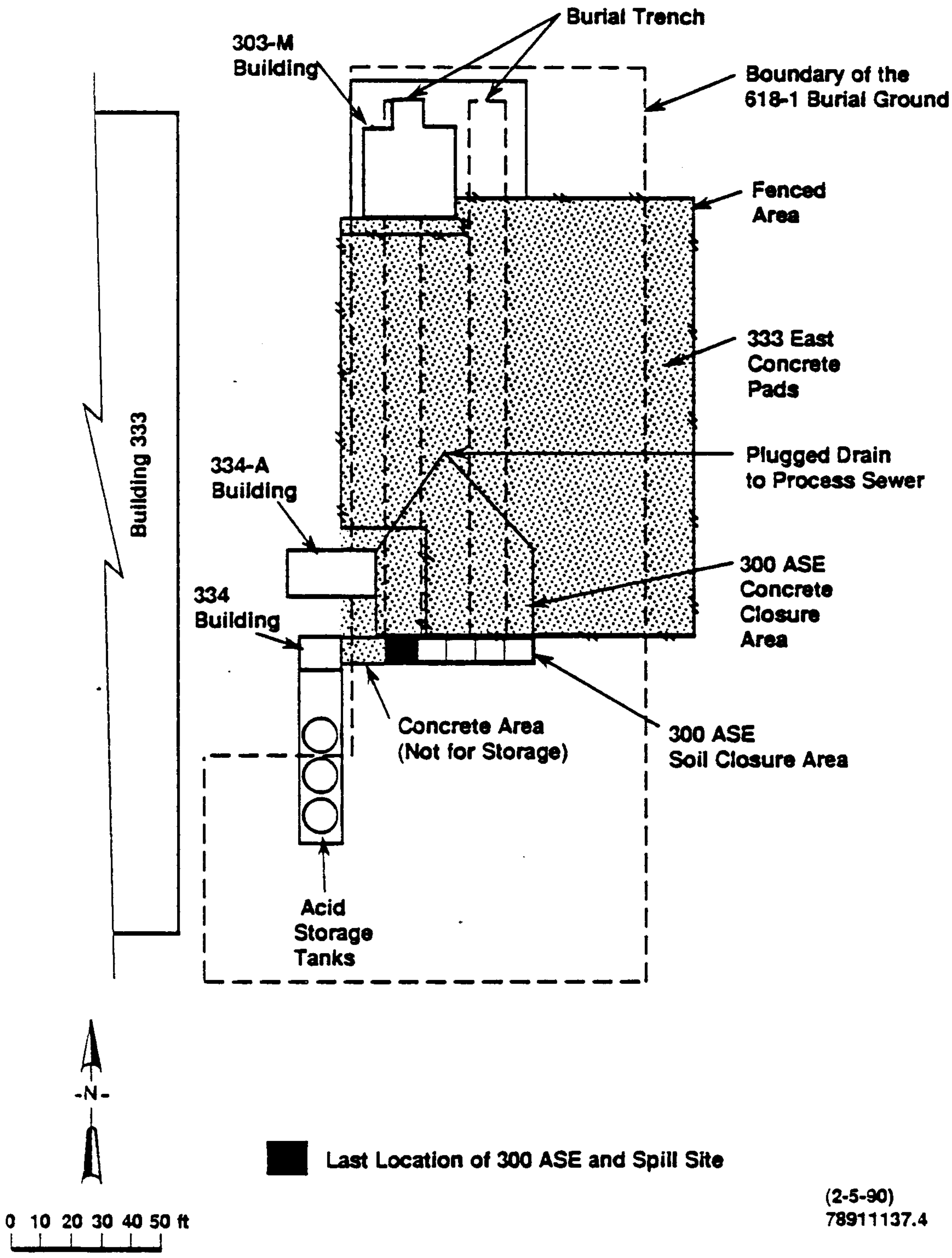
APPENDIX B

HANFORD SITE
WASTE INFORMATION DATA SYSTEM (WIDS)

CONTENTS

HANFORD SITE
WASTE INFORMATION DATA SYSTEM (WIDS)

Site Name:	618-1 Burial Ground
Status:	Operational: Inactive Radiological: Released
Site Type:	Non-Retrievable Solid Waste
Coordinates:	N55310/E14987, N55630/E14987, N55310/E14834, N55630/E14890, N55390/E14834, N55390/E14890
Reference Drawings:	H-3-9921 (sheet 2) and H-3-1172
Alias Names:	318-1, Solid Waste Burial Ground No. 1
Location:	300 Area - adjacent to the 333 Building in the northeast corner of the 300 Area near the exclusion fence.
Elevations and Depths:	Ground (above msl): 390 feet Water Table (below grade): 48 feet Site Depth (below grade): 20 feet
Waste Category:	Mixed Waste
Service Dates:	Start: 1944 End: 1951
Waste Volume:	Estimated at 350 tons in 37,000 cubic yards
Contaminated Soil Volume:	Not available
Overburden Soil Volume:	1,224 cubic yards
Site Area Boundary:	35,520 square feet
Summary Date:	July 30, 1987
Site Description:	Burial ground consisting of at least two trenches running north-south, 16 feet wide (surface) x 230 feet long x 8 feet deep. There also are a series of pits 15 feet wide, running east-west in the south end, 20 feet deep.
Service History:	This burial ground was active from 1944-1951. The site contains large quantities about 16.28 tons of uranium and small quantities of plutonium and fission products from the 300 Area Reactor Fuel Fabrication facilities and laboratories.
Associated Structures:	None.



1 Figure B-1. 300 Area Solvent Evaporator Closure Area
2 and 618-1 Burial Ground.

APPENDIX C

COMPOSITION AND DESIGNATION OF SOLVENT EVAPORATOR WASTE

CONTENTS

APPENDIX C

COMPOSITION AND DESIGNATION OF SOLVENT EVAPORATOR WASTE

Table C-1. Toxicity Determination.

Component	Concentration(%)	WT%	Category[a]	EC[b]
Perchloroethylene	71	7.10E+01	B	7.1E+01
1,1,1-trichloroethane	9	9.00E+00	C	9.0E-03
Trichloroethylene	11	1.10E+01	B	1.1E-03
Combination mixture[c]	9	9.00E+00	C	9.0E-03
Ethyl acetate			D	
Bromine			None	
Used Oil			None	
Methyl ethyl ketone			D	
Methylene chloride			C	
Petroleum naphtha			None	
Aluminum	10ppm	1.0E-03	None	---
Boron	5ppm	5.0E-04	None	---
Calcium	52ppm	5.2E-03	None	---
Iron	78ppm	7.8E-03	None	---
Lithium	4ppm	4.0E-04	None	---
Beryllium	<0.11ppm[d]	1.1E-05	A	1.1E-05
Phosphorus	25ppm	2.5E-03	X	2.5E-03
Silicon	28ppm	2.8E-03	None	---
Sodium	46ppm	4.6E-03	A	4.6E-03
Zirconium	2ppm	2.0E-04	None	---
		Total EC		7.1E+01

[a] WAC 173-303-084(5) and 40 CFR 302.4.
[b] EC=Equivalent Concentration.
[c] The combination mixture will be classified as Toxic C for designating purposes.
[d] Calculated Concentration.

Note: Concentration of uranium was below detection limits (less than 10 micrograms per milliliter). If the EC is greater than 1 percent, then the solution is regulated for toxicity as WT01 (extremely hazardous waste according to WAC-173-303).

Table C-2. Carcinogenesis Determination.

Component	Concentration (WT%)
Perchloroethylene	71
Trichloroethylene	11
Beryllium	1.1E-05
SUM OF WT% OF CARCINOGENS	>82

Weight percent (wt%) of total carcinogens must be greater than or equal to 1 percent in order to be regulated as WC01 (extremely hazardous waste).

Table C-3. Persistence Determination.

Component	Concentration (WT%)
Perchloroethylene	71
1,1,1-trichloroethane	9
Trichloroethylene	11
SUM OF WT% OF CARCINOGENS	>90

Weight percent (wt%) of total halogenated hydrocarbons must be greater than or equal to 1 percent in order to be regulated as WP01 (extremely hazardous waste).

Table C-4. Listed Waste Designations*.

Perchloroethylene	F001, WT01, WC01, WP01, D001
1,1,1-trichloroethane	F002, WP01
Trichloroethylene	F001, WC01, WP01
Ethyl acetate	F003
Methyl ethyl ketone	F005
Methylene chloride	F001

* Based on WAC 173-303 dangerous waste listings.

APPENDIX D

PROCEDURES, WORK AUTHORIZATIONS, BURIAL RECORDS, AND COMPLIANCE CHECKSHEETS

NOTE: These historical procedures are reprinted without benefit of current editorial standards. These procedures do not necessarily reflect the current Hanford Site environmental practices.

CONTENTS

SAMPLE

UNC NUCLEAR INDUSTRIES

FUELS OPERATIONS DIVISION
ENVIRONMENTAL CONTAMINATION CONTROL PROCEDURES

Document No	UNI-M-46
Date Issued	7-15-83
Page No	
Supersedes Issue Dated	6-1-82
Subject	ECC-114 - WASTE SOLVENT SYSTEM
Issued By	Fuels Engineering

BASIS

At the present time there is no absolute environmentally acceptable manner (such as a high temperature incinerator) for disposing of waste solvents at Hanford. Most of the solvents from Fuels Operations Division are waste vapor degreasing solvents (trichloroethylene, 1,1,1 trichloroethane and perchloroethylene) and can be contaminated with uranium and Be from degreasing uranium billets and Be-Zr-2 braze rings.

A dumpster has been provided at a remote distance from occupied areas and within a restricted area (east of the 334 Building) and the waste solvents are poured into this dumpster where the excess solvent is allowed to slowly evaporate. When the dried sludge has built-up sufficiently, the sludge and excess solvent will be packaged as "Liquid Organic Material" in 17C drums for disposal as per U contaminated oil (see ECC-104).

CONTROLS

A. Administrative Controls

The use of the solvent dumpster shall be limited to organic solvents that cannot be disposed of in the waste oil system as per ECC-104. (No heavy oils, greases or aqueous solutions.)

B. Inspection of Facilities

Inspection of the solvent dumpster on the east side of 334 Building shall be conducted and documented annually by facility management.

Revision 1, Dated April 17, 1978:

Basis: Added 1,1,1 trichloroethane to list of degreasing solvents.

Revision 2, Dated September 26, 1980:

Basis: Now require that when the sludge builds up in the waste dumpster it will be barrelled for disposal (not burying the dumpster).

Control 3: Deleted DUN-M-31.

Revision 3, Dated June 1, 1982:

Basis: Sludge in dumpster to be disposed of in 17C drums as per ECC-104 not in 17H drums as solid waste.

Revision 4, Dated July 15, 1983:

Basis: Changed "Fuels Production Department" to "Fuels Operations Division."

OBSOLETE AS OF FEB 12 1986

SAMPLE

UNC NUCLEAR INDUSTRIES FUELS PRODUCTION DEPARTMENT OPERATING PROCEDURES	Document No. UNI-M-58	
	Procedure No. E-14	Page No. 1 of 3
	Date Issued 1-11-85	Supersedes Issue Dated 1-20-84
Title: DEGREASER SOLVENT FILL AND DISPOSAL SYSTEM	Issued By FUELS OPERATIONS	

I. BASIS

Clean perchloroethylene for filling the degreasers is obtained in drums from 303-F. A portable pump is used to transfer from the drum into the degreaser.

No. 3 degreaser uses solvent: 1,1,1-trichloroethane. This solvent is received in a 54 gallon drum and is stored near the degreaser. The solvent is pumped from the drum into the degreaser with a portable pump. The pump is stored behind tank #24.

II. REFERENCE

DUN-5601
UNI-M-38
Job Hazard Breakdown #33-1

III. EQUIPMENT NEEDED

Bump cap
Acid goggles
Coveralls
Safety shoes or toe protectors
Leather or rubber gloves
Oil sorbent sheets

IV. PROCEDURE

A. Filling of the Degreasers

When solvent is needed in a degreaser, the chem bay chief operator will bring it into the 333 Building in 55 gallon drums and pump it into the degreaser.

CAUTION: The degreasers using perchlorethylene receive the clean solvent into the cold side, it is possible to overfill them as the perchlorethylene goes into the degreaser faster than it flows from the cold side to the hot side. Due to this delay in the perchlorethylene moving from the hot side, shut off perchlorethylene fill valve, when the level in the hot side is approximately 1" below the desired level. This will prevent overfilling. Wait about 2 minutes, check solvent level and add more if needed.

Review Dates and Initials						

Prepared by	Reviewed by	Approved by
P. Neale Supervisor, Fuels Operations	H. G. [signature] 1/2/85	John A. Kenerick 1-9-85 Manager, Fuels Operations

A-6300-282 (2-82)

B. Emptying Degreaser

Each degreaser (except end cap and support etch) is equipped with a spray wand and a drain line to remove the solvent. Use the same pump to remove solvent from #3 degreaser that was used to fill it.

1. Close overflow line and boil off solvent from vapor zone to condensate storage tank. Shut off heater and let vapor zone cool down.

2. Pump out cold reservoir by using the spray wand. Pump into barrels. Return the spray wand properly to its holder immediately upon completion of pumping.

3. Pump out cool solvent in boiling side by attaching a portable pump to drain line. Pump into barrels (old black trichloroethane barrels, which are stored next to 334 by the waste solvent dumpster, are used to transfer the dirty solvent).

C. A waste solvent dumpster is located east of the 334 Building. Transfer barrels of dirty solvent to waste solvent dumpster and pour into dumpster.

D. If the solvent level in the dumpster is high, speed up the evaporation by using the steam coils:

1. Set up "Warning Steam Hose" signs in 334 Building and east of 334 Building near hose.

2. Turn on steam in 334 Building.

3. Allow solvent to evaporate to desired level and then turn off steam.

Review Dates and Initials						

Prepared by	Reviewed by	Approved by
P. Pruk Supervisor, Fuels Operations	H.B. Jensen 1/2/85	John A Reinaye 1-9-85 Manager, Fuels Operations

OBSOLETE AS OF FEB 12 1986 SAMPLE

UNC NUCLEAR INDUSTRIES FUELS PRODUCTION DEPARTMENT OPERATING PROCEDURES	Document No. UNI-M-58	
	Procedure No. E-14	Page No. 3 of 3
	Date Issued 1-11-85	Supersedes Issue Dated 1-20-84
Title DEGREASER SOLVENT FILL AND DISPOSAL SYSTEM	Issued By FUELS OPERATIONS	

V. ACCIDENTAL SPILLS OR LEAKS

A. If any solvent accidentally gets on you, follow the emergency procedure as defined in Chemical Bulletins #3 and #26 from UNI-M-38.

B. If any solvent is spilled onto the ground or into a trench, notify supervision immediately. If oil sorbant sheets are handy use them to contain the spill (even in a trench with water) and then notify supervision. Supervision will arrange to properly dispose of the solvent soaked sheets.

WP#0025E

Review Dates and Initials						

Prepared by	Reviewed by	Approved by
[signature] Supervisor, Fuels Operations	[signature] 1/2/85	[signature] 1-9-85 Manager, Fuels Operations

A-6300-282 (2-82)

UNC NUCLEAR INDUSTRIES FUELS PRODUCTION DEPARTMENT OPERATING PROCEDURES	Document No. UNI-M-58	
	Procedure No. E-14	Page No. 1 of 4
	Date Issued 1-20-84	Supersedes Issue Dated 9-18-79
Title DEGREASER SOLVENT FILL AND DISPOSAL SYSTEM	Issued By FUELS OPERATIONS	

I. BASIS

Clean perchloroethylene for filling the degreasers is obtained from the 313 pumping station. It can either be pumped directly to the degreasers or it can be put into the solvent holding tank in the chem bay mezzanine and later be used to fill the degreaser by gravity flow. The normal procedure is to use the percholorethylene from the solvent still storage tank.

No. 3 degreaser uses solvent: 1,1,1-trichloroethane. This solvent is received in a 54 gallon drum and is stored near the degreaser. The solvent is pumped from the drum into the degreaser with a portable pump. The pump is stored behind tank #24.

II. REFERENCE

DUN-5601
UNI-M-58
Job Hazard Breakdown

III. EQUIPMENT NEEDED

Bump cap
Acid goggles
Coveralls
Safety shoes or toe protectors
Leather or rubber gloves

IV. PROCEDURE

A. To obtain fresh perchlorethylene from the 313 Building, contact the 313 fuel recovery operator and notify him that you are ready to receive perchlorethylene. Open valve T-1 and watch the storage tank until it is full. Shut off valve T-1 and tell the 313 operator that the pumping is completed. Valve T-2 is in the supply line to the degreasers and is left open.

B. Filling of the Degreasers

When perchlorethylene is desired in a degreaser in the 333 Building, open the fill valve located on the degreaser. Each valve is numbered as listed:

Review Dates and Initials						

Prepared by	Reviewed by	Approved by
[signature] 12-12-83 Supervisor, Fuels Operations	[signature] 12/27/83	[signature] Manager, Fuels Operations

No. 1 degreaser (vacublast) valve #T-7
No. 2 degreaser (final etch) valve #T-11.
No. 3 degreaser (end cap and support etch) filled from barrel of 1,1,1-trichloroethane
No. 4 degreaser (billet cleaning) valve #T-4
No. 5 degreaser (component cleaning) valve #T-13
No. 6 degreaser (billet lube) valve #T-16

Observe the filling of the degreaser and shut off the valve when the desired level is reached.

CAUTION: The degreasers using perchlorethylene receive the clean solvent into the cold side, it is possible to overfill them as the perchlorethylene goes into the degreaser faster than it flows from the cold side to the hot side. Due to this delay in the perchlorethylene moving from the hot side, shut off perchlorethylene fill valve, when the level in the hot side is approximately 1" below the desired level. This will prevent overfilling. Wait about 2 minutes, check solvent level and add more if needed.

C. Emptying Degreaser

Each degreaser (except #3) is equipped with a spray wand and a drain line to remove the solvent. Use the same pump to remove solvent from #3 degreaser that was used to fill it.

1. Pump out cold reservoir by using the spray wand. Pump into barrels.

2. Pump out cool solvent in boiling side by attaching a portable pump to drain line. Pump into barrels.

   a. Fuels Maintenance will supply pump, fitting and make connections.
   b. Barrels supplied by Materials Services.

D. A waste solvent dumpster is located east of the 334 Building. Transfer barrels of dirty solvent to waste solvent dumpster and pour into dumpster.

SAMPLE

E. If the solvent level in the dumpster is high, speed up the evaporation by using the steam coils:

1. Set up "Warning Steam Hose" signs in 334 Building and east of 334 Building near hose.

2. Turn on steam in 334 Building.

3. Allow solvent to evaporate to desired level and then turn off steam.

WP#0025E

SAMPLE

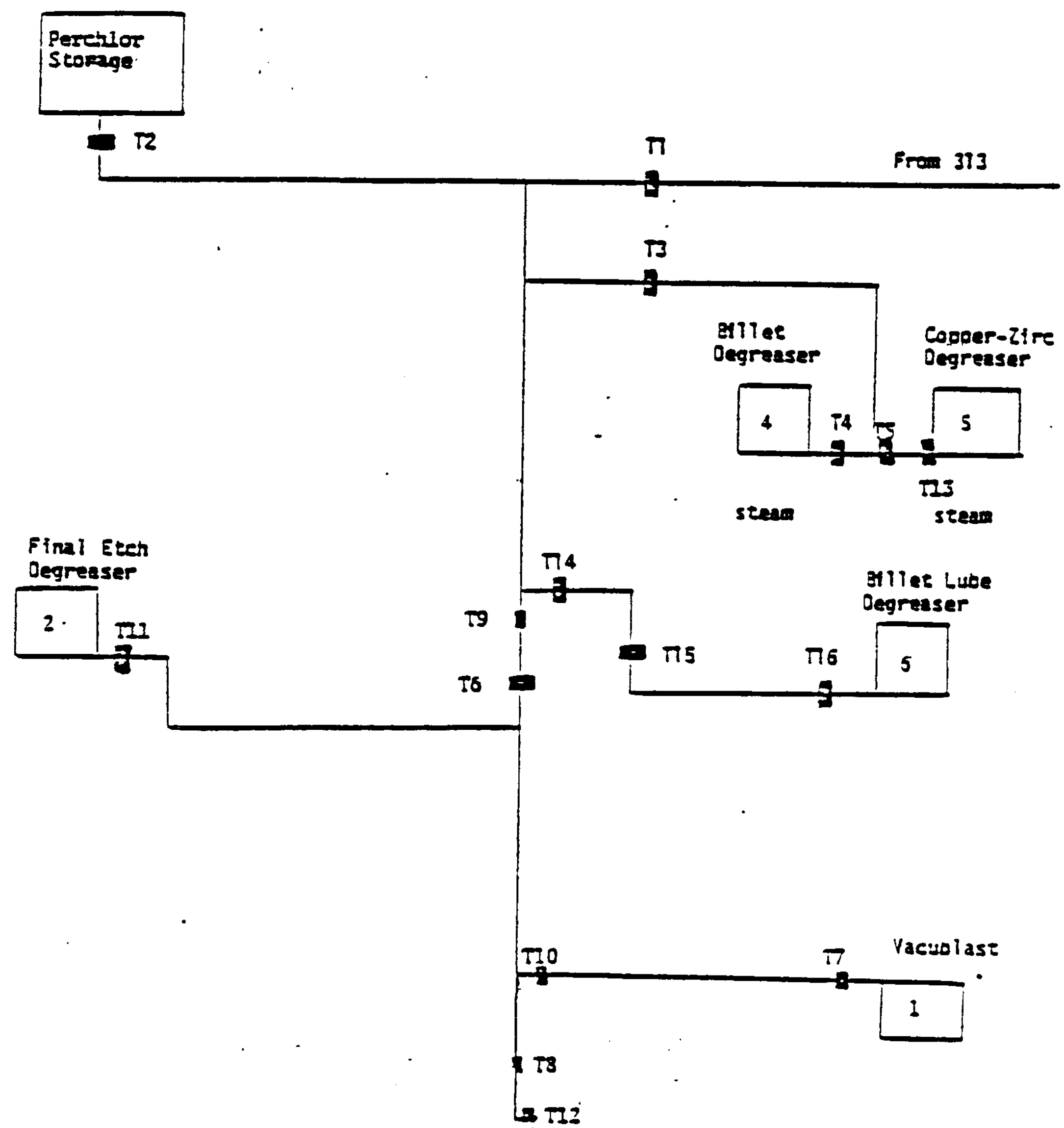
UNC NUCLEAR INDUSTRIES

FUELS PRODUCTION DEPARTMENT
OPERATING PROCEDURES

Document No.	UNI-M-58
Procedure No.	E-14
Page No.	4 of 4
Date Issued	1-20-84
Supersedes Issue Dated	9-18-79
Issued By	FUELS OPERATIONS

Title

DEGREASER SOLVENT FILL AND DISPOSAL SYSTEM



Review Dates and Initials						

Prepared by	Reviewed by	Approved by
1-16-84 Supervisor, Fuels Operations	10/31/83	Manager, Fuels Operations

Title
DEGREASER SOLVENT FILL AND DISPOSAL SYSTEM

I. BASIS

Clean perchloroethylene for filling the degreasers is obtained from the 313 pumping station. It can either be pumped directly to the degreasers or it can be put into the solvent holding tank in the chem bay mezzanine and later be used to fill the degreasers by gravity flow. The normal procedure is to use the perchloroethylene from the solvent still storage tank.

No. 3 degreaser uses solvent: 1,1,1-trichloroethane. This solvent is received in a 54 gallon drum and is stored near the degreaser. The solvent is pumped from the drum into the degreaser with a portable pump. The pump is stored behind tank #24.

II. REFERENCE

DUN-5601
UNI-M-38
Job Hazard Breakdown

III. EQUIPMENT NEEDED

1. Acid goggles
2. Coveralls
3. Safety shoes and toe protectors
4. Leather or rubber gloves

IV. PROCEDURE

A. To obtain fresh perchloroethylene from the 313 Building, contact the 313 fuel recovery operator and notify him that you are ready to receive perchloroethylene. Open valve T-1 and watch the storage tank until it is full. Shut off valve T-1 and tell the 313 operator that the pumping is completed. Valve T-2 is in the supply line to the degreasers and is left open.

B. Filling of the Degreasers

When perchloroethylene is desired in a degreaser in the 333 Building, open the fill valve located on the degreaser. Each valve is numbered as listed:

No. 1 degreaser (vacublast) valve #T-7
No. 2 degreaser (final etch) valve #T-11
No. 3 degreaser (end cap and support etch) filled from barrel of 1,1,1 trichloroethane
No. 4 degreaser (billet cleaning) valve #T-4
No. 5 degreaser (component cleaning) valve #T-13
No. 6 degreaser (billet lube) valve #T-16

Title	Procedure No
DEGREASER SOLVENT FILL AND DISPOSAL SYSTEM	E-14

Observe the filling of the degreaser and shut off the valve when the desired level is reached.

CAUTION: All of the degreasers receive the clean perchloroethylene into the cold side, it is possible to overfill them as the perchloroethylene goes into the degreaser faster than it flows from the cold side to the hot side. Due to this delay in the perchloroethylene moving from the cold side to the hot side, shut off perchloroethylene fill valve, when the level in the hot side is approximately 1" below the desired level. This will prevent overfilling. Wait about 2 minutes, check solvent level and add more if needed.

C. Emptying Degreaser

Each degreaser (except #3) is equipped with a spray wand and a drain line to remove the solvent. Use the same pump to remove solvent from #3 degreaser that was used to fill it.

1. Pump out cold reservoir by using the spray wand. Pump into barrels.
2. Pump out cool solvent in boiling side by attaching a portable pump to drain line. Pump into barrels.
   a. Fuels Maintenance will supply pump, fitting and make connections.
   b. Barrels supplied by Material Services.

D. A waste solvent dumpster is located east of the 334 Building. Transfer barrels of dirty solvent to waste solvent dumpster and pour into dumpster.

E. If the solvent level in the dumpster is high, speed up the evaporation by using the steam coils:

1. Set up "Warning Steam Hose" signs in 334 Building and east of 334 Building near hose.
2. Turn on steam in 334 Building.
3. Allow solvent to evaporate to desired level and then turn off steam.

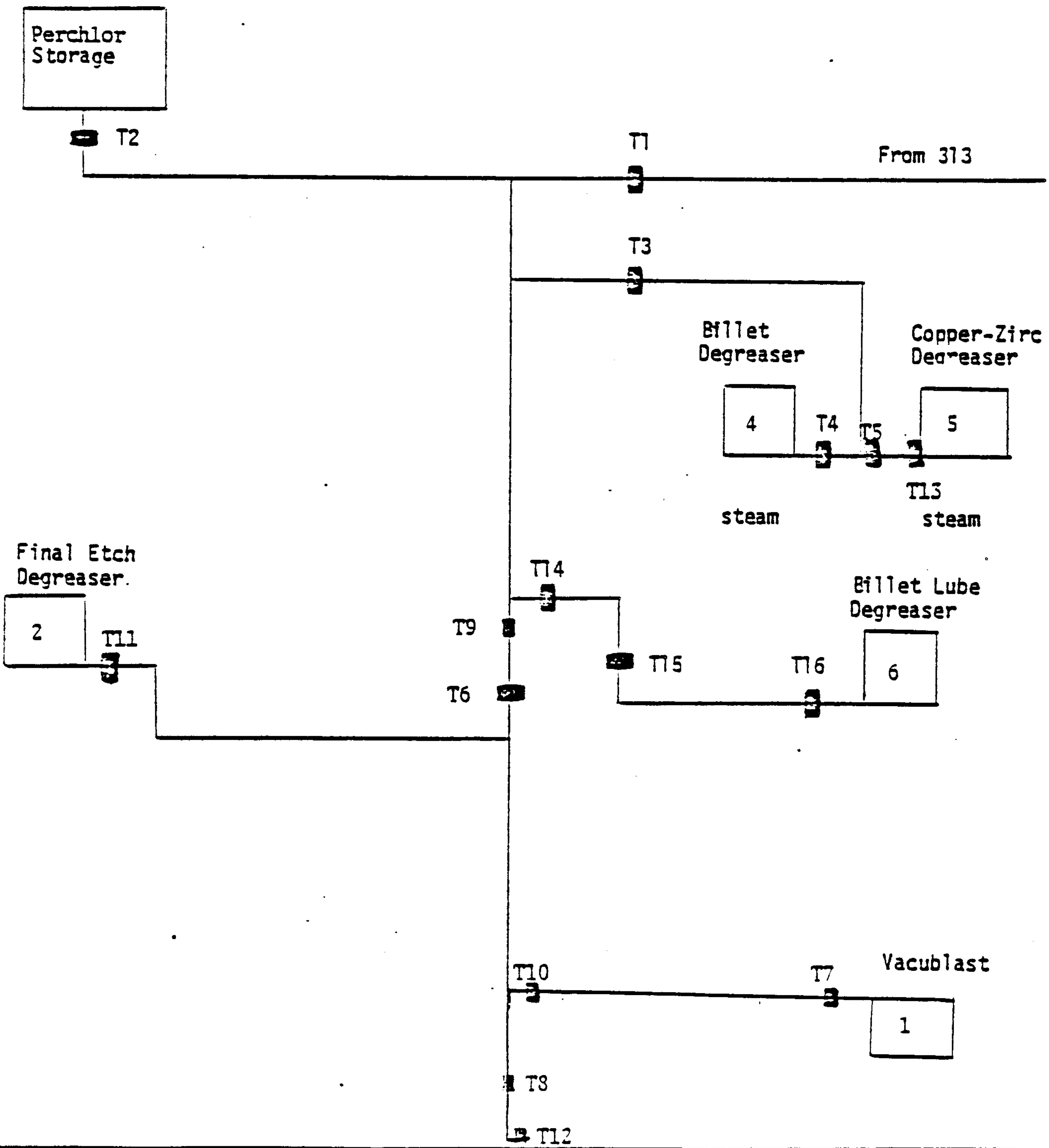
OBSOLETE AS OF FEB 07 1984

SAMPLE

FUELS PRODUCTION DEPARTMENT
OPERATING PROCEDURES
FUELS OPERATION

UNI-M-58

Title	Procedure No
DEGREASER SOLVENT FILL AND DISPOSAL SYSTEM	E-14



Reviewed by: [illegible] Date: 8-30-79

Prepared By	Approved By	Date Issued	Supersedes Issue Dated	Page No.
H. D. [illegible]	[illegible]	[illegible]	[illegible]	3 of 3

SAMPLE

UNI-M-58

Title	Procedure No.
PERCHLOR FILL AND DISPOSAL SYSTEM	CA-748 E-14

I. BASIS

OBSOLETE AS OF OCT 0 1 1979

Clean perchlor for filling the degreasers is obtained from the 313 pumping station. It can either be pumped directly to the degreasers or it can be put into the perchlor still holding tank in the chem bay meazzanine and later be used to fill the degreasers by gravity flow. The normal procedure is to use the perchlor from the perchlor still storage tank.

II. REFERENCE

DUN-5601
UNI-M-38
DUN-5750
Job Hazard Breakdown

III. EQUIPMENT NEEDED

1. Acid goggles.
2. Coveralls
3. Safety shoes and toe protectors.
4. Leather or asbestos gloves.

IV. PROCEDURE

A. To obtain fresh perchlor from the 313 Building, contact the 313 fuel recovery operator and notify him that you are ready to receive perchlor. Open valve T-1 and watch the storage tank until it is full. Shut off valve T-1 and tell the 313 operator that the pumping is completed.

B. Filling of the Degreasers

When perchlor is desired in a degreaser in the 333 Building, open the valve nearest the degreaser. Observe the filling of the degreaser and shut off the valve when the desired level is reached.

CAUTION: All of the degreasers receive the clean perchlor into the cold side, it is possible to overfill them as the perchlor goes into the degreaser faster than it flows from the cold side to the hot side. Due to this delay in the perchlor moving from the cold side to the hot side, shut off perchlor fill valve before the desired level is reached to prevent overfilling.

Prepared By	Approved By	Date Issued	Supersedes Issue Dated	Page No.
H. D. Rice Supv., Shop Operations	[signature] Mgr, Shop Operations	6-20-78	4-11-77	1 of 3

Title	Procedure No.
PERCHLOR FILL AND DISPOSAL SYSTEM	CA-748 E-14

C. Emptying Degreaser

1. Pump out cold reservoir by using spray wand or attaching a portable pump to drain line. Pump into barrels.

2. Pump out cool solvent in boiling side by using supplied pump or attaching a portable pump to drain line. Pump into barrels.

D. Transfer barrels of dirty solvent to waste solvent dumpster and pour into dumpster.

E. If the solvent level in the dumpster is high, speed up the evaporation by using the steam coils:

1. Uncoil hoses at dumpster and in 334 Building and attach.

2. Set up "Warning Steam Hose" signs in 334 Building and east of 334 Building near hose.

3. Turn on steam in 334 Building.

4. Allow solvent to evaporate to desired level and then turn off steam.

5. Let steam hose cool before disconnecting and coiling up hose.

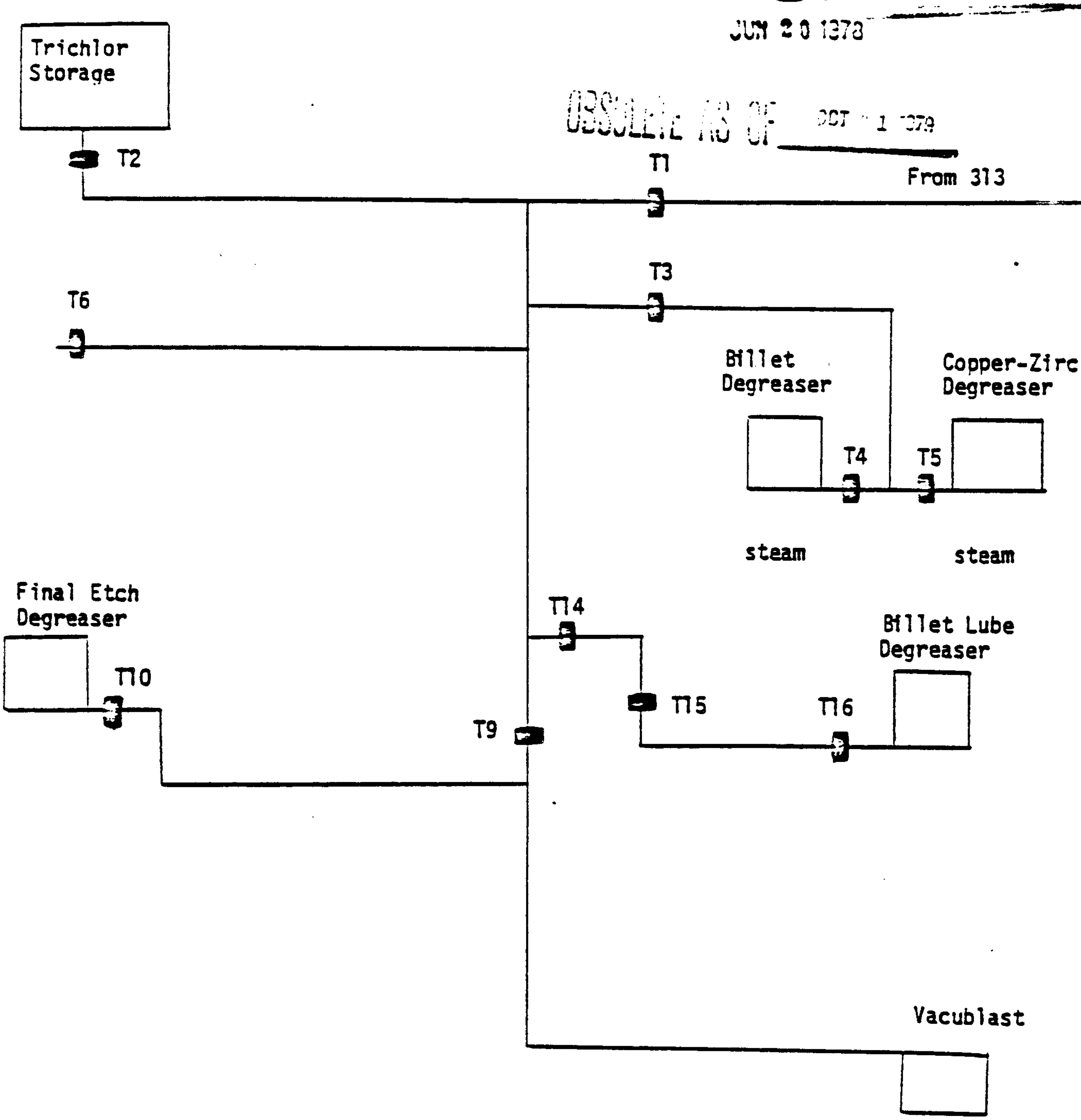
TRICHLOR FILL AND DISPOSAL SYSTEM

UNI-M-68 Ca-748
E-14

SAMPLE

JUN 20 1978

OBSOLETE AS OF OCT 1 1979



SAMPLE

FUELS PRODUCTION DIVISION
OPERATING PROCEDURES
SHOP OPERATIONS

OBSOLETE AS OF JUN 8 0 1979

UNI-M-58

Title	Procedure No
PERCHLOR FILL SYSTEM	CA-748 E-

I. BASIS

Clean perchlor for filling the degreasers is obtained from the 313 pumping station. It can either be pumped directly to the degreasers or it can be put into the perchlor still holding tank in the chem bay meazzanine and later be used to fill the degreasers by gravity flow. The normal procedure is to use the perchlor from the perchlor still storage tank.

II. REFERENCE

DUN-5601
UNI-M-38
DUN-5750
Job Hazard Breakdown

III. EQUIPMENT NEEDED

1. Acid goggles.
2. Coveralls
3. Safety shoes and toe protectors.
4. Leather or asbestos gloves.

IV. PROCEDURE

A. To obtain fresh perchlor from the 313 Building, contact the 313 fuel recovery operator and notify him that you are ready to receive perchlor. Open valve T-1 and watch the storage tank until it is full. Shut off valve T-1 and tell the 313 operator that the pumping is completed.

B. Filling of the Degreasers

When perchlor is desired in a degreaser in the 333 Building, open the valve nearest the degreaser. Observe the filling of the degreaser and shut off the valve when the desired level is reached.

CAUTION: All of the degreasers receive the clean perchlor into the cold side, it is possible to overfill them as the perchlor goes into the degreaser faster than it flows from the cold side to the hot side. Due to this delay in the perchlor moving from the cold side to the hot side, shut off perchlor fill valve before the desired level is reached to prevent overfilling.

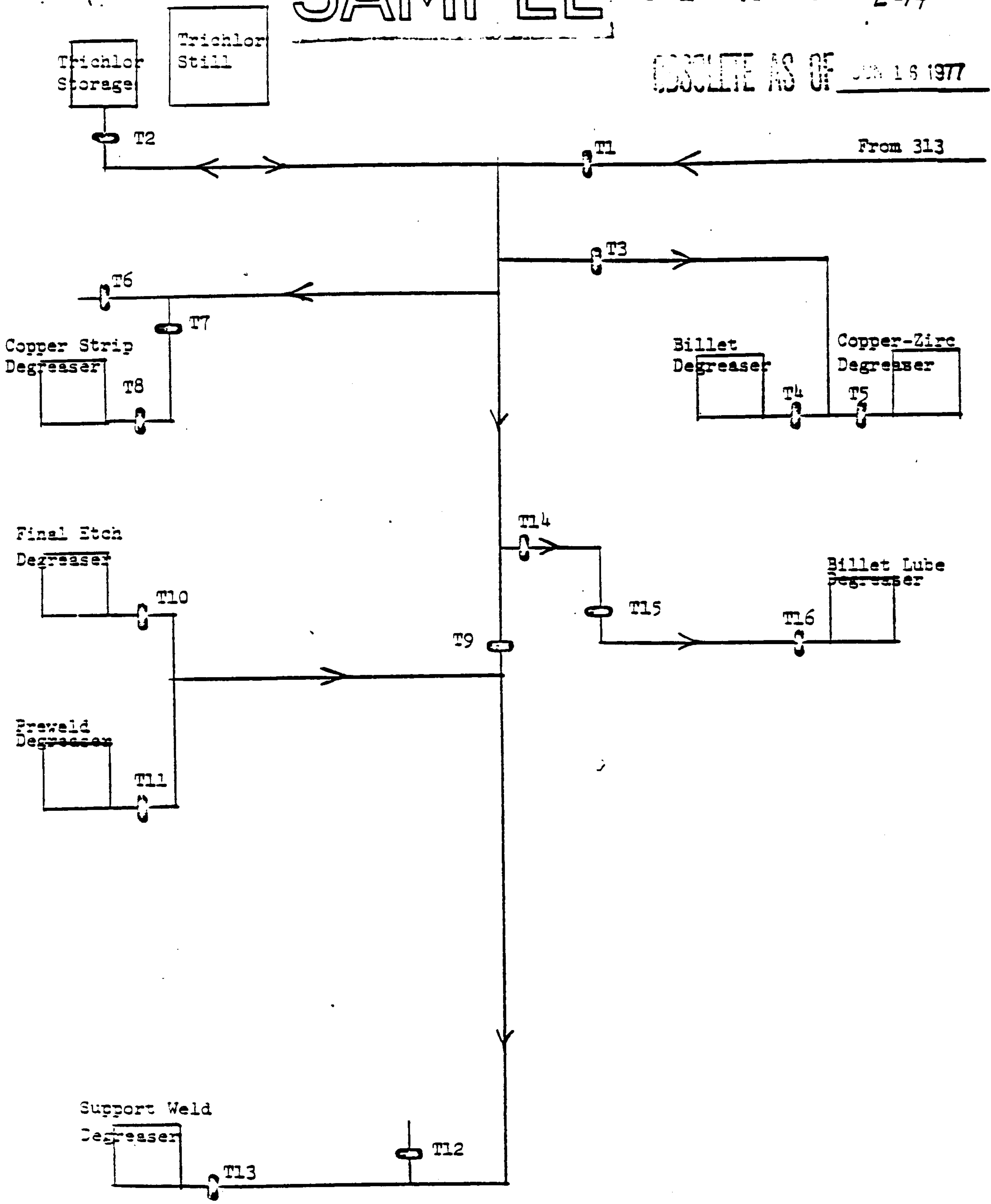
Prepared By	Approved By	Date Issued	Supersedes Issue Dated	Page No.
H. D. Rice Supv., Shop Operations	[signature] Mgr, Shop Operations	4-11-77	1-16-75	1 of 2

TRICHLOR FILL SYSTEM

SAMPLE

UNI-M-58 CA-748 E-14

OBSOLETE AS OF JUN 16 1977



SAMPLE

FUELS PRODUCTION DIVISION OBSOLETE AS OF JUN 16 1977
OPERATING PROCEDURES UNI-M-58
SHOP OPERATIONS

Title	Procedure
END CLOSURE - TRICHLOR FILL SYSTEM	CA-748 E-1

I. BASIS

Clean trichlor for filling the degreasers is obtained from the 313 pumping station. It can either be pumped directly to the degreasers or it can be put into the trichlor still holding tank in the chem bay mezzanine and later be used to fill the degreasers by gravity flow. The normal procedure is to use the trichlor from the trichlor still storage tank.

II. PROCEDURE

A. To obtain fresh trichlor from the 313 Building, contact the 313 fuel recovery operator and notify him that you are ready to receive trichlor. Open valve T-1 and watch the storage tank until it is full. Shut off valve T-1 and tell the 313 operator that the pumping is completed.

B. Filling of the Degreasers

When trichlor is desired in one of the seven degreasers in the 333 Building, open the valve nearest the degreaser. Observe the filling of the degreaser and shut off the valve when the desired trichlor level is reached.

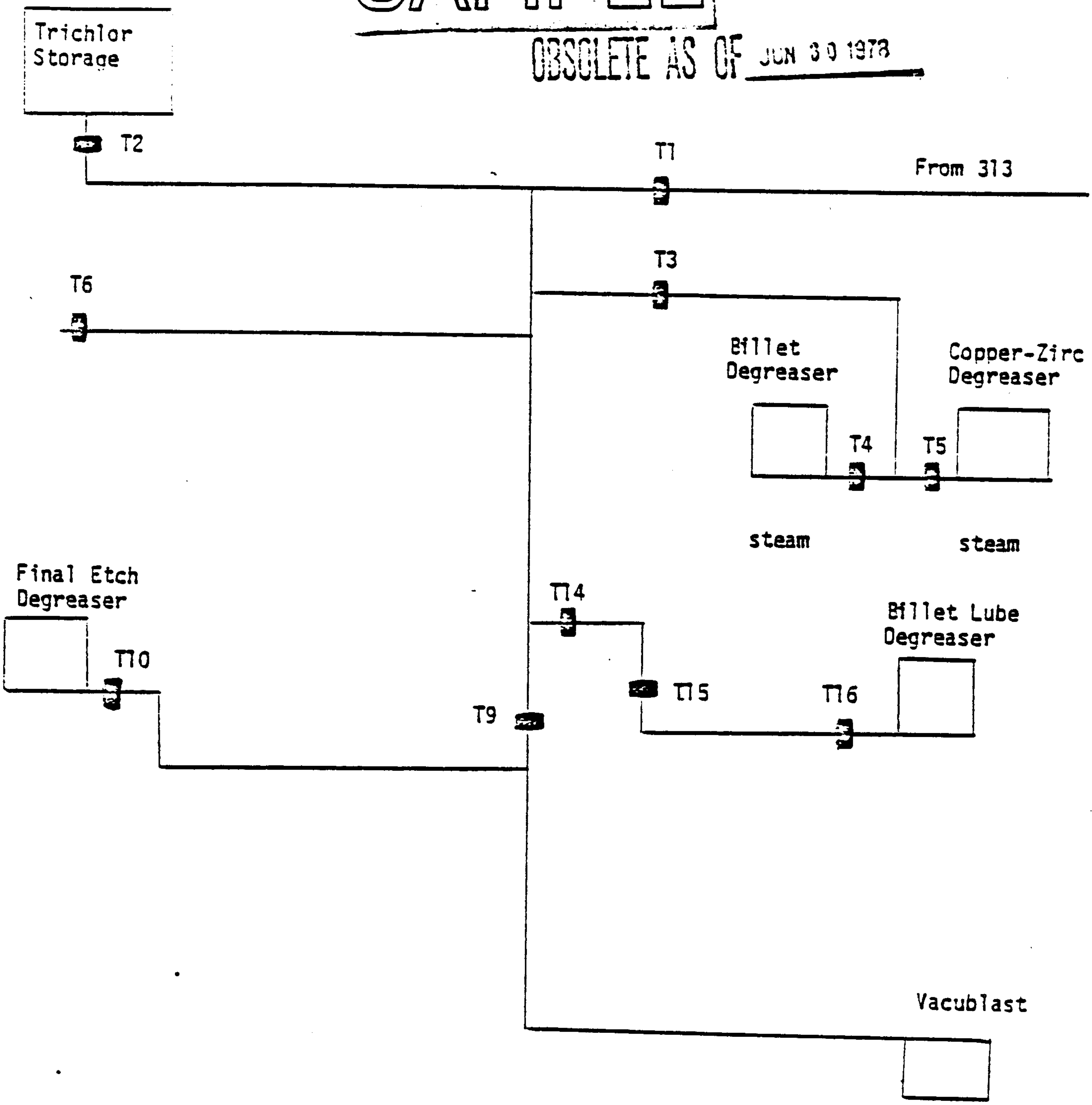
CAUTION: All of the degreasers receive the clean trichlor into the cold side, it is possible to overfill them as the trichlor goes into the degreaser faster than it flows from the cold side to the hot side. Due to this delay in the trichlor moving from the cold side to the hot side, shut off trichlor fill valve before the desired level is reached to prevent overfilling.

Prepared By	Approved By	Date Issued	Supersedes Issue Dated	Page No.
A. N. Stinson, Supv. Shop Operations	H. C. Money, Mgr. Shop Operations	1/16/75	1/12/70	1 of 2

TRICHLOR FILL SYSTEM

UNI-M-58

Ca-748
E-14



SAMPLE

Page 1 of

☐ 333 ☐ 313

☒ 334A

UNC NUCLEAR INDUSTRIES

FUELS OPERATIONS

PROCESS WORK REQUEST NO. 8-441

MATERIAL USE

☐ Customer Use

☒ Noncustomer Use

SPECIFICATIONS WAIVED

☐ Mfg. Proc. Spec. No.

☐ Engr. Spec. No.

☒ None

Test ☐ Specification Change ☐

To
Production Control

From
Process Control

No. Of Elements Involved
N/A

Model
N/A

QAL Level
–

Dates
From - Aug., 1985 To - Nov., 1985

Purpose And Justification

Provide necessary instructions for the solidification and disposal of accumulated solvent sludges in the waste solvent evaporator behind the 334-A Building. The volume of sludge is starting to limit the capacity of the evaporator to receive additional solvent wastes. The accumulated sludges need to be disposed of to allow treatment of future solvent wastes.

Special Equipment And Material

Use of special chemical Gypsum formulation to solidify wastes.

Special Procedures And Responsibility

Production Control personnel will recover the evaporator sludges and under direction of Fuels Engineering treat the waste in 30 gallon drums as detailed in the attached procedure. Overpack and shipping instructions are outlined in the attached compliance checksheet.

An RWP will be prepared by Production Control to prevent contamination release and augment sanitary measures.

INITIATOR
HF Jensen [signature]

Date
8/7/85

APPROVALS

Director, Fuels Engineering: [signature] 8-7-85	Manager, Fuels Quality Assurance: [signature] 8-7-85
Manager, Fuels Production: N/A	Supervisor, Fuels Inspection: N/A
Manager, Process Control: [signature] 8/7/85	Manager, Production Control: [signature] 8/8/85

Director, Fuels Manufacturing: [signature] 8-8-85

BM-5400-185 (1-84)

SAMPLE

PWR 8-441
Attachment 1

Procedure for the Solidification of Perchlorethylene Solvent Wastes

1. Place a 30 gallon drum in the catch basin next to the perchlor evaporator.

2. Using a hand-held electric pump, transfer 13 gallons of waste from the evaporator into the 30 gallon drum.

3. Add 1-1/2 gallons of Envirostone liquid emulsifier and 6-1/2* gallons of water, then mix with a clamp-on agitator to create a uniform emulsion.

4. Add 160 lbs. of Envirostone cement while mixing.

5. Mix for 10-15 minutes, then let the mixture set up.

6. After the mixture has hardened, add Dolomite to the top of the 30 gallon drum and attach lid.

7. Overpack the 30 gallon drum in a 55 gallon non-TRU drum and place Dolomite in between the drums.

8. Place the lid on the 55 gallon drum and torque the locking ring bolt to 40 ft-lbs.minimum.

9. Label the 55 gallon drum per the attached Burial Compliance checksheet.

10. Place the drums in the waste materials storage area east of the 333 Bldg. until shipment to RHO.

* Amount of water may be subject to change based on water already present in waste.

SAMPLE

RISK LEVEL EVALUATION

CONCERN	Minor (Use Control Factor 1-7)	Moderate (Use Control Factor 1-4)	Major (Use Control Factor 1-2)
Personal Injury	4		
Equipment Damage	7		
Violation of Nuclear Safety Specification	7		
Fire from Pyrophoric Metals	7		
Environmental Release	4		

SPILLS AND POSSIBLE SKIN IRRITATION TO PERSONNEL. PROPER CARE IN HANDLING SHOULD MINIMIZE ANY SERIOUS INCIDENT

W L Clemans [illegible]
8/7/85

SAMPLE

ATTACHMENT I

HAZARD ANALYSIS CHECKLIST

Job To Be Performed

Building 334A Date AS NECESSARY Shift DAY

Description of Job: SOLIDIFY AND PACKAGE SOLVENT EVAPORATOR WASTES PER PWR B-441

Associated Hazards*

toxic chemicals release	YES	radiological work	NO
flammables/explosives	NO	high temperature	NO
asbestos release	NO	hazard atmosphere	NO
nuclear safety requirement	NO	pyrophoric material	NO
solid, liquid, gaseous release to environment	POSSIBLE	protective clothing requirement	YES

*Indicate "Yes" or "No" for each hazard item. If "Yes", the special instruction section shall indicate how that hazard is to be controlled.

Special Instruction: THE SOLVENT SLUDGES CONTAIN PERCHLOROETHYLENE SOLVENT COUPLED WITH ACCUMULATIONS OF VARIOUS ORGANIC CONTAMINANTS - CARE MUST BE EXERCISED TO PREVENT SPILLAGE AND SKIN CONTAMINATION

Approval: W H Clemmons 8/7/85
Section Manager

Revised 8/28/84

SAMPLE

TEMPORARY RADIATION WORK PROCEDURE
(3 Rem/Hr or Less)

Area	Building	Valid Date of Procedure		Temporary RWP No.
300	334-A	From: 8-9-85	To: 12-9-85	300-1-85

Location

Description of Work: Solidification and Disposal of Solvent Sludges

RADIOLOGICAL CONDITIONS

Low Level Contamination Liquid Sludge

RADIATION MONITORING REQUIREMENTS

- [ ] Continuous Rm
- [x] Intermittent

Contact Rm
- [x] Before Entering Zone
- [x] If Conditions Change
- [x] Release Survey of Personnel and Equipment

~~XXXXXX~~ ~~Phone No. XXXXXX~~

Phone#-6-3311
Pax# - 816

INSTRUCTIONS

1. Comply with all Fuels Operations "Employee Radiation Zone Rules".
2. Temporary Radiation Zones to be set up for pumping, and storage of drums of waste.
3. Waste drums (smears) shall be <200 cpm., and packaged per UNI-M-29.
4. Comply with Process Work Request No. B-441.

PROTECTIVE EQUIPMENT REQUIREMENTS

HEAD
- [x] Cap
- [ ] Hood
- [ ] Rubber
- [ ] Plastic
- [ ] Face Shield
- [ ] ______

BODY
- [x] 1 Pr. Coveralls
- [ ] 2 Pr. Coveralls
- [x] No Personal Outer Clothes
- [ ] Waterproof Outer Layer
- [ ] ______

HANDS
- [ ] Canvas Gloves
- [ ] Surgeons Gloves
- [x] Rubber Gauntlets
- [ ] Canners Gloves
- [ ] ______

FEET
- [x] Canvas Boots
- [ ] Shoe Covers
- [x] Rubbers
- [ ] British Leggings
- [ ] ______

RESPIRATORY
- [ ] Full Face
- [ ] Air Supplied Hood
- [ ] Fresh Air
- [ ] SCBA
- [x] Protection as specified by Rm
- [ ] ______

PERSONNEL METERS
- [x] TLD
- [ ] PADI
- [ ] PARD
- [ ] Self-Reading Pencils
- [ ] Finger Ring
- [ ] ______

APPROVALS

J K Marshall 8-14-85	C F Pau[illegible] 8-16-85
Ma Hanson 8/15/85	

Title
SOLIDIFYING AND PACKAGING OF WASTE SOLVENTS

A. PURPOSE

This procedure describes the process for solidifying waste solvents. Solidification is necessary for the disposal of this material.

B. DESCRIPTION

Solvents are used in the manufacturing process of N Reactor fuels. The solvents are used in degreasers to clean the fuel elements and are routinely changed out and pumped into 55-gallon drums for transport. The drum of waste solvent is then solidified.

Waste solvents are solidified by mixing the solvents with cement and liquid emulsifiers. The solidified solvents are packaged in 55-gallon 17H "Non-Tru" drums for disposal.

C. REFERENCES

DUN-5601, "Manufacturing Process Specifications".
DUN-M-29, "N-Fuels Process Control Procedures".
UNI-M-32, "Radiation Work Procedures".
UNI-M-38, "Industrial Safety Manual".
UNI-M-59, "Job Hazard Breakdown".
RHO-MA-222 REV1, "Hanford Radioactive Solid Waste Packaging, Storage, and Disposal Requirements".

D. EQUIPMENT

30 Gallon 17-H Drums	Leather Gloves	55 Gallon 17-H Drums
Rubber Gloves	Absorbent Material	SWP Clothing
Drum Labels	Dolomite	Envirostone Cement
Drum Pumps	Catch Basin	Drum Agitator
Envirostone Liquid Emulsifier	Extension Cord	Water Hose
Forklift w/drum gipping attach.	Air Hose	Bucket

Review Dates and Initials					

Prepared by [signature] 11/12/85   Reviewed by [signature] 11-12-85   Approved by [signature] 11/12/85
Supervisor [signature] 11/12/85   Manager, Production Control

Tape Measure	Rubber Shoe Covers	Paint Stick Marker
Forklift Transport Tray	Bump Cap	Goggles

E. PROCEDURE

1. Transport of Solvent Drums

   a. A Metal Operator, Production Control, shall transport the solvent drums to the solidification location. The Operator shall:

      1) Assure that the durms are sealed before attempting to move them.

      2) Assure that a RM survey has been done on the drum and a "Conditional Radiation Release" label is in place on the drum. See attachment I.

      3) Place one drum in the transport tray.

      WARNING: Transport only one drum of waste solvent at a time.

2. Solidification Procedure

   a. Metal Operators, Production Control, shall perform the solidification process. The Operators shall:

      1) Obtain a new empty 30 gallon 17-H drum.

      2) Using a tape measure and paint stick marker, place two marks in the drum. Measuring from the bottom of the drum, place the marks at 10-1/2 inches and 16-1/2 inches respectively on the inside of the drum.

      NOTE: The marks are used as a gauge when adding ingredients to the drum.

      3) Place a new empty 55 gallon 17-H drum in the catch basin with "Radioactive Waste" label affixed to one side. See attachment II.

      4) Place the marked 30 gallon drum inside a 55 gallon drum.

5) Place a lid on the 30 gallon drum.
6) Fill the void between the drums with dolomite.
7) Remove the lid from the 30 gallon drum.
8) Using an electric solvent pump, transfer 13 gallons of waste solvent from the drum into the 30 gallon drum. Fill to first mark from the bottom of the drum at 10-1/2 inches.
9) Using a water hose, add 6-1/2 gallons of water to the 30 gallon drum. Fill to the second mark from the bottom of the drum at 16-1/2 inches.
10) Using the hand pump equipped with gallon meter, pump 1-1/2 gallons of Envirostone liquid emulsifier into a bucket and add to the 30 gallon drum ingredients.
11) Place the air operated mixer in the 30 gallon drum and clamp it to the outside of the 55 gallon drum.
12) Start the mixer and mix for two minutes.
13) Slowly add 160 lbs. of Envirostone cement to 30 gallon drum with the mixer running.
14) Allow to mix for 10-15 minutes.
15) Stop mixer. Remove it from the drum.
16) Using the highlift, remove the completed 55 gallon drum from the catch basin and place it away from the work area.
17) Allow completed drum to cure for 24 hours before permanently sealing drum.
18) Repeat steps 3 through 16 to continue the solidification process.

3. <u>Drum Packaging and Marking</u>

a. Metal Operators, Production Control, will package the solidified solvents. The Operators shall:

1) Fill the remaining space in the 30 gallon inner drum with absorbent material.
2) Seal the 30 gallon drum with lid, lock ring, and bolt.
3) Fill the remaining space above the 30 gallon drum to the top of the 55 gallon drum with absorbent material.
4) Attach the lid, lock ring, bolt and lock nut to the 55 gallon overpack drum.
5) Torque the bolt and lock nut to 40 lbs. minimum.
6) Weigh each drum for gross weight.
7) Label each drum with the following information in the order given.

   NOTE: All stenciling shall be 2" high, contrasting color to background, durable, water and corrosion resistent for the service life of the container.

   a) Information stenciled on the lid of drum.
      (1) Point of Origin, "UNC/300".
      (2) Gross weight, "G.W. xxx lbs.".
      (3) Container I.D. number, "I.D.-SP-xxx".
   b) Information stenciled on the side of drum.
      (1) Point of Origin, "UNC/300".
      (2) Gross weight, "G.W. xxx lbs.".
      (3) Container I.D. number, "I.D.-SP-xxx".
      (4) D.O.T. hazard class, "ORM-A".
      (5) D.O.T. shipping name, "Tetrachloroethylene".
      (6) D.O.T. Hazardous Material I.D. number, "UN 1897".

         NOTE: If the gross weight exceeds 1120 lbs., the words, "Bottom Tier Only" must be stenciled to the side of the drum.

8) Inspect each drum and for the following information:
   a) Drum identification number.
   b) Contents of drum.
   c) Gross weight.
   d) Date of operator inspection.

9) Complete a "Waste Control" form for each drum.

   NOTE: The form will have an assigned number. This number shall be the container I.D. number.

10) Contact a Radiation Technician to survey the drum and complete their portion of the "Waste Control" form.

11) Attach the "Waste Control" form to the drum. See attachment III for example of "Waste Control" form.

12) Give the pink copy of the "Waste Control" form to the Supervisor, Production Control.

13) Transport the drum to an approved storage area designated by the Supervisor, Production Control.

4. Cleanup and Storage of Equipment Used in Solidification Process

   a. A Metal Operator, Production Control, shall cleanup the work area. He shall:

      1) Seal any open drums of waste solvent.
      2) Clean up the catch basin if any spills have occurred, using absorbent material.

         NOTE: Any used absorbent material may be saved in a spare 30 gallon drum and later placed in a solidification drum with other absorbent material.

      3) Clean mixer shaft to prevent hardening of material.

4) Place the electric solvent pump and mixer in a spare 55 gallon drum.

WARNING: A Radiation Technician must be contacted and a survey of personnel and equipment taken before leaving the radiation zone.

WP#0096P

Review Dates and Initials						

Prepared by: [signature] 11/12/85
Supervisor: [signature] 11/12/85
Reviewed by: JK Marshall 11-12-85
Approved by: [signature] 11/12/85 Manager, Production Control

SAMPLE

UNC NUCLEAR INDUSTRIES FUELS MANUFACTURING DEPARTMENT OPERATING PROCEDURES	Document No. UNI-M-57 REV1	
	Procedure No. D-411	Page No. 7 of 9
	Date Issued 11-12-85	Supersedes Issue Dated NEW
Title SOLIDIFYING AND PACKAGING OF WASTE SOLVENTS	Issued By PRODUCTION CONTROL	

ATTACHMENT I

CONDITIONAL RADIATION RELEASE

Instructions: ______________________________

____

____

____

____

Date: ______________ By: ______________
Radiation Monitoring

BL-6700-133 (10-77)

(Actual size 2" x 4", yellow-in-color)

Review Dates and Initials						

Prepared by [signature], 11/12/85 Supervisor [signature] 11/12/85	Reviewed by JK Marshall 11-12-85	Approved by [signature] 11/12/85 Manager, Production Control

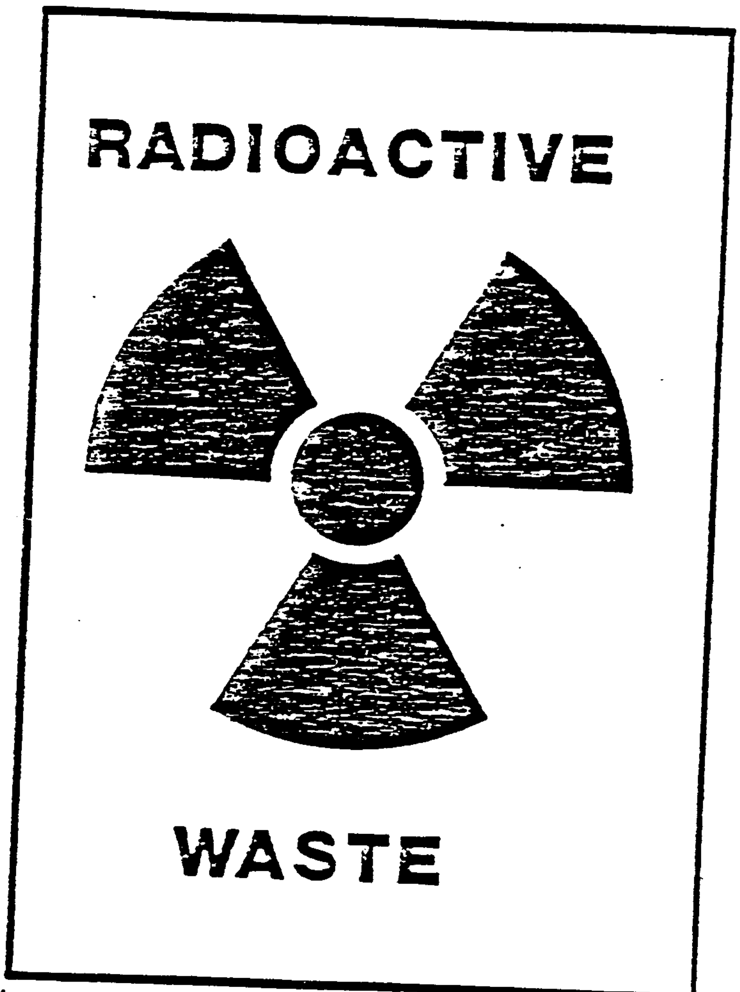
UNC NUCLEAR INDUSTRIES
FUELS MANUFACTURING DEPARTMENT
OPERATING PROCEDURES

Document No.	UNI-M-57 REV1
Procedure No.	D-411
Page No.	8 of 9
Date Issued	11-12-85
Supersedes Issue Dated	NEW
Issued By	PRODUCTION CONTROL

Title

SOLIDIFYING AND PACKAGING OF WASTE SOLVENTS

ATTACHMENT II



("Radioactive Waste" label, 5" x 7" in size)

Review Dates and Initials						

Prepared by 11/12/85
Supervisor 11/12/85
Reviewed by 11-12-85
Approved by Manager, Production Control 11/12/85

A-5300-285 (3-83)

ATTACHMENT III

Hanford Engineering
Development Laboratory

WASTE MANAGEMENT

WASTE CONTROL

☐ HEDL
☐ PNL

Bldg. No.	Room No.	Item No.	Type of Container *	Volume (ft³) *	Cost Code or Work Order No.

FORM ☐ Liquid ☐ Aqueous ☐ pH ≤ 2? ______ Neutralized By ______ Date

☐ Organic ______ (specify)

☐ Solid ☐ Absorbed Liquid ______ (specify) absorbent/liquid = 2/1

☐ Dry Waste ______

TYPE ☐ Fission Products ☐ Uranium ☐ Transuranics (>10 nCi TRU/gram)

Nuclides ______ Enrichment ______ % Nuclides ______

Activity ______ mCi Weight ______ g Weight ______ mg

VOLUME % COMPOSITION

______ % Paper ______ % Metal

______ % Wood ______ % Glass

______ % Plastic ______ % Animal

______ % Other (specify)

*Type & Size of Container if not Standard ______ Weight ______ Pounds

Signature of Person Sealing Container ______ Other ______

Print Name ______ Phone No. ______ Date ______

RADIATION SURVEY INFORMATION ON CONTAINER

Max Contact: ☐ <0.5 mrem/hr or ______ mrem/hr at 3' ☐ <0.5 mR/hr or ______ mR/hr

Smearable Contamination: ☐ <2200 d/m/100 cm² BETA-GAMMA ☐ <220d/m/100 cm² ALPHA

Other: ______ Surveyed by ______ Date ______

54-7200-340 (5-81)

(Actual size 8-1/2" x 5-1/2", 2 copies multicolored)

BURIAL COMPLIANCE CHECKSHEET
FOR RADIOACTIVE SOLID WASTE MATERIAL

SAMPLE

3-1A-7G-1
Rockwell Storage & Disposal Approval Number

6-25 85
Date

Rockwell Solid Waste Processing & Disposal Unit Approval Signature

Waste Generator: UNC Nuclear Industries

Waste Title: Non-Transuranic Contaminated Solidified Perchloroethylene

Storage/Disposal Container: DOT Spec 17C/17H Painted Steel 55 Gal. Drum

Reference: RHO-MA-222, Rev.2 (Unclassified), July 1984, D.P.Belgrair, "Hanford Radioactive Solid Waste Packaging, Storage and Disposal Requirements"

Waste Type:
[ ] Classified
[X] Non-Transuranic
[ ] Transuranic WIPP Certified
[ ] Transuranic WIPP Un-Certified

Disposal Type:
[X] Scheduled
[ ] Retrievable Storage
[ ] Non-Scheduled
[X] Contact Handled
[ ] One-Time Only
[ ] Remote Handled
[X] Direct Burial

Transport Criteria:
[ ] U.S.Department of Transportation
[X] Waste Generator
[ ] Rockwell Transport Approval Number: ____________

Transport Category:
[X] Low Specific Activity
[ ] Limited Quantity
[ ] Type A
[ ] Type B
[ ] Highway Route Controlled Quantity

SAMPLE

A. WASTE DESCRIPTION

3-1A-7G-1
Rockwell Storage & Disposal Approval Number

1. Waste Contents Included:

Yes	No		Yes	No	
[ ]	[X]	Miscellaneous Solid Waste	[ ]	[X]	Tritium
[ ]	[X]	Animal Carcasses	[ ]	[X]	Alkali Metals
[ ]	[X]	Unabsorbed Liquid Organics	[ ]	[X]	Asbestos
[ ]	[X]	Ion Exchange Columns	[ ]	[X]	Lead Shielding
[ ]	[X]	DOT Class B Poison: ______	[ ]	[X]	Gas Generating Potential
[ ]	[X]	Heat Generating Potential (Greater than 0.1 watts/cf)	[X]	[ ]	Hazardous Material Co-contamination
[X]	[ ]	Other: Solidified Perchloroethylene with Beryllium			

Note: The following are prohibited: Free inorganic liquids, incompatible materials, pyrophorics, explosives, unreacted alkali metals, and unvented gas cylinders.

2. Physical Description of Waste:
Perchloroethylene and Beryllium solidified with U.S.Gypsum emulsifier and Envirostone.

3. Radionuclide Activity Description

Non-Transuranic: DOT Low Specific Activity concentrations of Uranium and Beryllium.

Transuranic: Less than 100 nCi/gram waste matrix.

4. Hazardous Material Co-contaminant Description: Perchloroethylene (Tetrachloroethylene) and Beryllium.

5. Maximum Allowable Fissile Quantity: Less than 1 gram/drum

6. Void Space Filler Material: Vermiculite, diatomite or other inert absorbent material.

B. WASTE PACKAGING SYSTEM

SAMPLE

3-1A-7G-1
Rockwell Storage & Disposal Approval Number

1. Container Name: DOT Spec. 17C/17H Painted Steel 55 Gal. Drum

2. Drawing or Specification Number: DOT Specification 17C/17H

3. External Dimensions: 24" OD x 35" H

4. Disposal Volume: 7.4 cf per container

5. Maximum Gross Weight: 1450 lbs.

6. General Description: Steel 55 gallon drum manufactured in accordance with DOT specification 17C or 17H with a gasketed lid. Lid locking ring bolt is torqued to 40 ft-lbs, and a lock nut is installed.

7. Required Internal Packaging: Solidification mixture may be placed directly in 5 to 30 gallon steel containers. Those containers are sealed and surrounded within a 55 gallon drum by absorbent material and the drum sealed.

8. Closure Mechanism: Gasketed lid with locking ring.

9. Maximum Allowable Radiation Levels: Less than 200 mR/hr (Contact); N/A (Other)

10. Maximum Allowable Surface Contamination: Less than 220 d/m/100 sq cm alpha; Less than 2200 d/m/100 sq cm beta-gamma

11. Required Labels:
    - -Top and side: Point of Origin (eg. UNC 300)
    - -Top and side: Gross Weight (eg. GW XXX LBS)
    - -Side only: Radioactive
    - -Side only: "BOTTOM TIER ONLY" (Only required if gross weight is 1120 lbs or greater)
    - -Side only: Additional DOT Hazard Class (eg. ORM-A)
    - -Side only: Additional DOT Proper Shipping Name (eg. Tetrachloroethylene)
    - -Side only: Additional DOT Hazardous Material ID Number (eg. UN 1897)

2-1A-7G-1
Rockwell Storage & Disposal Approval Number

12. Returnable Transport Overpacks: None.

Note: The Waste Generator must send a current Certificate of Compliance (COC) and Safety Analysis for Packaging (SARP) for each type of Returnable Transport Overpack to Rockwell prior to the initial shipment and each time these documents are revised.

C. OTHER REQUIREMENTS

1. Administrative Controls: None.

   (1) Solidification method shall be as follows: Blend 1/2 gallon of water and 3/4 to 1 pint of U.S.Gypsum emulsifier to each 1 gallon of Perchloroethylene to form a uniform emulsion. Add 10 to 11 pounds of Envirostone per each gallon of perchloroethylene with continuous mixing. Allow mixture to cure for 24 hours before sealing drum.

2. Rockwell Storage/Disposal Instructions:

   (1) Waste may be handled by forktruck and stacked.

BURIAL COMPLIANCE CHECKSHEET
FOR RADIOACTIVE SOLID WASTE MATERIAL

SAMPLE

3-1A-7L-1	01-21-86	[signature] 3-0
Rockwell Storage & Disposal Approval Number	Date	Rockwell Solid Waste Processing & Disposal Unit Approval Signature

Waste Generator: UNC Nuclear Industries
Reference letter #29464 dated 12-16-85

Waste Title: Low Level Solidified Mixed Chemical Waste

Storage/Disposal Container: DOT Spec 17C/17H Painted Steel 55 Gal. Drum

Reference: RHO-MA-222, Rev.3 (Unclassified), August 1985, T.R. Pauly, "Hanford Radioactive Solid Waste Packaging, Storage and Disposal Requirements"

Waste Type:
[ ] Transuranic [X] Low Level
[X] Unclassified [ ] Classified

Disposal Type:
[X] Burial [ ] Retrievable Storage
[X] Scheduled [X] Contact Handled
[ ] Routine [ ] Remote Handled
[ ] One-Time Only

Transport Criteria:
[ ] U.S.Department of Transportation
[X] Waste Generator
[ ] Rockwell Transport Approval Number: ____________

Transport Category:
[X] Low Specific Activity [ ] Limited Quantity
[X] Type A [ ] Type B [ ] Highway Route Controlled Quantity

SAMPLE

A. WASTE DESCRIPTION

3-1A-7L-1

Rockwell Storage & Disposal Approval Number

1. Waste Contents Included:

Yes	No		Yes	No	
[ ]	[X]	Miscellaneous Solid Waste	[ ]	[X]	Tritium (>20 mCi/M^3)
[ ]	[X]	Animal Carcasses	[ ]	[X]	Alkali Metals
[ ]	[X]	Unabsorbed Liquid Organics	[ ]	[X]	Asbestos
[ ]	[X]	Ion Exchange Columns	[ ]	[X]	Lead Shielding
[ ]	[X]	Significant Concentrations Of C-14, Kr-85, Tc-99, I-129	[ ]	[X]	Gas Generating Potential
[ ]	[X]	Heat Generating Potential (Greater than 0.1 watts/cf)	[X]	[ ]	Radioactive Mixed Waste
[X]	[ ]	Other: Solidified Mixed Chemical Waste			

Note: The following are prohibited: Free inorganic liquids, incompatable materials, pyrophorics, explosives, unreacted alkali metals, and unvented gas cylinders.

2. Physical Description of Waste:
   Ethyl acetate and bromine solidified in small metal containers.

3. Radionuclide Activity Description

   Non-Transuranic: DOT Low Specific Activity concentrations of various radionuclides including uranium.

   Transuranic: Less than 100 nCi/gram waste matrix.

4. Radioactive Mixed Waste Hazardous Constituent Description:
   Perchloroethylene, trichloroethylene, trichloroethane, ethyl acetate and bromine.

5. Maximum Allowable Fissile Quantity: Less than 1 gram/drum.

6. Void Space Filler Material: Soil, vermiculite, or other inert materials.

B. WASTE PACKAGING SYSTEM

3-1A-7L-1
Rockwell Storage & Disposal Approval Number

SAMPLE

1. Container Name: DOT Spec. 17C/17H Painted Steel 55 Gal. Drum

2. Drawing or Specification Number: DOT Specification 17C/17H

3. External Dimensions: 24" OD x 35" H

4. Disposal Volume: 7.4 cf per container

5. Maximum Gross Weight: 900 lbs.

6. General Description: Steel 55 gallon drum manufactured in accordance with DOT specification 17C or 17H with a 4 mil (nominal) or thicker polyethylene liner and a gasketed lid. Lid locking ring bolt is torqued to 40 ft-lbs, and a lock nut is installed.

7. Required Internal Packaging: Solidification mixture may be placed directly in 1 to 30 gallon steel containers and then sealed. This steel container is then transfered into the polyethylene lined 55 gallon drum. Absorbent material (diatomacious earth) is next added to fill the void spaces within the polyethlyene lined drum. The liner and drum are then sealed.

8. Closure Mechanism: Gasketed lid with locking ring.

9. Maximum Allowable Radiation Levels: Less than 200 mR/hr (Contact); N/A (Other)

10. Maximum Allowable Surface Contamination: Less than 220 d/m/100 sq cm alpha; Less than 2200 d/m/100 sq cm beta-gamma

11. Required Labels:
    - -Top and side: Point of Origin (eg.UNC 300)
    - -Top and side: Gross Weight (eg. GW XXX LBS)
    - -Side only: Radioactive Materials (DOT or equivalent)
    - -Side only: Additional DOT Hazard Class label for Corrosive Material
    - -Side only: EPA Hazardous Waste Stickers as required:
      "F003. WT02, Ethyl Acetate"
      "D002, DW, Bromine Solution"
      "U210, Perchloroethylene"
      "U228, Trichloroethylene"
      "U226, Trichloroethane"

    Use the BCC number for the Manifest Document No.

3-1A-7L-1
Rockwell Storage & Disposal Approval Number

SAMPLE

12. Returnable Transport Overpacks: None.

Note: The Waste Generator must send a current Certificate of Compliance (COC) and Unloading and Handling Procedures for each type of Returnable Transport Overpack to Rockwell prior to the initial shipment and each time these documents are revised.

C. OTHER REQUIREMENTS

1. Administrative Controls:

   (1) The chemical waste mixtures shall be completely solidified and inspected after the curing time for any leached fluid. No free liquids shall be allowed.
   (2) Individual Solid Waste Burial Record-Low Level forms are required for each drum. The composition of the waste in volume % shall be indicated.
   (3) The name of the hazardous constituents and quantity present must be identified on each corresponding Solid Waste Burial-Record-Low Level form.
   (4) The chemicals forming the mixture shall be compatible, that is, must not react dangerously with each other, be decomposed by or ignited by the contaminated waste.

2. Rockwell Storage/Disposal Instructions:

   (1) Waste may be handled by forktruck and stacked.

Rockwell Hanford Operations

~~SOLID WASTE BURIAL~~ RECORD — LOW LEVEL

SAMPLE

USE BLACK BALL POINT PEN OR TYPE

SWBR NO. 313-UNC-80-10 (DO NOT WRITE IN THIS SPACE) (57)

DISPOSAL SITE — This portion of form to be completed by Rockwell Representative at Disposal Site.

Area	Burial Ground No.	Trench No.
200 West	218 W 3 AC	10E

Caisson No.: N/A

Beginning Coordinates: N 45804 W 76627

Ending Coordinates: N 45804 W 76635

Remarks: 10E

Signature - Acceptance: Bruce A Rogers — Date: 2-28-1986

Signature - Burial: — Date:

WASTE GENERATOR: UNC

Charge Code: U3-86-W-090

DOE Authorization No. (RRM): N/A

Address/Phone: 313/300 Area 376-3518

I certify that: 1. No capital property is included in this burial unless documented by a Property Disposal Request and described below.
2. The waste package description below is complete and the waste package conforms to RHO-MA-222 and the approved Burial Compliance Checksheet (BCC).
3. The charge code is correct.

Signature: [signature] — Date: 2-28-86

WASTE DESCRIPTION

COMBUSTIBLE MATERIALS	%	NONCOMBUSTIBLE MATERIALS	%
Paper Products	%	Glass	%
Plastic	%	Concrete	%
Cloth	%	Stainless Steel	%
Rubber	%	Other Metals	20 %
	%	Absorbent	20 %
	%	Solid Solvent	60 %
	%		%
	%		%
Total	%	Total	100 %

HAZARDOUS/CORROSIVE CONSTITUENTS

Name	Quantity (Lb or Kg)
Perchloroethylene	7,980 lbs
Trichloroethane	1,995 lbs

CONTAINER INFORMATION

Quantity & Name: 57 55 Gallon Drums; ___ Hanford Standard Fiberboard Boxes (18" x 18" x 24"); ___ Other: ___

BCC Approval Number: 3-1A-7L-1

Dose Rate - Package: <.5 mrem/hr at Contact

Diameter or Length x Width: 24" OD — Height: 35"

Material of Construction: Steel

Nuclear Transaction No.: N/A — Property Disposal Request No.: N/A

Total Volume: 4275 — Gross Weight: 34,200 ☒ Pounds ☐ Kilogram

WASTE CATEGORIES: ☐ BW ☒ DS ☐ CE ☐ SS ☐ DD ☐ NC

Thermal Power: ☒ 0.1 w/ft³ or less; ___ Other

Remarks: 86-W-090

RADIOACTIVE MATERIAL CONTENT

TRANSURANIC AND URANIUM			NONTRANSURANIC	
Element	Isotopic Distribution (Wt %)	Total Element Weight	Isotope	Grams or Curies
U 235	.95	4.30 gms	NONE	NONE
U 238	99.05	449.29 gms		
Totals		453.59 gms		NONE

Measurement Method: Calculation

Determined By: J. M. Bishop

DISTRIBUTION: White - SWPDU 2750-E/200 E
Canary - TFS 272-W/200 W
Pink - Reojan ... Shipper 200 W

54-3000-581 (7-8

SAMPLE

APPENDIX A

Area 300 Bldg. 394A Date 3-4-86 Shift Day

Description of Job ______

Associated Hazards

Yes toxic chemicals
No electrical
No flammables/explosives
No confined space
No asbestos

No one person lifting over 90 lbs.
No elevated work area
Yes high temperature
No excavation
Yes hazardous atmosphere
___ other ______

Protective Equipment Requirements

___ canvas gloves
___ rubber gloves
✓ coveralls
___ acid suit
___ hood

___ shoe covers
___ rubber boots
___ chemical goggles
___ face shield
✓ safety glasses

___ ear protection
✓ full face mask
✓ supplied air resp.
___ safety belt/harness
___ other ______

Special Instructions:

Approvals: [signature] Job Supervisor   [signature] 3/3/86 Industrial Safety

Signatures of Personnel Assigned

Name	PR #	Date(s) worked
[signature]	55552	3-4-86
[signature]	54716	3/4/86

Return this form to Industrial Safety upon completion of job.

FUELS MAINTENANCE WORK AUTHORIZATION 030

SAMPLE

Job Title	Date	W.A. No.
Disposition of Solvent Evaporator	10/30/85	85-0510

Originator	Section	Building
J. K. Marshall	Process Engineering	3707D

Description Of Work: The load lugger which was used as the waste solvent evaporator; located east of the 334 building, needs to be cut up and placed in a 4' x 4' x 8' burial box to be supplied by Production Control.

CAUTION: The high temperatures involved in cutting the load lugger may break down the chlorinated solvents into phosgene gas. See attached Hazard analysis for special instructions.

How Discovered:

Cost Center	Activity Task	J.R. No.
HF-660	F3-02	U-09528

Equipment No.	QAL	Priority	Procedure No.
30LECO	I	1 20	HAZARD ANALYSIS - (ATTACHED)

REVIEWED BY: / APPROVED BY:

Fuels Engineering	Industrial Safety	Fuels Quality Assurance	Other	Fuels Maintenance
Marshall	L. Herbert	[signature] 12/13/85	N/A	W. H. Clark 12-17-85

Fuels Production/Production Control Supervisor Signatures:

Equipment Released	Date	Equipment Accepted	Date
N/A		JK Marshall	3-5-86
Name	Date	Name	Date
Name	Date	Name	Date
Name	Date	Name	Date

Material Location:

Bldg. No.

Bin No.

Tagout Nos.:

Fuels Prod./Prod. Control	Fuels Maintenance
N/A	N/A

Work That Was Done:

Explain: CUT UP LOAD LUGGER + ALUMINUM LID FOR DISPOSAL. Deen 3-4-86

ASSISTED HANDLING OF CUT UP PIECES RHODES VARGAS 3-4-86

How Failed:

Post Repair Testing Requirements: CONTACT J.K. MARSHALL FOR ACCEPTANCE

Work Completed:

Fuels Maintenance Supervisor Signatures:

Name: W. R. Peterson Date: 3-5-86

Name: Date:

Name: Date:

WA 85-2570

SAFETY ANALYSIS CHECKLIST

Document or Procedure Number and/or Title:

Disposition of Solvent Evaporator

Location: Adjacent to 334 Building

Description of Job: Cut up the load lugger used for storage of waste solvent and place in a 4' x 4' x 8' burial box.

RISK LEVEL EVALUATION

	Minor (Control Factor 1-7)	Moderate (Control Factor 1-4)	Major (Control Factor 1-2)
Personal Injury		2	
Equipment Damage	NA		
Violation of Nuclear Safety Specification	NA		
Fire from Pyrophoric Metals	NA		
Environmental Release	NA		

Specific Hazards Identified:

Evaluator: J. K. Marshall JK Marshall Date: 11/1/85

Approvals: [signature] Date: 11/8/85

Date:

Date:

Date:

WA-85-2516

ATTACHMENT I

HAZARD ANALYSIS CHECKLIST

SAMPLE

Document or Procedure Number and/or Title:

Disposition of Solvent Evaporator

Location: Adjacent to 334 Building

Description of Job: Cut up the load lugger used for storage of waste solvent and place in a 4' x 4' x 8' burial box.

Potential Associated Hazards*

toxic chemicals release	Yes (1)	radiological work	No (2)
flammables/explosives	No	high temperature	Yes (3)
asbestos material	No	hazardous atmosphere	Yes (1)
nuclear safety	No	pyrophoric material	No
solid, liquid or gaseous release to the enrivonment	Yes (1)	Electrical Shock	No
rotating equipment	No	Use of Compressed Air Welding (eye protection)	No

*Indicate "Yes" or "No" for each hazard item. If "Yes" the special instruction section shall indicate how that hazard is to be controlled.

Special Instruction: (Including Protective Clothing Requirements)

(1) See attached sheet. (2) Radiation Monitoring has investigated and ruled that an RWP is not necessary. (3) Use proper caution in operation of cutting torch.

Hazard Level Evaluator J. K. Marshall *JK Marshall* Date: 11/1/85

Approval: *[signature]* Date: 11/8/85

Section Manager

WA 85-251

(1) Although the solvent evaporator has been cleaned as thoroughly as possible, some residual perchloroethylene and 1, 1, 1- trichloroethane most likely is present on the load lugger. These solvents can break down at high temperatures into phosgene, a poisonous gas. To protect the cutting torch operator, a full face hood with supplied air is required.

A Rockwell safety group at 200W area has been contacted that can supply a fresh air hood with a welding visor attachment. Since a specific hose type and air pressure is required to use with this hood, Rockwell will also supply an air bottle and cart. Please call one of the Rockwell safety engineers at 3-3761 to schedule use of this system. They will deliver it and provide instruction on its use.

T.S.

INTERNAL WORK ORDER $20.00/HR - 1 MAN

OJT

TITLE DISPOSITION OF SOLVENT ~~EVAPORATOR~~ W/A NO. 85-251

PETERSON 3-3

RESPONSIBLE PARTY	PROCEDURES REQUIRED
ENGINEER	EFDA N/A FRRR FORM N/A
PLANNING & SCHEDULING/ ENGINEERING	DETAILED WORK SEE HAZARD ANALYSIS PROCEDURES SEE HAZARD ANALYSIS
SUPERVISOR	TAG OUT N/A RWP N/A HAZARD ANALYSIS YES ATTACHED Be PERMIT N/A BURNING/WELDING PERMIT YES WELD ROD SLIP N/A
MAINT. ANALYST (ROUTE FOR APPROVALS ONLY)	EXCAVATION PERMIT N/A
QUALITY ASSURANCE	* HOLD POINTS NO MMEA 12-11-85 * INSPECTION SHEET NO MMEA 12-11-85

	MATERIALS REQUIRED
FM MATERIALS	CERT'S REQUIRED N/A ACCEPTANCE DOCUMENTS N/A (GREEN TAGS)
QUALITY ASSURANCE	SPECIAL HANDLING

* REQUIRES QA DETERMINATION

T. T. Ezil [signature] — 12/2/85

PLANNING & SCHEDULING SIGNATURE — DATE

BURIAL COMPLIANCE CHECKSHEET
FOR RADIOACTIVE SOLID WASTE MATERIAL

SAMPLE

3-58-1A-1
Rockwell Storage & Disposal Approval Number

2/10/84
Date

R. Davis
Rockwell Solid Waste Processing & Disposal Unit Approval Signature

Waste Generator: UNC NUCLEAR INDUSTRIES
Reference Letter # N/A Dated File #15

Waste Title: Low Level Miscellaneous Radioactive Solid Waste

Storage/Disposal Container: UNC 4x4x8 Plywood Box

Reference: RHO-MA-222, Rev.3 (Unclassified), August, 1985, T. R. Pauly, "Hanford Radioactive Solid Waste Packaging, Storage and Disposal Requirements"

Waste Type:
- [ ] Transuranic
- [X] Low Level
- [X] Unclassified
- [ ] Classified

Disposal Type:
- [X] Burial
- [ ] Retrievable Storage
- [X] Scheduled
- [X] Contact Handled
- [ ] Routine
- [X] Remote Handled
- [ ] One-Time Only

Transport Approval:
- [ ] U.S.Department of Transportation
- [X] Waste Generator
- [ ] Rockwell Transport Approval Number: ____________

Transport Category:
- [X] Low Specific Activity
- [X] Limited Quantity
- [X] Type A
- [ ] Type B
- [ ] Highway Route Controlled Quantity

3-58-1A-1
Rockwell Storage & Disposal Approval Number

SAMPLE

1. Waste Contents Included:

Yes	No		Yes	No	
[X]	[ ]	Miscellaneous Solid Waste	[ ]	[X]	Tritium (>20 mCi/cu. M)
[ ]	[X]	Animal Carcasses	[ ]	[X]	Alkali Metals
[ ]	[X]	Unabsorbed Liquid Organics	[X]	[ ]	Asbestos
[ ]	[X]	Ion Exchange Resins	[ ]	[X]	Lead Shielding
[ ]	[X]	Significant Concentrations of C-14, Kr-85, Tc-99, I-129	[ ]	[X]	Gas Generating Potential
[ ]	[X]	Heat Generating Potential (Greater than 0.1 watts/cu. ft.)	[ ]	[X]	Radioactive Mixed Waste
[ ]	[X]	Other: ______			

Note: The following are prohibited: Free inorganic liquids, incompatible materials, pyrophorics, explosives, unreacted alkali metals, and unvented gas cylinders.

2. Physical Description of Waste: May include asbestos and miscellaneous solid radioactive waste including paper, cloth, plastic (polyethylene, wood, steel concrete, soil, piping, tools, ductwork, etc.

3. Radioactive Material Description

Non-Transuranic: Up to and including DOT Type A quantities of various radionuclides including mixed activation and fission products.

Transuranic: Less than 100 nCi/gram waste matrix.

4. Radioactive Mixed Waste Hazardous Constituent Description:

None

5 Maximum Allowable Fissile Quantity: 15 grams per container.

6. Void Space Filler Material: Soil, vermiculite or other inert material.

3-SB-1A-1
Rockwell Storage & Disposal Approval Number

SAMPLE

1. Container Name: UNC 4'x4'x8' Plywood Box

2. Drawing or Specification Number: H-1-42701

3. External Dimensions: 8'L x 4'W x 4'5-1/2" H

4. Disposal Volume: 143 cu. ft. per container

5. Maximum Gross Weight: 2000 lbs.

6. General Description: Wooden box constructed of 3/4" fire-retardent plywood with 2x4 inner framing and glued and nailed joints, and 1 1/4" wide steel banding. Box is mounted on 4x4 wood skids for forktruck handling.

7. Required Internal Packaging: None required.

8. Closure Mechanism: Box lid is glued and nailed in place, and steel banding is installed.

9. Maximum Allowable Radiation Levels: Less than 200 mR/hr (Contact)
Single points to 1 R/hr with (Other)
Administrative controls on page 4

10. Maximum Allowable Surface Contamination: Less than 220 d/m/100 sq cm alpha
Less than 2200 d/m/100 sq cm beta-gamma

11. Required Labels:
Top and side: - Point of Origin (eg. UNC 100N)
- Gross Weight (eg. GW XXX lbs)
Side only: - DOT or equivalent "Radioactive Material"
-Container ID (eg. H-1-42701)
-Grams Fissile Material (only required if 1 gram or mor is present)

Rockwell Storage &
Disposal Approval
Number

SAMPLE

11. Required Labels (continued): If asbestos is present mark 2 sides wit

CAUTION
Contains Asbestos
Avoid Opening or
Breaking Container
Breathing Asbestos is Hazardous
to your Health

12. Returnable Transport Overpacks: None

C. OTHER REQUIREMENTS

1. Administrative Controls:

(1) The container shall be inspected to assure there has been no breach of containment during loading.
(2) Containers with "hot spots", i.e. greater than 200 mR/hr and up to 1 R/hr, on one side and/or container bottom must have hot spots on sides marked, and container shall be loaded such that side with hot spots remains opposite from fork-truck operator during unloading.
(3) Containers with hot spots on more than one side shall be pre-rigged for crane unloading and shall not be sent in the same shipment with forktruck unloaded or other contact handled containers.
(4) Rockwell shall be notified of containers with hot spots during scheduling for disposal.
(5) A single Solid Waste Burial Record-Low Level form (Rockwell form 54-3000-581) may be used for containers with like contents in the same shipment.

2. Rockwell Storage/Disposal Information:

(1) Waste may be handled by forktruck or crane (depending upon radiation levels) and may be stacked.
(2) Use other containers to shield those with hot spots
(3) Backfilling should be completed prior to accumulating 180 grams fissile material in the trench or as required by applicable procedures and specification.

SAMPLE

Rockwell Hanford Operations — SOLID WASTE BURIAL RECORD – LOW LEVEL 37

RSR 47034

USE BLACK BALL POINT PEN OR TYPE

SWBR NO. 313- UNC- 86- 4 (DO NOT WRITE IN THIS SPACE)

DISPOSAL SITE

This portion of form to be completed by Rockwell Representative at Disposal site.

Area	Burial Ground No.	Trench No.
200 W	3-A-E	5-E

Caisson No.: N/A

Beginning Coordinates: N 46186 W 76592

Ending Coordinates: N 46186 W 76600

Remarks:

Signature - Acceptance: A.E. Clughey — Date: 7-11-86

Signature - Burial: RW Lidereer — Date: 7-14-86

WASTE GENERATOR: UNC

Charge Code: 43-86-W-237

DOE Authorization No. (RRM): N/A

Address/Phone: 313/300 Area 376-3518

I certify that: 1. No capital property is included in this burial unless documented by a Property Disposal Request and described below.
2. The waste package description below is complete and the waste package conforms to RHO-MA-222 and the approved Burial Compliance Checksheet (BCC).
3. The charge code is correct.

Signature: J. M. Bishop — Date: 7-11-86

WASTE DESCRIPTION

COMBUSTIBLE MATERIALS		NONCOMBUSTIBLE MATERIALS	
Paper Products	10 %	Glass	%
Plastic	20 %	Concrete	%
Cloth	%	Stainless Steel	%
Rubber	%	Other Metals	20 %
Wood	40 %	Absorbent	10 %
	%		%
	%		%
	%		%
Total	70 %	Total	30 %

CONTAINER INFORMATION

Quantity & Name: ___ 55 Gallon Drums; ___ Hanford Standard Fiberboard Boxes (18" x 18" x 24")

10 ea Other: 4'x4'x8' Burial Box

BCC Approval Number: 3-58-1A-0

Dose Rate - Package: < 5 mrem/hr at Contact

Diameter or Length x Width: 4'x8'

Height: 4'

Material of Construction: Plywood

Nuclear Transaction No.: N/A

Property Disposal Request No.: 86-577

Total Volume: 1,280 cu ft

Gross Weight: 20,000 ☒ Pounds ☐ Kilograms

HAZARDOUS/CORROSIVE CONSTITUENTS

Name	Quantity (Lb or Kg)
N/A	N/A

WASTE CATEGORIES:

☐ BW ☒ DS
☐ CE ☐ SS
☐ DD ☐ NC

Thermal Power:
☒ 0.1 w/ft³ or less
___ Other

Remarks: Charge this burial to W.O. # B27580-FN01

RADIOACTIVE MATERIAL CONTENT

TRANSURANIC AND URANIUM			NONTRANSURANIC	
Element	Isotopic Distribution (Wt %)	Total Element Weight	Isotope	Grams or Curies
U235	.95	4.30 grams	NONE	None
U238	99.05	449.29 grams		
Totals		453.59 grams		None

Measurement Method: Calculations

Determined By: J. M. Bishop

DISTRIBUTION: White - SWPOU 2750-E/200 E
Canary - TFS 272-W/200 W

54-3000 581 (7-

APPENDIX E

SOIL AND CONCRETE SAMPLING AND ANALYSIS PLAN FOR THE 300 AREA SOLVENT EVAPORATOR

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FIGURES

TABLES

APPENDIX E

SOIL AND CONCRETE SAMPLING AND ANALYSIS PLAN FOR THE 300 AREA SOLVENT EVAPORATOR

E-1 INTRODUCTION

The Soil and Concrete Sampling and Analysis Plan for the 300 Area Solvent Evaporator (300 ASE) has been designed for the assessment of contamination of surface or near-surface soils and an adjacent concrete pad that originated from the 300 ASE and attendant barrel storage operations. The 300 ASE treated radioactively contaminated dangerous wastes and thus was a mixed-waste treatment and storage facility. The location of the 300 ASE closure area and proximity to other 300 Area facilities are shown in Figures E-1 and E-2. The closure area consists of a part of the concrete pad (333 East pad) adjoining the 333 Building and the soil immediately adjacent to the south end of this concrete.

The 300 ASE operated prior to the effective date of the RCRA regulations. Operations associated with the facility ceased and the evaporator was dismantled prior to the first formal interpretive guidance clarifying the applicability of RCRA to mixed wastes. The specific data/documentation requirements of either RCRA or Ecology's *Dangerous Waste Regulations*, WAC 173-303 (Ecology 1991), were not implemented while operating or dismantling the 300 ASE. In accordance with the procedures identified in Appendix D, the 300 ASE was dismantled and buried.

E-1.1 CLOSURE STRATEGY

The data generated through implementation of this plan will be used to assess the extent of contamination in the closure area that is attributable to the 300 ASE. Based on the evaluation of these data, the facility will be either clean closed under RCRA or closed in conjunction with the Remedial Investigation/Feasibility Study of Operable Unit 300-FF-2 under CERCLA.

Remedial action for the 618-1 Burial Ground underlying the 300 ASE closure area, at a depth of approximately 4 feet, will be evaluated as part of the 300-FF-2 Operable Unit. The 618-1 Burial Ground was operated from 1944 to 1951 as a low-level radioactive solid waste burial ground which received uranium, other metallic and non-metallic materials, and incidental laboratory wastes.

E-1.2 GENERAL SAMPLING STRATEGY

The strategy for sampling and analysis of both the soil and the concrete has been based on assessments of potential waste discharges using historical information on the storage of spent solvent on the concrete pad, and on the only known spill (onto the soil). Assessments of hypothetical waste discharges have been developed using the physical characteristics of the waste

300 AREA SOLVENT EVAPORATOR UNIT

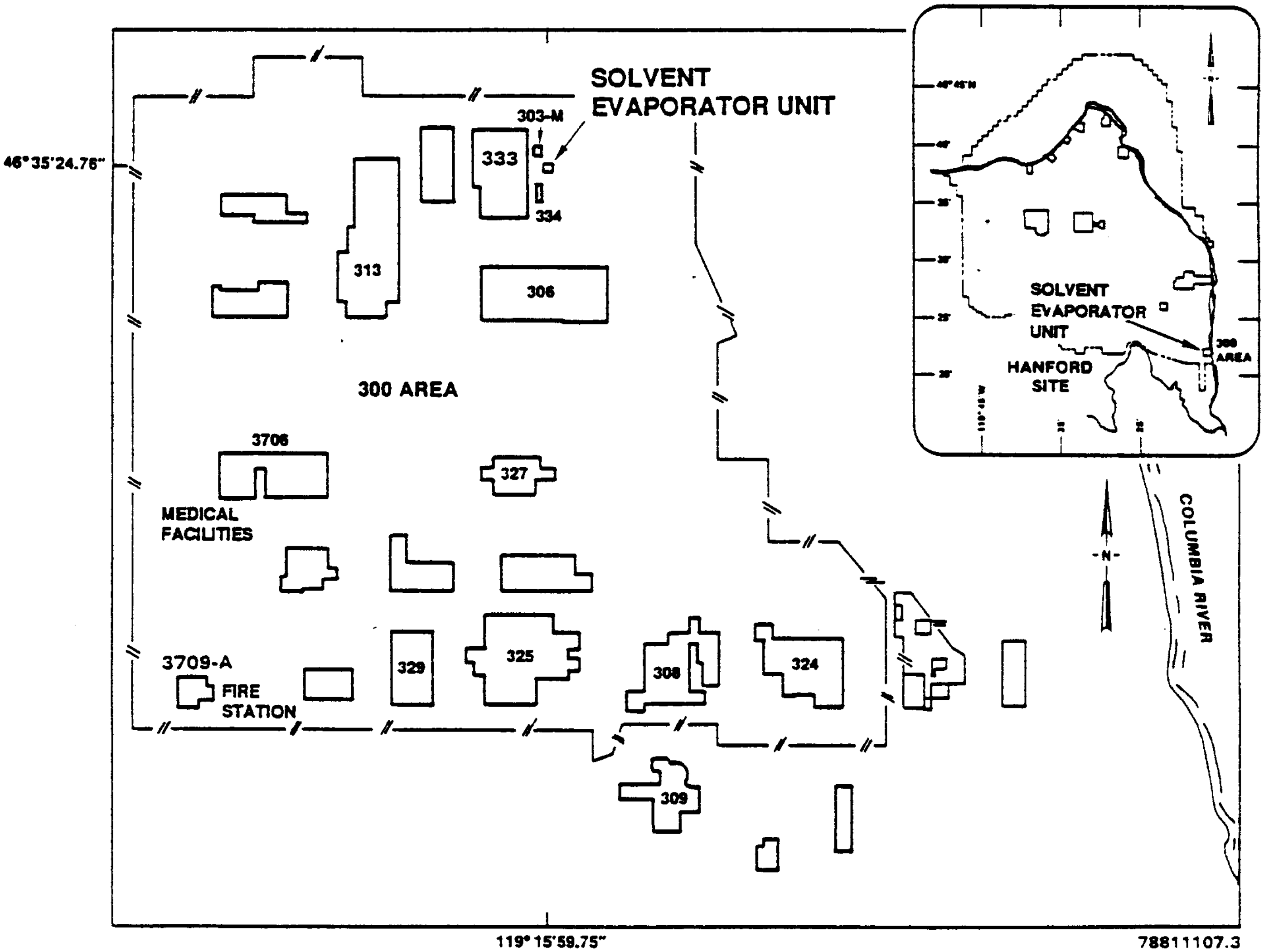


Figure E-1. 300 Area Solvent Evaporator. (78811107.3)

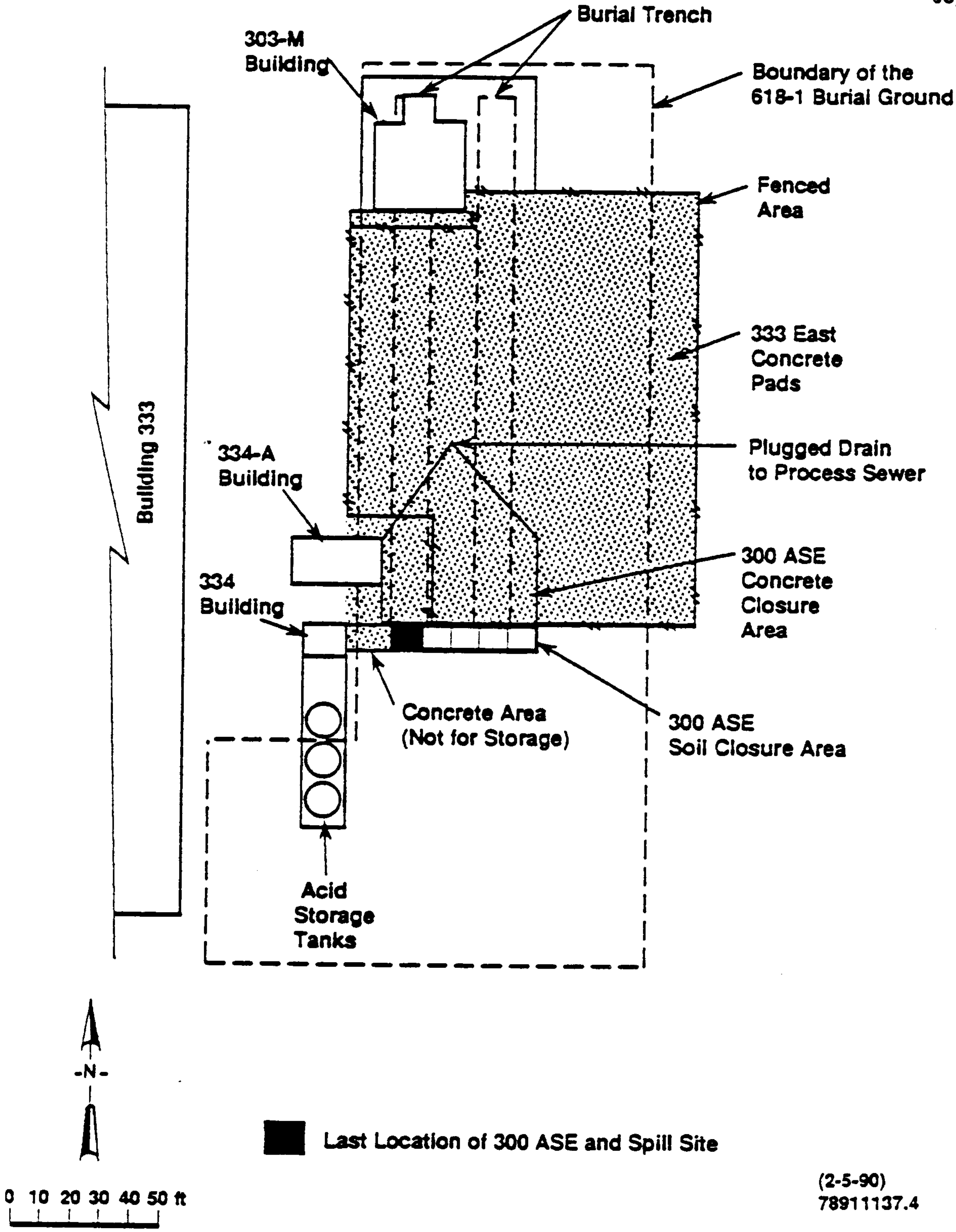


Figure E-2. Layout of 300 Area Solvent Evaporator Closure Area and 618-1 Burial Ground.
(78911137.4)

constituents, weather conditions, known properties of the soil and concrete, and the time and location of the known spill (Section E-2). It has been deduced from the most liberal assessment that none of the 300 ASE volatile constituents should now be present either in the soil or in the concrete. This conclusion is, therefore, the technical basis for performing verification sampling of both the soil and concrete.

E-1.2.1 Soil Analytes

Soil analysis will be largely confined to known and suspected waste constituents associated with the 300 ASE. This rationale is justified by the uncertainties associated with the nature of the 618-1 Burial Ground soil cover, the unknown impact of wastes from the underlying 618-1 Burial Ground, and the potential for contamination from other adjacent operations in the immediate area. These waste constituents can be grouped into the following four categories.

1. Solvents and organic compounds known to be treated in the evaporator.

2. Organic degradation products of the primary organic compounds.

3. Inorganic constituents from the degreasing of fuel element materials.

4. Inorganic constituents that may have been treated in the evaporator via paint in conjunction with paint solvent.

The specific constituents associated with these four categories are listed in Table E-1. Inorganic constituents having concentrations at or below detection limits in the analysis of the raw-waste solvent (Table E-2) are omitted from the list of constituents to be analyzed. The elements silicon, aluminum, iron, calcium, sodium, and phosphorous also are excluded because they are primary constituents in native rocks and soils and occur at concentrations far in excess (1,000 to 500,000 micrograms per gram) of those in the raw waste (less than 100 micrograms per gram). All additional organic constituents obtained by Methods 8210 or 8240 and 8270 (SW-846) (EPA 1986) will be reported since they are measured concurrently in the analysis and can be used in CERCLA (1980) characterization efforts. Thus, compliance with RCRA regulations will be verified using the constituents listed in Table E-1. The presence of the additional organic constituents (other than those listed in Table E-1) from the closure area and baseline samples, will be regarded as originating from the underlying 618-1 Burial Ground or other operations in the 300 Area. Likewise, elevated concentrations of inorganic constituents in baseline samples will be interpreted as originating from other sources. Any remedial actions for non-300 ASE contaminants will be evaluated in conjunction with the Remedial Investigation/Feasibility Study of Operable Unit 300-FF-2.

Table E-1. The 300 Area Solvent Evaporator Analytes and Performance Standards.

Category-Constituent	Initial action level		Alternative action level	
	Soil	Concrete	Soil	Concrete
1- 300 ASE primary organic constituents				
Perchloroethylene (PCE)	a	b	c	c
1,1,1-trichloroethane (TCA)	a	b	c	c
Trichloroethylene (TCE)	a	b	c	c
Methyl ethyl ketone (MEK)	a	b	c	c
Ethyl acetate	a	b	c	c
Dichloromethane (methylene chloride)	a	b	c	c
Petroleum naptha	c	c	-	-
2- 300 ASE secondary organic constituents (i.e., degradation products)				
1,1-dichloroethylene (DCE)	a	b	c	c
trans-1,2-dichloroethylene (DCE)	a	b	c	c
1,1-dichloroethane (DCA)	a	a	c	c
1,2-dichloroethane (DCA)	a	b	c	c
Vinyl chloride	a	b	c	c
3- Inorganic constituents (related to fuel fabrication)				
Zirconium	a	d	b	d
Beryllium	a	d	b	d
Bromine	a	d	b	d
Uranium	d	d	d	d
Copper	a	d	b	d
4- Inorganic constituents (related to paint shop solvents)				
Barium	a	d	c	d
Cadmium	a	d	c	d
Lead	a	d	c	d
Silver	a	d	c	d

a Concentrations that exceed baseline (local background) threshold levels.

b Concentrations that exceed limits of quantitation (LOQ), i.e., the level above which quantitative results may be obtained with a specified degree of confidence, is defined by the American Chemical Society (1983) as $10\sigma \pm 3\sigma$ at the 99 percent confidence level, where σ is the standard deviation of the instrumental background noise.

c Concentrations that exceed human health-based protection or safety levels (Appendix E-3); contingent on approval by Ecology.

d No action level. Concentration determined for information only.

E-1.2.2 Concrete Analytes

Concrete samples will be analyzed for the same constituents as soil samples (Table E-1). The action levels for the 300 ASE solvent waste species in constituent categories (1) and (2) identified in Table E-1 are the primary concrete performance standards for two main reasons: only very small amounts of inorganic constituents, if any, would have accompanied spills or leaks from the 300 ASE and organic waste constituents are the only reliable indicators of contamination originating from the 300 ASE operations.

Although inorganic constituents from fuel fabrication activities were present in the 300 ASE, they would not have been present in spilled solvent or water in significant quantities based on solubility considerations and concentrations of the raw waste solvent. The analysis of the raw waste as shown in Table 1-2 (Section 1.3.1) indicates that the concentrations for categories (3) and (4) of Table E-1 were largely undetectable (only zirconium was detectable at 2 ppm). Concentrations of any 300 ASE-derived inorganic contamination in a solid matrix such as soil or concrete would, therefore, be significantly smaller. Thus, detectable contamination of the soil or concrete with respect to inorganic constituents originating from the 300 ASE is highly unlikely given the type and extent of known and potential spills.

Past practice operations on the 333 East concrete pad and elsewhere in the 300-FF-2 Operable Unit are known to have involved fuels fabrication-related inorganic constituents. Both the 300 ASE and past practice activities involved the same types of inorganic constituents [i.e., fuel fabrication-related constituents of the type listed in categories (3) of Table E-1]. However, the 333 East concrete pad is known to be contaminated with inorganic constituents from the past practice activities (Chapter 1.0, Section 1.1.2) in larger amounts than any which could have possibly come from the 300 ASE. Organic waste constituents, which constituted nearly 100 percent of the waste of concern, are therefore regarded as the only reliable indicators of 300 ASE derived contamination because: (1) it would not be possible to discriminate 300 ASE-derived inorganic contamination from past practice derived contamination and (2) any detectable inorganic contamination or contamination patterns are undoubtedly attributable to past practice activities rather than to the 300 ASE. Thus, inorganic contamination associated with the 300 East concrete pad is most appropriately handled in conjunction with the 300-FF-2 Operable Unit remedial actions. Ecology's final decisions regarding the closure of the 300 ASE, however, will be made on the basis of all data.

Table E-2. Solvent Evaporator Inductively Coupled Plasma-Atomic Emission Spectroscopy Analytical Results (1985).

	Detection limit[a] µg/mL	NaOH/Zr[b] µg/mL	KOH/Ni[c] µg/mL	Average µg/mL
Aluminum	0.03	6	10	8
Antimony	0.05			
Arsenic	0.8			
Barium	0.002			
Boron	0.01	5	2	4
Cadmium	0.004			
Calcium	0.01	46	52	48
Cerium	0.04			
Chromium	0.02			
Cobalt	0.01			
Copper	0.004			
Dysprosium	0.004			
Europium	0.002			
Gadolinium	0.01			
Iron	0.005	6	78	30
Lanthanum	0.008			
Lead	0.06			
Lithium	0.004	4	2	3
Magnesium	0.06			
Manganese	0.002			
Molybdenum	0.01			
Neodymium	0.02			
Nickel	0.02			
Phosphorus	0.1	18	25	20
Potassium	0.3		ND	
Ruthenium	0.05			
Silicon	0.02	20	28	24
Sodium	0.01	ND	46	46
Strontium	0.002			
Tellurium	0.06			
Titanium	0.02			
Zinc	0.02			
Zirconium	0.008	ND	2	2

[a] ICP-AES analysis performed for the elements listed. No results shown for concentrations below detection limit.
[b] Sodium hydroxide fusion in a zirconium crucible was performed to solubilize the sample.
[c] Potassium hydroxide fusion in a nickel crucible was performed to solubilize the sample.
[d] ND = Not determined.

E-1.3 CLEAN CLOSURE CRITERIA

Data obtained from this investigation will be evaluated against the performance standards identified as action levels in Table E-1. The term 'action level' herein refers to concentration levels that sample analytes should not statistically exceed for clean closure of the facility. These concentration levels include baseline thresholds or other concentrations that are protective of human health and the environment (e.g., Table E-1). If the concentration level of any constituent identified in Table E-1 is significantly above the initial action level, continued efforts toward clean closure will be pursued only if further assessment of action levels is warranted. This measure is proposed because contaminant concentrations for soil and concrete which may exceed an action level, also may be significantly below any health or environmental-based risk level. Reevaluation of the action levels could, therefore, be considered in the event that one or more of the initial action levels are exceeded, and further assessment of the action level is warranted. Any additional evaluation would be based on 1) the type and extent to which an action level is exceeded, and 2) the further assessment of health-based risk using data from sources such as the EPA Integrated Risk Information System (IRIS) (EPA 1991), the Health Effects Assessment summary tables (EPA 1989b), and methods recommended by EPA (1989a), Ecology (1991), or other appropriate sources. The DOE-RL will request approval for the use of alternative action levels from Ecology for closure of the 300 ASE, where warranted. If dangerous constituents are determined to exist in concentrations above action levels and reevaluation of action levels is not warranted, an alternative plan of closure in conjunction with the Remedial Investigation/Feasibility Study of Operable Unit 300-FF-2 will be implemented.

E-1.4 ACTION LEVELS AND BASELINE THRESHOLD CONCENTRATIONS

Initial action levels for both the inorganic and organic constituents listed in Table E-1 in soil samples will be the baseline threshold values obtained from the composition of baseline samples. The initial action levels for the organic constituents in concrete will be the analytical limits of quantitation (ACS 1983). Inorganic constituents in concrete and uranium in soil will be determined for information only (Appendix E-1.2.2). Alternative action levels will be considered where warranted. Ecology will review all data in the decision process. If clean closure conditions cannot be met, closure will be performed in conjunction with Operable Unit 300-FF-2 as identified in Chapter 3.0, Section 3-4 (Figure 3-1).

Alternative action levels will be health-based protection levels or other appropriate criteria. Assessment of the concentration levels that are protective of human health will be based on hazard identification, dose-response information, exposure models, and risk characterization (EPA 1991). The parameters used in assessing potential toxicity and increased cancer risk from the 300 ASE waste constituents are listed in Table E-3. Specific values will be calculated from these data with appropriate assumptions for exposure and acceptable risk. Calculation methods for these protection levels, as recommended by Ecology (1991) and EPA (1989b, 1991), will be generally similar and only differ in the parameters used in the exposure models, which include land use. Examples of health-based action levels for soil are listed in Table E-3. In general, carcinogenicity criteria will be used to define the action levels for known and probable carcinogens (Class A and B carcinogens). Chronic toxicity no effect levels will be used as action levels for constituents that are potentially toxic. It is seen in Table E-3, however, that these protection levels for toxicity can vary be times for exposure type and by nearly 44 times as a function of land use. For carcinogenicity, land use considerations result in action levels that differ by over 132 times. The basic differences in the assumptions regarding exposure for the values calculated in Table E-3 are summarized at the bottom of the table. The validity and practicality of these assessments, therefore, depend on a careful assessment of how these values will be generated, and the use of realistic assumptions regarding exposure and risk for the case considered.

The evaluation of potential soil contamination derived from the 300 ASE operations will requires a comparison between the compositions of the samples from the closure area to those of an appropriate reference or background soil site. Because the soil covering the 618-1 Burial Ground is also the soil material upon which 300 ASE wastes may have been spilled, and because it is probably unique to the 300 Area (i.e., from an unknown source); this soil cover is the only appropriate material (similar strata) that can be used for comparison with soil from the closure areas. Therefore, the soil cover for the 618-1 Burial Ground has been used to establish reference soil concentrations. Samples of the 618-1 Burial Ground soil, apart from the 300 ASE, will, in effect, serve as the local background. In order to avoid confusion, these local (area) background samples will be referred to as baseline samples because they are not natural background in the strict sense (i.e., unaffected samples that are part of the population of soil samples in the general area outside the 618-1 Burial Ground). Thus, this type of baseline represents a special case in the context of Ecology's definition of backgrounds (Ecology 1991).

Note that the term 'baseline' as used in this document refers to threshold concentrations rather than mean baseline concentrations. The technical basis for establishing baseline threshold concentrations and the new methods by which significant deviation from baseline is to be determined is addressed in Section E-10, Interpretations and Statistical Treatment of Data. The selection of the number of baseline soil samples has been based on professional judgment. Eight baseline soil samples will be collected. Written notification will be provided to Ecology in the event that Westinghouse Hanford and the DOE-RL recommend that this number be changed.

Table E-3. Performance Standards for Organic Constituents. (sheet 1 of 2)

Constituent	Constituent CASRN ID number	Chronic toxicity reference dose (RfD) (mg/kg/day)*	Cancer potency factor (mg/kg/day)*	Carcinogen class*	Health-based action level examples (mg/kg)††			Selection basis
					1	2	3	
Primary 300 ASE Constituents								
Perchloroethylene (PCE)	127-18-4		0.051[a]	B2**	20[a]	14 to 1,400[a]	2,574[a]	Carcinogenicity[a]
Perchloroethylene (PCE)	127-18-4	0.01			800	7,000	35,000	Toxicity
Trichloroethylene (TCD)	79-01-6	8 E[04b]	0.011[b]	B2**	64[b]	560[b]	2,800[b]	Toxicity
1,1,1-trichloroethane (TCA)	71-55-6	0.09	c,d	D	7,200	63,000	315,000	Toxicity
Ethyl acetate	141-78-6	0.9	e		72,000	630,000	no limit	Toxicity
Methyl ethyl ketone (MEK)	78-93-3	0.05	c	D	4,000	35,000	175,000	Toxicity
Dichloromethane (Methylene chloride)	75-09-2	0.06	0.0075	B2	133	1,164	17,500	Carcinogenicity
Naptha (petroleum)	8030-30-6	f	f		N/A	N/A	N/A	
Secondary 300 ASE constituents (i.e., daughter products)								
1,1-Dichloroethylene (DCE)	75-35-4	0.009	0.6	A	2		219	Carcinogenicity
trans-1,2-Dichloroethylene (DCE)	156-60-5	0.02	c		1,500	14,000	70,000	Toxicity
1,1-Dichloroethane (DCA)	75-34-3	c	g	C	N/A	N/A	N/A	
1,2-Dichloroethane (DCA)	107-06-2	C	0.091	B2	11		1,442	Carcinogenicity
Vinyl chloride	75-01-4	c	2.3†	h	0.43		57	Carcinogenicity

* Data from IRIS online data base (EPA 1991) as of 03-27-91.

† Information from the Health Effects Assessment Summary Tables (HEAST) (EPA 1989b).

†† Example (1): Based on Ecology's (1991) residential model for child exposure due to soil ingestion: Toxicity protection levels based on child exposure using the following parameters: 16 kg body weight, ingestion of 200 mg soil/day daily, 365 days per year for a lifetime (75 years), and 100 percent efficiency for metabolism of ingested soil. Carcinogenicity is based on the same parameters for an acceptable cancer risk factor of 1 in 1,000,000 (10^{-6}), and a 6 year duration of exposure.

Table E-3. Performance Standards for Organic Constituents. (sheet 2 of 2)

Example (2): Based on an EPA (1989b) residential model for adult exposure due to soil ingestion. Toxicity protection levels based on adult exposure using the following parameters: 70 kg body weight, ingestion of 100 mg soil/day daily, 365 days per year for a lifetime (75 years) and 100 percent efficiency for metabolism of ingested soil. Carcinogenicity is based on the same parameters for cancer risk ranging from 10^{-4} (for suspected carcinogens) to 10^{-6} (for known carcinogens) averaged over a lifetime (75 years).

Example (3): Based on Ecology's (1991) industrial model for adult exposure due to soil ingestion: Toxicity protection levels based on adult exposure using the following parameters: 70 kg body weight, ingestion of 50 mg soil/day daily, on the average of 40 percent of each year over a lifetime (75 years), and 100 percent efficiency for metabolism of ingested soil. Carcinogenicity is based on the same parameters for an acceptable cancer risk factor of 10^{-5}, and a 20 year duration of exposure.

a Carcinogenicity data for lifetime exposures are not available at this time. This substance has been evaluated by the EPA for evidence of human carcinogenicity potential. This does not imply that this chemical is necessarily a carcinogen. The evaluation is under review by an inter-office agency work group. A risk assessment summary will be included on IRIS when the review has been completed (EPA 1991).

b Reference dose for chronic oral exposure is under review by EPA (pending). Carcinogen assessment summary has been withdrawn following further review. A new carcinogen summary is in preparation by the CRAVE work group (EPA 1991).

c Reported human data and animal studies for this substance have not demonstrated carcinogenicity (EPA 1991).

d Class D carcinogen; not classifiable as to human carcinogenicity (EPA 1991).

e This chemical has not been evaluated by EPA for evidence of human carcinogenic potential (EPA 1991).

f This substance is not included in the IRIS (EPA 1991) or HEAST (EPA 1989b) references. The only hazard identified for petroleum naptha is flammability at concentrations between 1-6 percent in air (Sax and Lewis 1987).

g There is presently no reference dose for chronic oral exposure (RfD). A risk assessment group for this substance/agent is under review by an EPA work group. This substance is a Class C carcinogen (i.e., possible human carcinogen). This classification is based on no human data and limited evidence of carcinogenicity in two animal species (rats and mice). No quantitative estimate of carcinogenic risk from oral exposure (EPA 1991).

h There is no information on this substance in IRIS (EPA 1991). The information listed here is from the Health Effects Assessment Summary Tables (EPA 1989b).

E-2 CONTAMINATION SCENARIOS AND ASSESSMENTS

The 300 ASE soil and concrete sampling and analysis strategy has been based on the operational history, known spill events, and assessments of the known spill and possible barrel leak events. Contamination assessments are especially useful as a basis for development and justification of the soil and concrete sampling and analysis strategy. The primary objective of these assessments has been the determination of how much waste material from any 300 ASE facility discharge, particularly the volatile/semi-volatile constituents, would be expected to remain in the soil and concrete. Worst case spill and leak scenarios were developed and analyzed to determine the time required for complete evaporation of the volatile constituents.

E-2.1 ASSESSMENT METHODS

The contamination assessment process for the 300 ASE involved the following steps:

- Development of spill/leak scenarios
- Identification and summary of pertinent conditions and physical properties necessary as model input parameters (e.g., temperature, vapor pressures, discharge rates, etc.)
- Calculation of evaporation rates as a function of temperature, relative humidity, etc.
- Determination of the time required for evaporation of the total spill from the concrete surface (concrete models only); maximum surface evaporation time set equal to residence time on the concrete
- Determination of maximum penetration depth of water/solvent or solvent using calculated residence times and physical characteristics of the medium
- Determination of maximum time required for complete evaporation of water/solvent or solvent from a maximum thickness of affected concrete (concrete models only).

All models incorporated the use of information such as weather conditions, assumptions concerning discharge volumes and rates, and the physical properties of the media as input parameters into the calculations. The pertinent data and representative ranges of temperature dependent parameter values are tabulated in Table E-4. Standard calculation methods for evaporation processes (e.g., Welty et al. 1969, p. 487) were used. The relative rates of evaporation rates for <u>Water</u>, <u>PCE</u>, and <u>TCA</u> at various temperatures were calculated. The values for water are consistent with annual Hanford Site evaporation rates over the past 10 years (WHC 1990). Weather conditions over the spill period were obtained from Pacific Northwest Laboratory reports for the Hanford Meteorology Station. Values for the physical and chemical properties of water and the solvents were obtained from

Table E-4. Model Conditions and Assessment Results.

Model conditions	Reference values	Range	March 1985 average	Hanford Site average
Temperature (°C)	5	-5 to 17	5	12
Relative humidity (%)	55		55	53
Wind velocity (mph)	0		7	7.7
Evaporator spill volume (gal)	100			
Barrel leak volume (gal= 1 bbl)	55			
Evaporator spill rate (l/h)	10	0 to 5		
Barrel leak rate (l/h)	10			
Evaporative film thickness (mm)	1			
Minimum evaporative surface area for a spill (ft^2)	200			
Minimum evaporative surface area for a barrel leak (ft^2)	11			
Hydraulic conductivity for concrete (m/sec)	10^{-9}	10^{-7} to 10^{-16}		
Porosity for concrete (%)	5	3 to 30		
Physical properties:		Water	PCE	TCA
Molecular weight (g/mole)		18	165.83	313.66
Density (g/cc)		1.0	1.63	1.35
Vapor pressure (mm)		6.5	3	20
Calculated results concrete assessments*				
Evaporation rate (l/m^2-hr) for reference values		0.26	0.68	10.7
Time required for spill/leak discharges (h)		40	21	21
Fluid penetration depth for spill/leak discharges (mm)		<9	<2	<2
Time for complete drying of the penetrated concrete (after discharge)		<7 days	<2 hours	<10 minutes
Total time required for complete evaporation (from the beginning of the spill/leak)		<12 days	<24 hours	<24 hours

* Calculated values for water are for the evaporator spill model, and values for PCE (perchloroethylene) and TCA (1,1,1 trichloroethane) are for the barrel leak models.

the *Handbook of Chemistry and Physics* (CRC Press 1987), and the *Handbook of Environmental Data on Organic Chemicals* (Verschueren 1983). Other sources of information include data from the Portland Cement Association (PCA 1968) and Feenstra and Cherry (1988). All concrete assessments were based on porous media models, i.e., unfractured concrete. Model results for each of the assessments are tabulated in Table E-4.

Conservative values for temperature, wind speed, humidity, etc., were also used in the concrete assessments to bias results toward minimization of evaporation effects in order to obtain upper limits on the duration of solvent wastes on the pad. Fluid penetration depth and subsequent drying time calculations vary directly with the hydraulic conductivity and inversely with the porosity of the medium. Therefore, conservatively large hydraulic conductivity values and small porosity values were used in the assessments.

Hydraulic conductivity values for unsaturated porous media, such as concrete, are up to 10,000 times smaller than those for saturated media (10^{-7} to 10^{-16} meters per second for limestone/concrete). Therefore, the value of 10^{-9} meters per second was used as the conservatively large value for concrete models. Typical values of total porosity for concrete range to values as high as 30 percent, however, a porosity of 5 percent was used as the conservatively small value in the calculations. The reference parameter values and normal ranges for these values are listed in Table E-4. Thus, all calculated evaporation times would be faster, and calculated fluid penetration depths shallower, for parameter values that were not as strongly biased toward minimizing the evaporation effects. Therefore, it should be recognized that these assessments represent worst-case scenarios; because of this bias in fluid discharge volumes and rates, temperature, humidity, wind speed, wetted surface area, hydraulic conductivity and porosity of the media.

E-2.2 CLOSURE AREA SOIL AND CONCRETE

The operational history (Section 1.1.2) and spill information (Section 1.4) have been previously described. Because this information provides the basis for development of spill scenarios and their assessment, information of events pertinent to the assessments are briefly summarized here.

Operation of the 300 ASE from 1975 to 1985 was confined to the portion of the original 333 East concrete storage pad and the 10 foot by 50 foot strip of soil adjacent to the pad on its southern edge, as shown in Figure E-3. The original pad is 4 inches thick and reinforced with number 10 wire mesh. The southern edge of the concrete and the adjacent soil (gravel) were sites on which the 300 ASE was located for solvent treatment. The soil consists of loose fill material approximately 4 feet thick that serves as a cover for the underlying 618-1 Burial Ground. The concrete area extending up to 20 feet north of the southern edge of the pad was used for the evaporator and storage of barrels containing solvent awaiting treatment in the evaporator. This portion of the concrete sloped to a drain as shown in Figure E-3, and was included in the closure area. These sites constitute the 300 ASE closure area shown in Figure E-3.

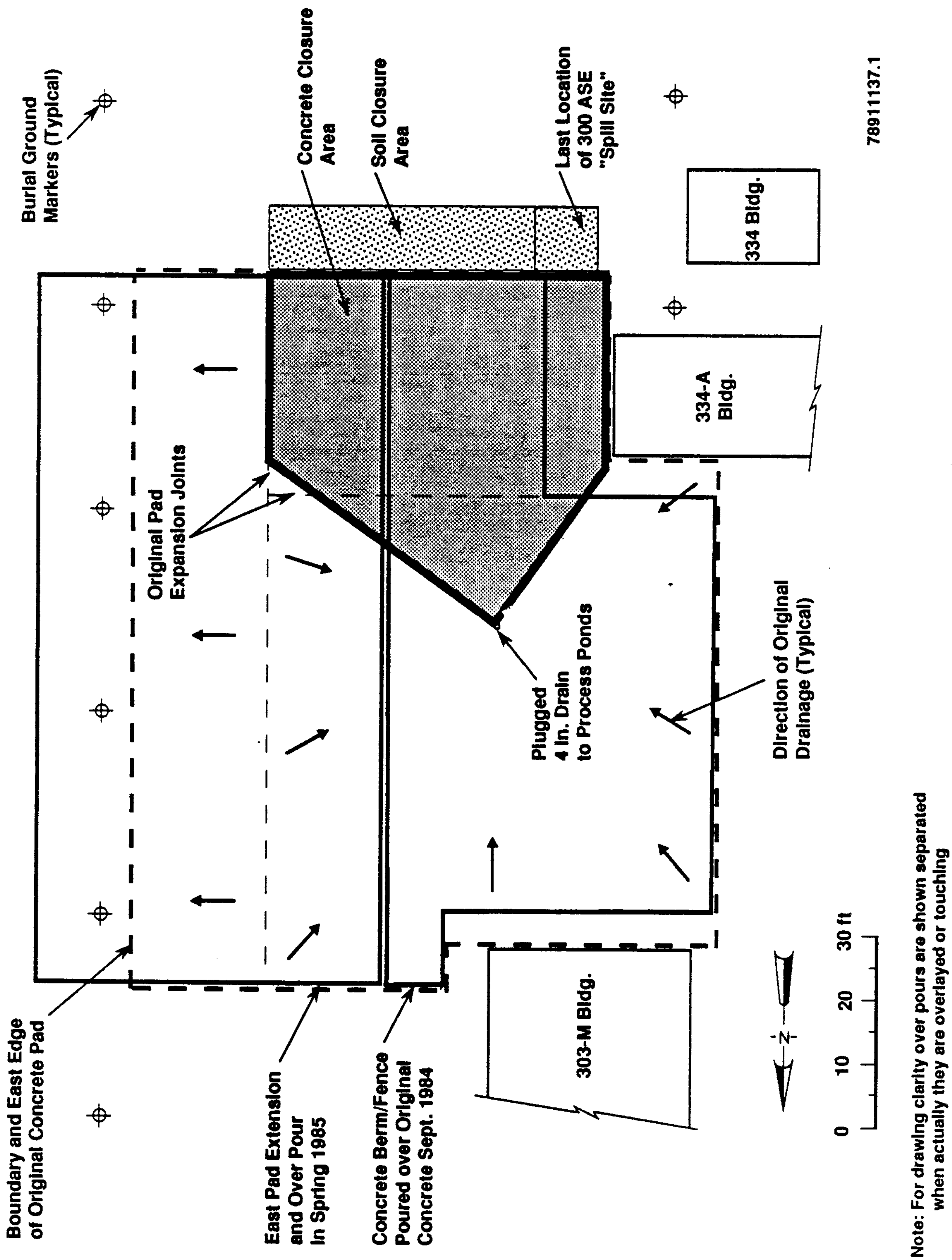


Figure E-3. Closure Area for the 333 East Concrete Pad.

A new concrete pad, the 333 East 'overlay' pad, was poured over most of the west side of the 333 East Concrete Pad in September 1984. This new pad ranges in thickness from about 2.5 inches to 8 inches, and is reinforced with number 10 wire spaced at 6-inch intervals. The original 333 East Concrete Pad drain to the 300 Area process sewer, was also plugged at this time. The eastern side and extension to this composite pad was added during the Spring of 1985. The southwestern part of the original 333 East Concrete Pad is the only part of the concrete closure area that remains exposed (Figure E-3).

E-2.3 SPILL AND LEAK SCENARIOS

Contamination assessments have been made for the following spill and leak scenarios:

- Water/solvent discharge (possibly including paint shop constituents) resulting from a known evaporator overflow (spill) onto the soil

- Water/solvent discharge resulting from known evaporator overflow (spill) onto the exposed 333 East Concrete Pad adjacent to the soil at the known spill location

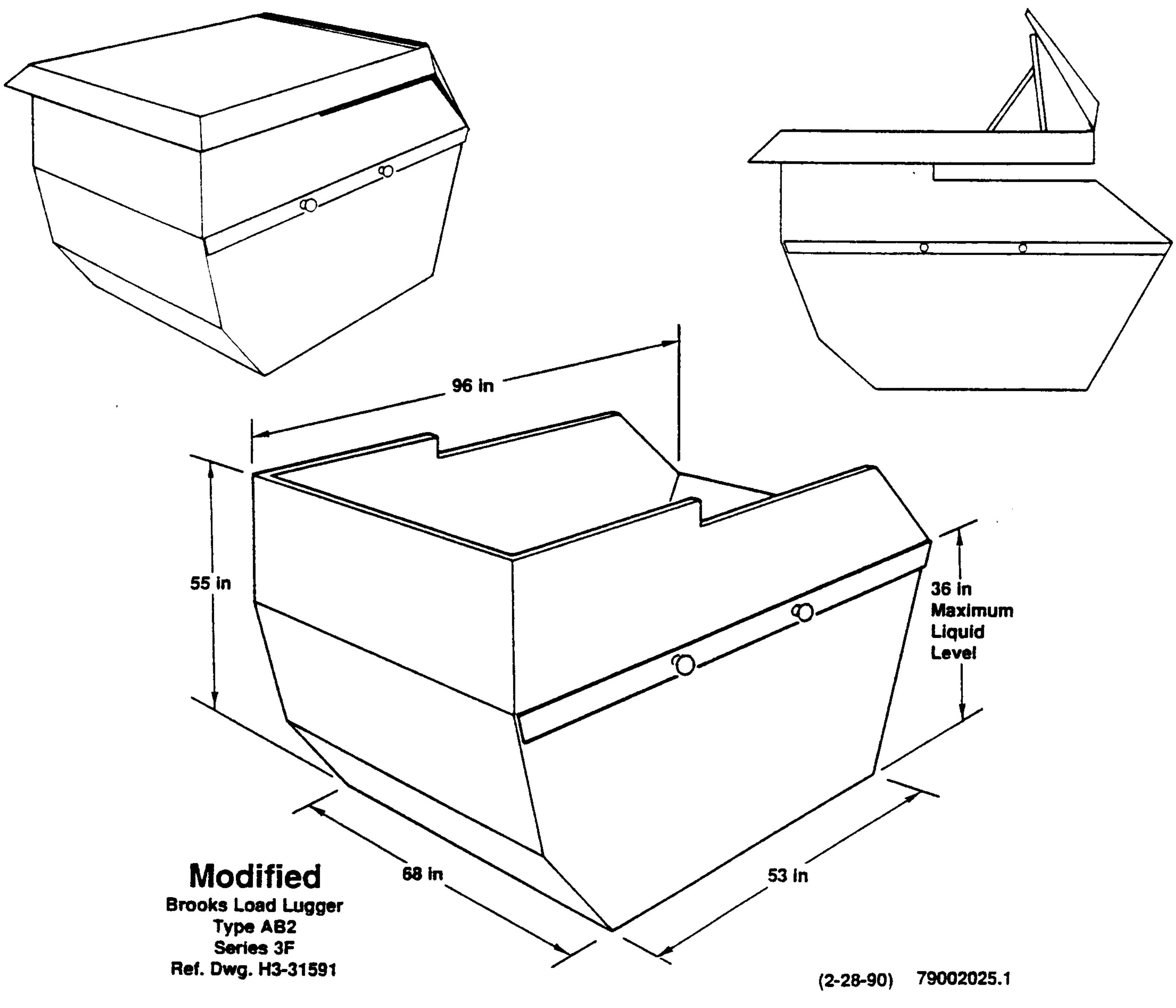
- The 1,1,1-trichloroethane leakage from barrels stored on the 333 East Concrete Pad

- The perchloroethylene leakage from barrels stored on the 333 East Concrete Pad.

E-2.4 EVAPORATOR OVERFLOW SPILL SCENARIOS

The only known spill associated with the 300 ASE operations occurred between March 1 and March 14, 1985, at the last location of the evaporator at the westernmost part of the soil closure area (see Figure E-2). The spill consisted primarily of water (steam condensate) based on the specific gravity and solubilities of the solvents present in the evaporator. The spill water has been estimated to have contained 0.05 percent 1,1,1-trichloroethane and 0.01 percent perchloroethylene based on solubilities. The spillage is presumed to have occurred from the north-facing cutout side of the evaporator which overhung the southern edge of the 333 East Concrete Pad (Figure E-4). It is likely that most or all of the spillage was discharged onto the soil because of the slow-leakage rate (significantly less than 5 liters per hour (i.e., about 1.3 gallons per hour), and the tendency for the water to overflow as a sheet on the outer edge of the evaporator. Because it is not certain whether any of the spillage was actually discharged onto the original 333 East concrete pad, models have been evaluated using highly liberal values for the discharge volume and rate of 400 liters and 10 liters per hour (approximately 106 gallons and 10.6 quarts per hour, respectively).

Weather conditions over this period recorded at the Hanford Meteorology Station are as follows: temperatures range 63°F to 23°F (17°C to -5°C) with an average of 41°F (5°C); average wind speed, 7 miles per hour; average



1 **Figure E-4.** Schematic of the Evaporator. (79002025.1)

relative humidity, 54 percent; 0.1 inches total precipitation. The evaporation rate for water was used as a conservative reference model because the water has the slowest evaporation rate, and would persist the longest in either the soil or the concrete.

E-2.4.1 Assessment of Discharges to Soil

It is indicated from an assessment of the spill onto the soil that due to the loose permeable nature of the 4-foot soil layer overlying the 618-1 Burial Ground, that most of the water/solvent would have passed through the soil and into the underlying burial ground. The upper 3 to 6 feet of soil (throughout the Hanford Site) is devoid of any water and volatile constituents during mid-summer months due to the complete drying of the soil percolation zone. It is indicated from soil moisture profiles (Last et al. 1976; Jones 1978) that soil moisture less than 12 to 20 feet deep normally evaporates, and that this zone becomes devoid of moisture (and any other liquids with vapor pressures similar to or greater than water) during the summer months. Any periodic spillage of water/solvent onto the soil would, therefore, be expected to completely evaporate and no longer be present if permitted to dry over a period including the summer months.

Inorganic metals dissolved in the spillage would tend to rémain in the upper soil column due to the ability of the soil to absorb these constituents. Because the concentrations of dissolved inorganic constituents of interest in the raw solvent (Table E-2) were at or near detection limits, the amount of dissolved inorganic material present in the spill water would have been 2,000 to 10,000 times smaller than that in the raw solvent and, therefore, negligible. Any contribution of these inorganic constituents to the soil due to sorption or other concentration processes should have also been negligible due to the large spill volume required to sufficiently concentrate inorganic constituent to levels above detection and/or the soil baseline.

The only inorganic materials that could have been added to the soil in larger quantities were those associated with the low density and/or dissolved paint shop solvents. However, it is not known whether the paint shop solvents contained inorganic materials, or whether any paint shop solvents were present in the evaporator at the time of the spill. Because of this uncertainty, there is a possibility of some inorganic soil contamination from this source.

E-2.4.2 Assessment of Discharge to Concrete

Although it is likely that little, if any, water/solvent from the evaporator was spilled onto the 333 East Concrete Pad, worst-case models were evaluated for the discharge of a 400 liter reference volume onto the pad at a rate of 10 liters per hour. Any spillage onto concrete would have been confined to the portion of the original concrete pad, i.e, the exposed 40 foot by 10 foot southwest corner of the pad, due to the effect of the overlay pad to prevent drainage toward the plugged 300 Area Process Sewer. Due to the presence of the overlay pad, any significant spill onto this portion of the pad would have resulted in ponding of the spill. A conservative estimate of the time required for evaporation of the water/solvent from the pad surface was based on evaporation of the entire 400 liter volume spread over an area of approximately one half of the 400 square foot exposed concrete area (i.e., 200 square feet). The minimum residence time of water/solvent on the concrete was taken to be the time required for the spill to occur (i.e., 40 hours) plus the calculated time required for evaporation of the 400 liters from the concrete surface (assuming no evaporation during the 40 hour spill time).

The assessment of the water/solvent overflow from the evaporator onto the 333 East Concrete Pad yielded the following result for the conditions described above and the reference values listed in Table E-4.

- The total spill volume of 400 liters of water/solvent would have completely evaporated from the surface of the concrete in less than 5 days. Complete drying of the concrete would have required less than 7 days for a fluid penetration depth of 3/8 inches (at 5°C). The concrete would have been devoid of spill constituents in less than 12 days after initiation of the spill.

- Water/solvent from the spill would have penetrated the concrete to maximum depth of less than 9 millimeters (3/8 inch).

- The choice of different (i.e., larger) spill volumes, discharge rates, or other parameters, would not alter the conclusion that the water/solvent would have evaporated from the exposed 333 East Concrete Pad in less than 2 weeks after discharge.

E-2.5 ASSESSMENTS OF BARREL LEAKS TO CONCRETE

Assessments of the discharge of solvent-only barrel leakage onto the 333 East Concrete Pad involved the determination of the maximum duration of solvent wastes on the pad and their removal due to evaporation. Evaporation models for perchloroethylene and 1,1,1-trichloroethane discharges were used to assess possible leakages from the barrels of spent solvent stored within 20 feet of the southern edge of the pad (i.e., a minimum of 55 feet from the 300 Area Process Sewer drain).

The barrel leak scenarios differ from the overflow spill scenario in that any leakage would have occurred prior to construction of the overlay pad and plugging of the 300 Area process sewer drain. Although barrel leakage rates would be expected to be smaller than the evaporator spill rate, the same discharge rate (10 liters per hour) were used as a worst-case condition. Residence time was assumed to be the time required for discharge of a 55-gallon drum (approximately 21 hours) plus the calculated time required for evaporation of solvent remaining on the pad at the end of this time. All assessments are calculated on a per barrel basis and assume porous media behavior of the concrete. It was also assumed in this model that any solvent not evaporated from the pad surface or penetrating the pad would have drained into the 300 Area process sewer system.

Average annual weather conditions at the Hanford Site pertinent to these assessments are as follows: temperature, 53°F, 54 percent humidity, and a 7.7 miles per hour wind speed (PNL 1983). However, it is not known whether leakage from the storage barrels ever occurred, or when a leak may have occurred. Therefore, the weather conditions used for calculation of evaporation rates in the evaporator spill assessments are considered to be conservative, and were also used for the leak assessments (Table E-3). Leak models were also based on 1 meter (3 foot) wide wetted areas extending toward the drain. Assessments of perchloroethylene and 1,1,1-trichloroethane leaks from solvent storage barrels yield the following results for the conditions described in Table E-4:

- The leak rate dominates the residence time of solvent on the concrete surface for both perchloroethylene and 1,1,1-trichloroethane; i.e., 21 hours for a leak from a 55-gallon barrel at 10 liters per hour, plus less than 1 hour for evaporation of residual perchloroethylene or 1,1,1-trichloroethane; maximum residence time of less than 24 hours.

- Both perchloroethylene and 1,1,1-trichloroethane would have penetrated to a maximum depth of less than 2 millimeters.

- The PCE would have evaporated from a wetted thickness of 2 millimeters in less than 2 hours after the discharged ceased; 1,1,1-trichloroethane would have evaporated about ten times faster.

- Only the concrete in the immediate vicinity (1 to 2 meters downslope) of a leaky barrel is likely to have been impacted by solvent wetting and evaporation.

- It is likely that leaks of perchloroethylene and/or 1,1,1-trichloroethane would not have reached the 300 Area Process Sewer drain prior to complete evaporation.

E-2.6 ASSESSMENT SUMMARY

It is concluded from the results of these assessments that any spillage of water/solvent onto the soil or 333 East Concrete Pad, or leakage of perchloroethylene or 1,1,1-trichloroethane onto the pad would have completely evaporated and no longer be present.

Therefore, it is expected that after a period of several weeks following discharge, the solvent from the 300 ASE overflow spill should not have been detected in either the soil or the exposed or covered part of the original 333 East Concrete Pad. Inorganic constituents associated with the primary solvents should not have been detected in the soil. However, inorganic constituents from paint shop solvents that may have been in the evaporator at the time of the spill, could have been discharged to the soil and could be present in the upper levels of the soil.

Any perchloroethylene and/or 1,1,1-trichloroethane leakage from barrels stored on the original 333 East Concrete Pad would have completely evaporated from the concrete within a few hours to days of discharge. Therefore, it is concluded that any leakage onto the concrete pad from barrels associated with the 300 ASE would have evaporated long before the overlay pad was constructed and would no longer be present in the exposed or covered part of the original 333 East Concrete Pad.

E-3 SOIL SAMPLING

A total of 15 soil samples will be collected for the 300 ASE and submitted for analysis. Figure E-5 shows the soil closure area sampling sites. Following is a summary of the soil sampling effort.

- Six soil samples from the soil closure area.
- One duplicate soil sample.
- Eight baseline soil samples.

All of the soil samples will be taken from the material that was used to construct the 618-1 Burial Ground cover. The physical appearance of the 618-1 Burial Ground surface soil indicates that the surface has been subjected to many uses. Color differences and undulations within the soil's surface are examples of prior utilization that has rendered parts of the 618-1 Burial Ground cover unsuitable for baseline sampling. These locations are identified as disturbed surface areas in Figure E-6. The soil sampling depth, sample locations, and discretion for field changes should minimize these factors. Sample locations and depths are described in the following sections. All soil samples will be collected in accordance with EII 5.2 and analyzed in accordance with standard SW-846 procedures (EPA 1986). Field and laboratory QA/QC requirements, specific methods and protocols are identified in the 300 ASE quality assurance project plan.

E-3.1 SOIL SAMPLING LOCATIONS

Six verification soil samples will be taken in the 300 ASE closure area. The soil closure area has been delineated by the locations of the evaporator during its operation. Throughout its use, the evaporator was confined to the southern edge of the 333 East Concrete Pad and the immediately adjacent 50 feet by 10 feet strip of soil (see Figure E-3). The strategy of soil sampling within this 50 feet by 10 feet area is based on the following.

- The evaporator was located on the 10 by 10 feet block of soil designated as Block A in Figure E-5 at the time of the known spill (March 1985).

- The possibility exists for other unknown leaks or spills to have occurred on the soil closure area.

- The overflow from the evaporator would likely have spilled from the north-facing (cut-out) side as shown in Figure E-4.

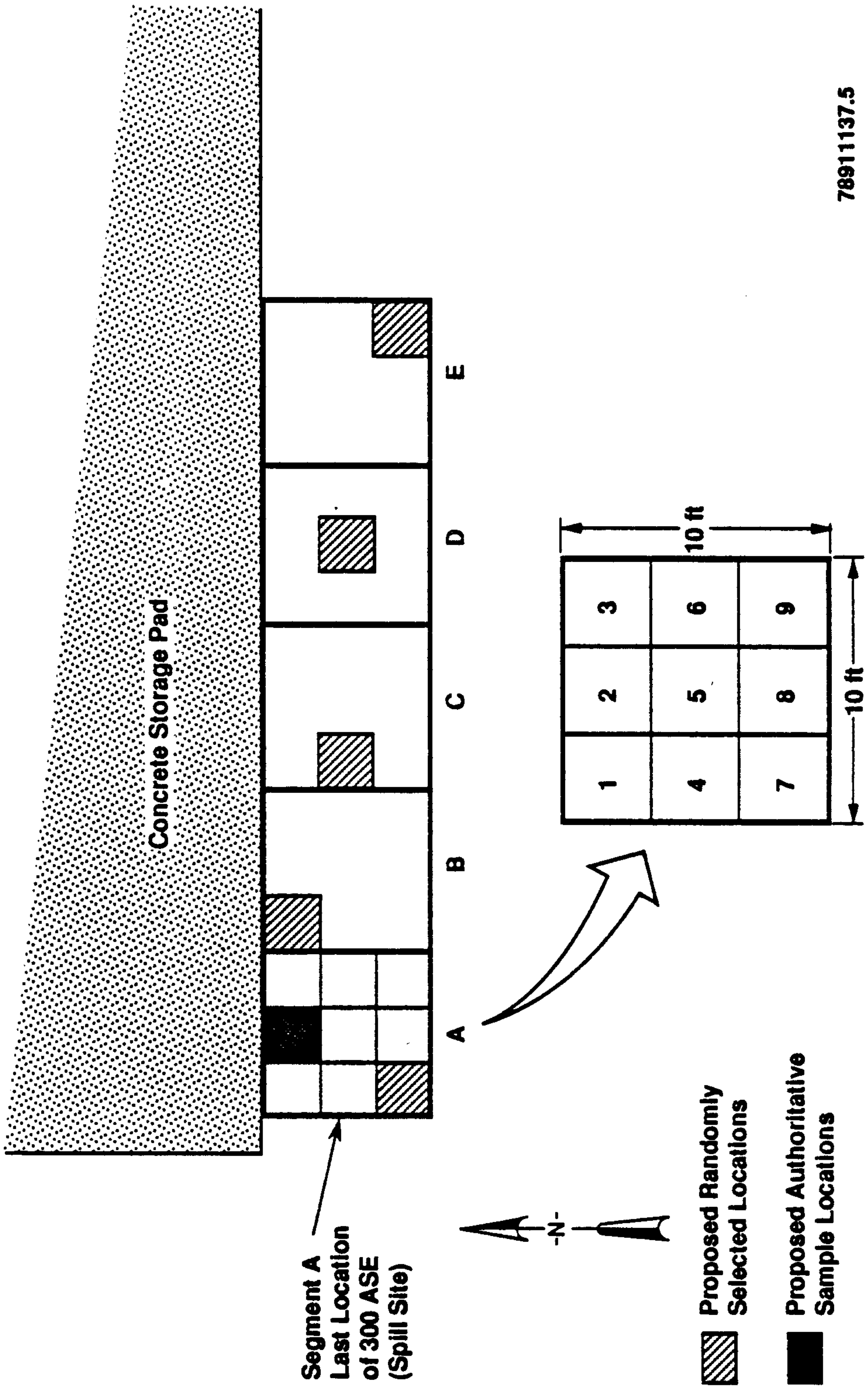


Figure E-5. Soil Closure Area and Sampling Sites.

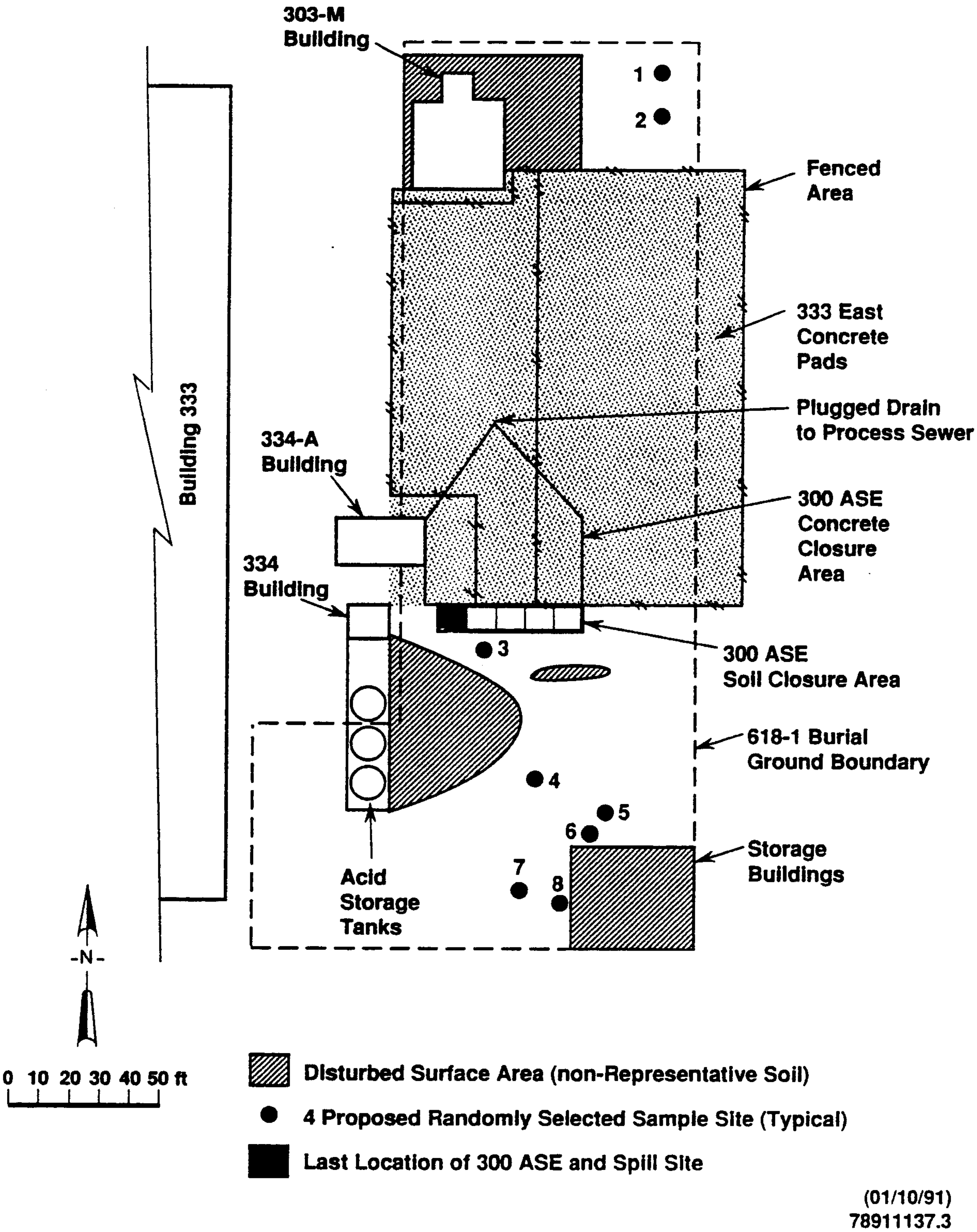


Figure E-6. Baseline Soil Sampling Sites. (78911137.3)

The 10 by 50 feet soil closure area (Figure E-5) was divided into five blocks: Block A, B, C, D, and E. Each block was subdivided into nine equal parts (3.33 feet on a side). A sample location (grid block) was randomly chosen using a random number table (Cochran and Cox 1957) for each of the five blocks; i.e., five representative samples from the 45 possible locations. Additionally, an authoritative sample from Block A was also selected from the site of the steam condensate overflow. One of the samples will be field split to make a duplicate sample.

Utilization of a simple random sampling scheme for these samples ensures that the data obtained will be representative of the population from which the samples were taken and will meet or exceed the minimum requirements of EPA SW-846 guidelines. Following soil sampling, the sampling locations will be hand graded to blend with the surrounding topography and will not become preferential pathways for precipitation infiltration.

E-3.2 SOIL SAMPLING DEPTH

The baseline and closure area soil samples will be restricted to the upper 12 inches of the 618-1 Burial Ground soil cover. This soil cover is nominally 4 feet thick. Based on factors such as compaction over time and the potentially undulating upper surface of the 618-1 Burial Ground, it must be assumed that the actual thickness of the soil cover could vary from 4 feet to less than 2 feet in any given location. The sampling strategy is to collect shallow soil samples to avoid penetration of the 618-1 Burial Ground for health and safety reasons, but deep enough to preclude surface contaminations. Given these conditions, only the upper 6- to 12-inch zone of the soil can be safely sampled. The entire sample from each sample location will be submitted to the laboratory for analysis.

Soil samples from the sampling zone of the closure area are expected to be suitable for evaluating contamination of the soil resulting from the 300 ASE operation for the following reasons:

- Inorganic metals and radionuclides would remain in the upper 12 inches of the soil based on the demonstrated ability of the soil to absorb these constituents (e.g., Routson et al. 1979)

- Soil moisture profiles (Last et al. 1976; Jones 1978) indicate that soil moisture less than 12 to 20 feet deep normally evaporates and the zone becomes devoid of moisture (and any other liquids with vapor pressures greater than water) during the summer months. Thus, the upper 12 inches of soil would be appropriate to verify the absence of volatile organic solvents from the upper 4 feet of the soil above the 618-1 Burial Ground.

E-3.3 SOIL BASELINE SAMPLING LOCATIONS

Eight randomly selected locations within the 618-1 Burial Ground boundary have been selected for baseline sampling (Figure E-6). The selection of the number of baseline samples was based on professional judgment

(Section E-10). The eight sampling sites were chosen from a total of 45 randomly selected grid intersections from a 10-feet grid matrix within the 618-1 Burial Ground area (exclusive of the datum reference point). The eight locations shown in Figure E-6, were screened from among the 45 possible locations based on the following parameters:

- Sample locations will be at least 10 feet away from the 334 Building (acid storage tanks), other buildings, or known surface disturbance areas

- No samples will be taken closer than 10 feet to the edge of the 618-1 Burial Ground boundary or closure area

- Sample locations will be at least 10 feet apart.

Soil at the sampling sites will be hand graded to surrounding levels following sampling to minimize the generation of artificially induced fluid pathways resulting from sampling activities.

E-3.4 SOIL BLANKS AND SUMMARY TABLE

Note: This table reflects the minimum number of samples and blanks consistent with the quality assurance requirements. Additional duplicates and blanks may be taken at the discretion of the team leader to respond to field conditions. Section E-8 discusses duplicates and blanks.

Summary Table - Number of Soil Samples and Blanks.

				Blanks		
	Soil	Duplicate	Trip	Field	Equipment	Total
Soil Baseline	8	0	0	0	0	8
Soil Closure Area	6	1	1	1	1	10
Total	14	1	1	1	1	18

E-4 CONCRETE CORE SAMPLES AND LOCATIONS

The concrete core sampling locations and sampling locations within each core are illustrated in Figure E-7. The following is a summary of the concrete sampling effort:

- Five concrete core sites

- A total of 14 concrete samples will be submitted for analysis; 13 samples from five cores and one duplicate

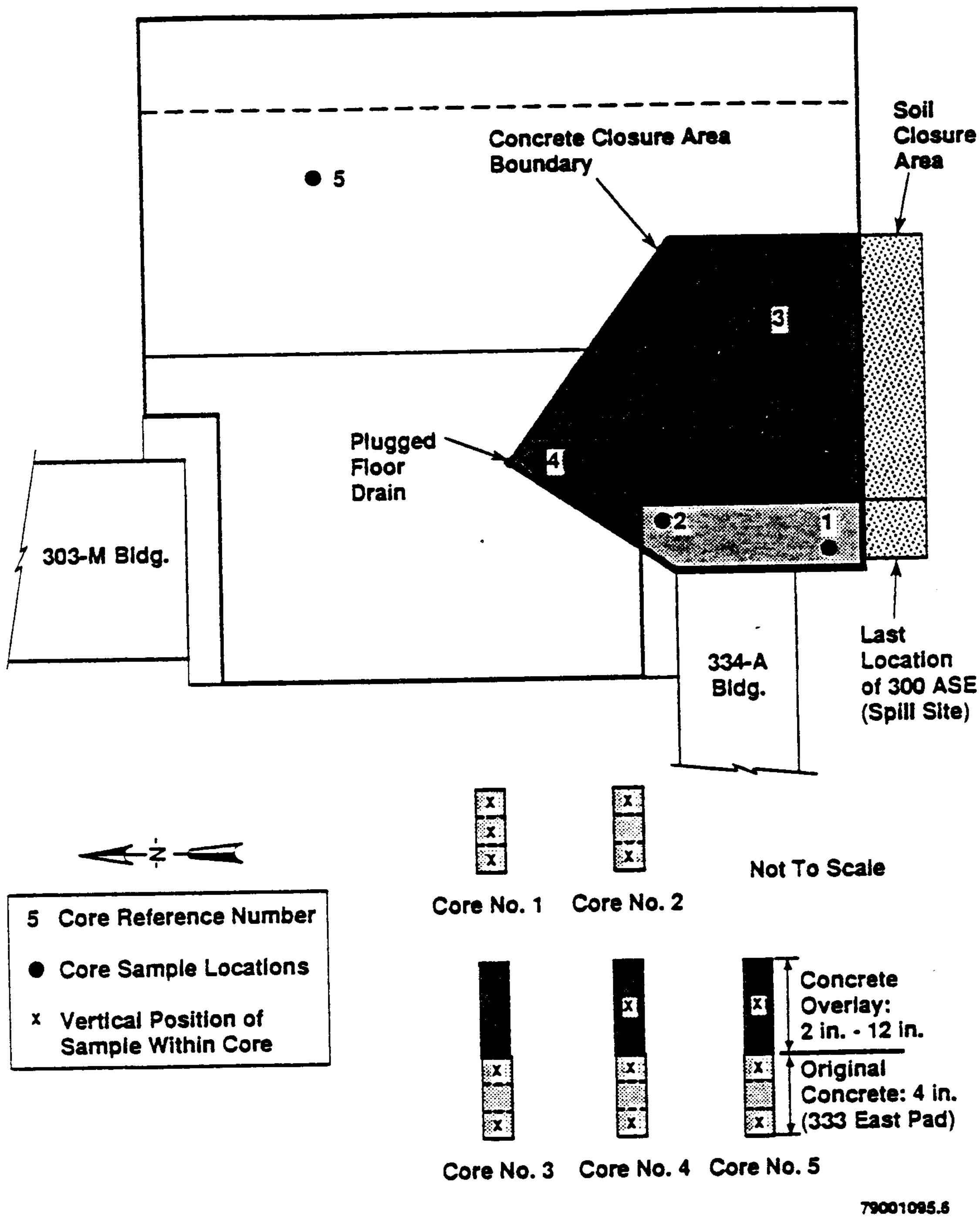


Figure E-7. Concrete Closure Area, Sampling Sites, and Sample Locations.

- Five samples from core sites 1 and 2 on the exposed 333 East Concrete Pad
  - three samples from core 1, which will be located on a fracture and penetrates the entire thickness of the pad
  - two samples from core 2, from the top half and the bottom half

- Six samples (two each from core sites 3, 4, and 5) that penetrate to the underlying (original) 333 East Concrete Pad.

- Two samples from the middle of the 333 East overlay pad from cores 4 and 5

- One sample from core 1 or 2 samples will be field split to make a duplicate sample.

Summary Table - Number of Concrete Samples and Blanks for the 300 Area Solvent Evaporator.

			Blanks			
	Concrete	Duplicate	Trip	Field	Equipment	Total
333 Concrete Pads			1	1	1	
Original pad	11	1				
Overlay pad	2	0				
Total	13	1	1	1	1	17

Note: This table reflects the minimum number of samples and blanks consistent with the quality assurance requirements. Additional samples and blanks may be taken at the discretion of the team leader to respond to field conditions. Section E-8 discusses duplicates and blanks.

E-4.1 CONCRETE CORE SAMPLES

At least 2 inches of concrete core from the 333 East Concrete Pad will be taken at each of the five sites shown in Figure E-7. The cores will be approximately 1.3 inches in diameter. Cores from the 333 East overlay pad will require penetration of up to 8 inches to reach the underlying 333 East Concrete Pad. Air-misting drilling methods can be used to minimize heating of the core and also prevent excessive flushing of the cores with cooling water. The drilling method used to penetrate the boundary between the 300 East overlay pad and the original pad must not compromise future pad use and must also not produce airborne radioactive material (i.e., uranium dust). Concrete cores 4 and 5 from the 333 East overlay pad, unaffected by 300 ASE activities, will be analyzed for information only as requested by Ecology (two samples).

E-4.2 CONCRETE CORE SITES

A total of five cores will be collected at the sites as shown in Figure E-7. The five cores will yield 14 samples (including the duplicate) for analyses. Following collection of the concrete cores, the holes will be immediately backfilled and sealed with field-mixed concrete to restore the pads for other usages and to preclude precipitation infiltration and/or contaminant migration.

E-4.2.1 Exposed 333 East Concrete Pad Locations

Two cores (cores 1 and 2) will be collected from the southwest part of the exposed 333 East Concrete Pad for verifying the absence of volatile constituents in the concrete arising from the overflow from the 300 ASE, or a leak from the evaporator or solvent barrels. Core 1 will be collected from the exposed 333 East Concrete Pad and will be located on a fracture about 8 to 10 feet from the south edge of the pad. This location was selected because the fracture would have provided a pathway through the concrete, if it existed at the time of the spill; and also because of its proximity to the spill site. This core will penetrate the entire 4 inch thickness of the pad and will yield three samples for analysis. Core 2 will be collected from the northeast corner of the exposed pad where it adjoins the 333 East overlay pad (core 1). This location was selected because it is in line with the preexisting drain and is, therefore, the lowest point on the down gradient part of the exposed pad. Any ponding of fluid would be expected to occur at this location. This core will be approximately 4 inches long and should yield two 1-inch long samples for analysis (one from the top half and one from the bottom half).

E-4.2.2 The 333 East Overlay Pad Locations

Three cores (cores 3, 4, and 5) will be collected through the 333 East overlay pad overlying the 333 East Concrete Pad for the purpose of verifying the absence of 300 ASE solvents that may have leaked from barrels onto the original 333 East Concrete Pad. Each of the cores will penetrate approximately 6 to 8 inches of concrete and must penetrate at least 2 inches into the underlying 333 East Concrete Pad. Core site 3 (two samples) has been selected because it is at a position in the southeastern portion of the pad approximately at a known temporary storage site of solvent barrels (see Figure 1-7 of the *300 Area Solvent Evaporator Closure Plan*, Revision 3.)

The remaining two core sites (cores 4 and 5) have been selected by Ecology. Core site 4 (three samples) has been located about 1 foot south of the plugged drain (Figure E-7) to verify that any solvents originating from solvent barrel leaks on the original 333 East Concrete Pad have not reached the drain. Core site 5 has been located outside of the closure area away from 300 ASE affected activities, as indicated in Figure E-7. This site will yield three samples: one from the middle of the overlay pad and two from the original 333 East Concrete Pad. The analysis of the samples from core site 5 will be for informational purposes only, as directed by Ecology.

E-4.3 CONCRETE ANALYSIS

There are currently no EPA protocols for the collection and processing of concrete core samples or the identification of volatile contamination of concrete. The analytical methods used for inorganic analysis of soils can be used for the analysis of inorganics in concrete samples; however, the sample preparation and analysis methods for volatile and semi-volatile waste constituents in soils cannot be applied to concrete because sample preparation involving crushing or powdering could severely compromise the integrity of concrete samples and thus render them useless for regulatory compliance purposes (Urban et al. 1989). This is a critical concern for verifying the absence of volatile waste constituents for RCRA clean closure requirements. The EPA (Office of Solid Waste) and authors of the EPA SW-846 protocols concur that approved methods for the analysis of solid waste and soils for volatile constituents are not suitable for concrete samples. It is indicated from a survey of laboratory techniques for the analysis of volatile constituents in concrete, that most of these techniques are not technically defensible. Existing methods are inadequate for several reasons:

- Concrete samples cannot be pulverized or finely crushed for gas chromatography analysis without extensive loss of volatile constituents from pore spaces

- Headspace and purge and trap techniques utilized for soils are inadequate for solid concrete owing to significant differences in the nature of the media, i.e., the pore spaces from solid concrete are not effectively purged as they are for soil

- Most fluid extraction (methanol or water) techniques are inadequate because constituents in the pore volume of the concrete cannot efficiently exchange with the extraction fluid, or because the efficiency of the extraction method is unknown.

The concern of volatile loss is also paramount in the sampling of concrete which potentially contains volatile waste constituents. Sampling of concrete is typically performed by coring. There are no specific guidelines regarding the coring techniques and coolant requirements, other than those concerning airborne radioactive materials. Concrete potentially contaminated with volatile waste constituents, however, requires special sampling considerations that preserve the integrity of the sample. Thus, practical and technically sound sampling and analysis methods for concrete must be calibrated or developed for RCRA activities involving concrete potentially contaminated by volatile constituents.

E-4.4 INTERIM MEASURES

Methods for practical and technically sound sampling and analysis of concrete containing volatile waste constituents are being investigated. Plans for feasibility and calibration testing of concrete testing methods are in preparation. The use of organic coolants will be avoided in any core sampling efforts. Based on expert opinion (e.g., Portland Cement Association) and calculations on the impact of coring cooling water on concrete core, it is indicated that air-misting while coring may be the most practical method of core sampling. Other possible methods include vacuum and heat extraction methods for pore gases from concrete cores and modified fluid extraction techniques. Decisions regarding the practicality and feasibility of the core-cooling methods will require proof-of-principal and calibration testing. These activities are planned to begin in 1991, and should be completed prior to the beginning of concrete sampling at the closure site. Preliminary findings and developments regarding this concrete sampling and analysis issue will be reported to Ecology at Unit Managers meetings or more frequently when necessary.

Verification of the absence of volatile constituents that may be near detection limit concentrations requires care in the taking and preparation of the sampling for analysis. Most sample preparation methods involving crushing of the sample for gas chromatography analysis are unacceptable because crushing the sample too finely causes the release of the volatile constituents from accessible pore spaces in the sample prior to analysis. The alternative method of analysis involves laboratory crushing of the concrete to obtain a size fraction about 1/8 inch in diameter that will be immediately loaded into the stainless steel sample port of a thermal desorption mass spectrometer, and analyzed for organic constituents. This method is preferred because crushing to the 1/8 inch size fraction does not severely impact volatile loss due to the relatively large amount of unaffected pore space that remains. Alternative sample handling and analysis methods are also under consideration. Analysis of concrete samples for volatile organic analyses must precede analysis for inorganic constituents. Concrete samples could then be processed (e.g., crushed) and analyzed for inorganic constituents according to EPA guidelines in the same manner as soil samples.

E-5 FIELD MODIFICATIONS TO THE SAMPLING PLAN

Under field conditions the optimal aspects of preliminary sample design are sometimes not achievable. Factors influencing the sampling efforts can be equipment malfunction or breakdown, improper equipment, physical barriers to coring equipment, weather conditions, soil conditions, and overly optimistic evaluation of capabilities at sites with no previous history of dangerous waste characterization. Because of unforeseen field conditions, decisions concerning modifications to the planned activity may be necessary. When conditions are encountered that require modifications in the field, the following steps as documented in *Environmental Investigation and Site Characterization Manual*, WHC-CM-7-7, EII 1.5, "Field Logbooks", and EII 5.2, "Soil and Sediment Sampling" (WHC 1989) will be observed and require post-approval of the project technical leader and/or the cognizant environmental quality assurance and quality control authority.

The field team leader will perform the following:

- Document any modifications required

- Record this information in the field logbook, including the modifications made and a justification for the change

- Obtain the project leader's approval and field logbook signature (Section E-6.3) following completion of the day's field work for instances where major deviations from the sampling plan occur.

Adherence to the normal sampling procedures will provide an accurate record of modifications and allow sampling to proceed safely, while maintaining efficient equipment and manpower usage.

E-6 SAMPLING EQUIPMENT AND PROCEDURES

The following sections outline the field sampling equipment and procedures that will be used during the soil and concrete sampling operations.

Samples collected for organic analysis will not be crushed or stirred in the field for homogenization purposes in order to avoid volatile loss and invalidation of the samples. Care will also be exercised to minimize disaggregation for the same reasons.

E-6.1 SOIL SAMPLERS

Samplers to be used will consist of appropriate tools to meet the broad spectrum of soil sampling needs that may be encountered. These samplers should generally be constructed of stainless steel or have liners constructed of inert materials. The following are examples of the types of samplers that may be used:

- Thief
- Trier
- Auger
- Split spoon
- Trowel
- Scoop
- Shovel.

The proposed method for soil sampling is to use a stainless steel hand-auger for boring to a depth of 12 inches.

Any additional equipment and supplies needed to perform the necessary soil sampling will be procured in accordance with WHC-CM-7-7, EII 5.2, "Soil and Sediment Sampling".

E-6.2 CONCRETE CORING AND SUPPLEMENTAL EQUIPMENT AND SUPPLIES

This section lists the possible types of equipment required to core drill into or through the 300 ASE concrete pad for the purpose of obtaining samples for site characterization.

- Electric generator set
- Core drill equipment

- Vacuum base drill mount
- Vacuum pump
- Hoses
- HILTI* concrete bolting equipment
- Compressed breathing air
- Non-shrink grout material
- Steam cleaning equipment
- ASTM Type IV reagent grade water.

Additional equipment and supplies will be procured as required to perform the necessary concrete sampling.

Procedures for concrete sampling are being prepared for inclusion into the *Environmental Investigation and Site Characterization Manual (EII)*.

E-6.3 FIELD LOGBOOKS

A vital part of any sampling and analysis plan requires the assurance that all the information and data associated with each sample are accurate and verifiable.

The personnel conducting sampling will maintain an official log book during the effort. The logbook will be bound and have consecutively numbered pages. All information pertinent to the sampling must be recorded in the logbook in a legible fashion. Changes shall be avoided but, when necessary, will be indicated by a single line drawn through the affected text. The individual responsible for the change will initial and date the entry. Daily activities or separate sampling episodes must be dated and signed. The logbook should be protected, stored in a safe file or other repository, and maintained as a permanent record.

The following information is documented in WHC-CM-7-7, EII 1.5, "Field Logbooks":

- Project/task name

- Site map, sketch, drawing, or other definitive site description

- Locations of all sampling points, including reference permits and scale

- Sample method

- Date and time of collection

- Daily identification of participants and their responsibilities

- Number, type, volume of samples taken

* HILTI is a trademark of HILTI Fastening Systems.

- Identification number for each sample
- Field observations (weather conditions, temperature, wind, wetness and appearance of sample, etc.)
- Laboratory of destination
- Field measurements, if any
- Signature of recording personnel.

As warranted, additional items that may be included are:

- Name and address of field contact
- Producer of waste
- Type of process
- Type of waste
- Type/purpose of sampling
- Suspected waste concentrations
- Sample distribution and transportation method
- Photographs of site for field conditions and site location verification
- Other information deemed pertinent.

E-6.4 GENERAL SAMPLE COLLECTION

This section chronologically lists the steps for collecting samples.

E-6.4.1 Sample Containers and Preservation

Containers for potentially dangerous waste samples will be chosen based on their compatibility with the waste, resistance to leakage or breakage, ability to seal tightly, and required volume for an optimum sample. Containers for collecting and sorting dangerous waste samples will be made of high-density plastic or glass appropriate for the constituents to be analyzed. The containers will have tight, screw-type lids with Teflon* cap liners for glass bottles.

Containers are purchased, precleaned according to EPA protocols from the supplier, and kept under strict chain of custody to preserve the integrity of

*Teflon is a registered Trademark of E.I. duPont de Nemours and Company.

the containers and samples from collection through disposal in accordance with WHC-CM-7-7, EII 5.2, "Soil and Sediment Sampling".

E-6.4.2 Sample Labels

Labels will be attached to each sample to prevent misidentification. They may be stick-on paper labels or tags and will be affixed to the proper sample containers prior to, or at the time of collection. All information will be filled out at the time of collection.

Nonsmearable pencil or ink will be used, but samples may be double bagged with the label in the outer bag. Each label will contain at least the following information:

- Site contractor
- Project/task name
- Collector's name
- Date and time collected
- Sample number.

E-6.4.3 Sample Container Seals

Sample container seals will be used to prevent and/or detect tampering; i.e., following collection until laboratory analyses. Seals will be applied to the sample containers before leaving the sample location. The seals will be attached so that the seal will be broken by opening the container.

E-6.4.4 Sample Analysis Request Form

The sample analysis request form as documented in WHC-CM-7-7, EII 5.2, "Soil and Sediment Sampling" has been designed to accompany the samples to the laboratory and designate the analyses to be performed on each sample. The form also provides the sampling supervisor's with documentation to ensure that all samples have been received and that correlation between sample analysis and sample numbers is finalized and completed. The minimal information on this form includes the following:

- Contractor
- Company contact
- Project/task name
- Sample number
- Sample type
- Analysis requested
- Data and time collected
- Laboratory sample custodian.

E-6.4.5 Storage of Samples

Once the samples have been collected, various steps may be required to preserve the chemical and physical integrity of the samples as documented in WHC-CM-7-7, EII 5.2, "Soil and Sediment Sampling". The method of sample preservation may vary according to sample type and parameter to be analyzed. Preservation and storage requirements will be followed based on the specific analytical methods to be used.

Regardless of the type of sample, all samples will be placed in an ice chest and cooled to 4°C (40°F) as soon as possible after collection.

Samples collected from radiation zones (i.e., the 618-1 Burial Ground) will be checked by a health physics technician prior to transportation from the site.

E-6.4.6 Chain of Custody Record

To ensure the integrity of the samples from collection, through analyses, to final disposition; documentation in accordance with WHC-CM-7-7, EII 5.1, "Chain of Custody", is necessary to trace possession and routing. This documentation generally takes the form of a record providing a history of persons having custody of the sample to include situations where the sample is subject to the following:

- In a person's physical possession
- In view of a person
- Secured by individual so tampering is impossible.

A chain of custody record will be filled out and accompany all samples from collection to analysis. Multiple copies will be required and at least one copy must be maintained by the sampling supervisor. The following information should be included:

- Contractor
- Project/task name
- Sample numbers
- Date and time collected
- Sample type
- Number of containers
- Collector's signature
- Signature of person receiving possession
- Inclusive dates of possession
- Condition of samples upon receipt.

E-6.4.7 Disposal Procedures

Excess sample material left over from filling of sample containers will be returned to the approximate site of origin. The sampling location will be hand graded to minimize potential precipitation infiltration and/or contaminant migration.

Nothing transported to the site will be disposed of onsite. Articles such as protective clothing that have been soiled with potentially contaminated materials will be temporarily placed in plastic-lined containers and managed by the sampling personnel. These containers will be stored in a designated area at the direction of the sampling personnel until the contents have been tested for dangerous wastes. If the contaminants are found to be dangerous, arrangements will be made for proper disposal. If they are discovered to be nondangerous, materials will be laundered or disposed of according to onsite procedures. Containers for temporary storage will be properly marked as potentially dangerous waste until the analyses are known.

E-7 RADIOLOGICAL CONTAMINATION CONTROL

Because sampling is to be undertaken within a radiological controlled area, appropriate radiation procedures (radiation work procedures) will be followed. If radioactive/dangerous waste is detected during physical sampling, the following activities in accordance with WHC-CM-7-7, EII 5.5, "Decontamination of Equipment for RCRA/CERCLA Sampling" will occur.

E-7.1 PERSONNEL DECONTAMINATION PROCEDURES

A decontamination area will be established near the control station and upwind of sampling activity whenever possible. In accordance with the *Health and Safety Plan* (WHC-CM-7-7, EII 2.1), Westinghouse Hanford Company's (internal use only) *Radiation Work Permit*, and WHC-CM-7-7, EII 5.4, "Decontamination of Drilling Equipment", personnel will be radiation surveyed before being allowed to leave the controlled work area.

E-7.2 MODIFICATION TO PERSONNEL DECONTAMINATION PROCEDURES

All modifications to decontamination procedures will be approved by the field team leader and the site safety officer. Modifications will be recorded in the appropriate logbooks.

E-7.3 EQUIPMENT DECONTAMINATION

Care will be taken in field sampling to ensure that there is no cross contamination of samples by sampling equipment. To prevent this source of contamination, freshly cleaned and decontaminated sampling tools will be used. When equipment must be reused in the field, it will be cleaned as thoroughly as practical. For this purpose, stringent laboratory cleaning procedures have been modified for field conditions as documented in WHC-CM-7-7, EII 5.5, "Decontamination of Equipment for RCRA/CERCLA Sampling".

E-8 FIELD QUALITY ASSURANCE/QUALITY CONTROL

When finalized, sampling procedures will be consistent with EPA (SW-846) protocols. Quality control samples for the soil and concrete will be collected in accordance with SW-846 guidelines, where applicable. Nomenclature and definition of terms will be consistent with those identified in SW-846. Field quality control samples will include duplicates, field blanks, equipment blanks, and trip blanks. At a minimum, 1 sample in 20 (5 percent) will be divided in the field, appropriately labeled, and treated as a duplicate. In the event that the sampling rate is less than 20 samples per week, or 20 per sampling effort, at least one duplicate sample will be collected per week, or per sampling effort, whichever is greater. All samples will be submitted to the same analytical laboratory. The quality assurance/quality control samples for both soil and concrete will be handled similarly.

At least one field blank will be collected for each sampling medium (e.g., soil and concrete). Field blanks will consist of aliquots of analyte-free water or solvents brought to the field in sealed containers, opened for typical sampling time, closed, properly labeled, resealed, and transported to the analytical laboratory with the other field samples. Trip blanks will be identical to field blanks, but are not opened in the field. At least one trip blank will accompany samples transported from the field to the analytical laboratory.

Equipment blanks (post-decontamination rinsate samples) will consist of field blank samples (i.e., analyte-free deionized water) opened in the field and the contents poured appropriately over or through the sample collection equipment after decontamination. At least one representative equipment blank will be collected for each sampling medium.

E-8.1 PERSONNEL TRAINING

Several training courses has been specified for soil sampling personnel. The required courses and activities are documented in WHC-CM-7-7, EII 1.7, "Indoctrination, Training, and Qualification" as follows:

- *Occupational Safety and Health Administration* (OSHA 1989) approved, 40-hour, Dangerous Waste Worker Training or Hanford-approved, 24-hour, basic waste site health and safety training
- Cascade and escape pack training (Hanford)
- Self-contained breathing apparatus training (Hanford)
- Radiation worker training (Hanford)
- A 3 day on-the-job training session under the supervision of an experienced person before full responsibility of the particular job may be assumed
- First aid training is desirable, but not mandatory, for work on the Hanford Site
- All personnel at the dangerous waste site will be required to have reviewed the sampling and analysis plan (this document).

E-8.2 STANDARD SAFETY PROCEDURES

In addition to the soil sampling requirements of SW-846, the following procedures will apply each time personnel make a site entry for soil sampling purposes.

- No personnel will be at the site without a designated 'buddy'.
- One of the persons entering the site will be designated to be in charge by the Health and Safety Plan.
- Personal protective equipment will be worn as specified. Approved deviations will be entered in the field logbook and signed by the field team leader and the site safety officer.
- Field work will be planned prior to site entry.
- Equipment needed for work will be inventoried and inspected prior to the site visit to ensure that all equipment is present and in operable condition.

E-8.3 HEALTH AND SAFETY PLAN

A Health and Safety Plan is required for all dangerous waste sampling sites. The plan is intended to specify information pertinent to field assignments and to be a guide in times of an unusual situation or emergency. The Health and Safety Plan is not intended to be an exhaustive encyclopedia covering every conceivable situation or question. The field team leader will always be present during site visits, and will be trained and experienced with the authority to make field decisions deviating from soil sampling procedures. During sampling activities, the site safety officer will be present or immediately available and will have authority to make decisions regarding safety issues. Telephone numbers also will be provided if further assistance is required. A reviewed and approved Health and Safety Plan will be developed and completed before initiation of soil sampling in accordance with WHC-CM-7-7, EII 2.1, "Preparation of Health and Safety Plans". All deviations from the approved Health and Safety Plan must be documented in the field logbook by the field team leader and later initialed by the site safety officer.

E-9 LABORATORY PROCEDURES, QUALITY ASSURANCE, AND QUALITY CONTROL

The following sections provide information on laboratory procedures, quality assurance, and quality control.

E-9.1 LABORATORY RECEIPT AND LOGGING OF SAMPLE

A sample custodian will receive the samples in the laboratory. Upon receipt of a sample, the custodian will, as documented in WHC-CM-7-7, EII 5.1, "Chain of Custody", inspect the condition of the sample and the sample seal; verify the information on the sample label and seal against that on the chain of custody record; assign a laboratory number; log in the sample in the laboratory logbook; store the sample in a secured sample storage room or cabinet; and report missing or damaged samples.

E-9.2 ANALYTICAL PROCEDURES

Analyses will be performed by the laboratory in accordance with EPA requirements. Whenever available, SW-846 methods will be used. Where appropriate, other sample preparation and analytical methods will be employed upon approval from Ecology.

E-9.3 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

The laboratory will ensure the integrity and validity of test results through implementation of an internal quality control program. The program will meet the quality control criteria of EPA guidelines and, as applicable, SW-846, and *The Handbook for Analytical QC in Water and Waste Water Laboratories*, third edition of EPA-600/4-79-019 (EPA 1979). A system of reviewing and analyzing the results of these samples will be maintained to detect problems due to contamination, inadequate calibrations, calculations, procedures, or other causes. Standard methods will be used and alternative methods that are developed or adapted will be tested and completely documented. All methods and method changes will be approved by the Westinghouse Hanford Company contracts representative.

The quality control procedures for laboratory analyses will include evaluation of blanks, matrix spikes, surrogates, and other quality control samples as appropriate for determination of the quality assurance/quality control (QA/QC) for each matrix and analytical method. Quality control procedures for individual methods will be documented in the laboratory's analytical procedures.

All analytical methods will be in compliance with minimum quality control criteria of standard EPA methods, where such criteria exist (EPA 1986). The analytical laboratory will have obtained the Westinghouse Hanford Company approval on all methods prior to the analysis of samples.

The EPA guidelines for the determination and reporting of accuracy, precision, and detection limits of the analytical methods will be met. The analytical laboratory will provide tabulated information representative of accuracy, precision, and detection limits for at least the three month period over which the analyses were performed. Laboratory quality assurance/quality control information will be required on representative constituents for each of the analytical methods used, e.g., those evaluated for the EPA contract laboratory program (CLP), for a soil matrix. Accuracy and precision will be determined for, and representative of, the mid-range of the standard working range used for the analysis. Information on accuracy and precision can be determined from the matrix spike and/or surrogate spike recoveries of standard reference samples or EPA control samples, if appropriate. Accuracy and precision will be reported in a manner similar to that indicated in SW-846 (6010-16). The upper and lower limits of the standard working range used for the analysis will be reported in a form comparable to Form XIII (SW-846; ONE-32).

Representative lower limits of detection will not exceed the EPA requirements for detection limits. Detection limits will be reported as one of the following: (1) the lower limit of the standard (linear) working range used for the analysis, (2) the low concentration standard used in the calibration provided that this concentration does not exceed EPA requirements, or (3) the detection limits and/or quantitation limits for each analyte calculated from measured standard deviation of the average background noise level using the criteria outlined in SW-846 (ONE-15; THREE-2), for either the interpolated background beneath analyte peaks in the low-concentration calibration standards, or at the peak spectral positions in a reagent blank. The analytical laboratory will specify the definition of lower limit of detection used. Detection limits will be regarded as the lower limits of reportable concentrations of an analyte. Concentrations less than these limits will be reported as less than detection limits (e.g., <1.0 mg/kg). Representative precision at the detection limits also will be determined and reported in a similar manner as the precision for the mid-range. Precision at the lower limit of detection, as defined above, will be determined from the replicate analyte peak measurements for the low-concentration calibration standards or for the samples used in establishing the lower limit of detection. Representative detection limits and associated precision on the lower limit of detection and precision at this limit, will be reported for each analyte in a form comparable to FORM VIII (SW-846; ONE-25).

A duplicate and a blank sample will be processed with each sample batch or after every 20 samples, whichever is more frequent. Quality control samples prepared in the same matrix and in the same manner as a mixed calibration standards, at 10 times the instrument detection limits or in the mid-range of the working standard calibration, will be analyzed after every 10 samples (e.g., SW-846, 6010-9,10; 7000-10). Spike recovery will be calculated by the method detailed in ASTM Method D 3856, Section 11.5.4, Annual Book of ASTM Standards, Volume 11.01 (1986). Analytical data on blanks, duplicates, and control samples will be reported in the same manner as samples. Care will be taken to ensure that duplicate samples are representative of the original sample.

E-9.4 DATA REPORTING

After completion of the sampling effort, verification documents will be provided for actual sample locations, numbers of samples, and specific methods used for collection as documented in WHC-CM-7-7, EII 6.1, "Activity Reports of Field Operations". Data received from the laboratory will be reviewed, analyzed, and summarized statistically. Reporting the results of the Soil and Concrete Sampling and Analysis Plan will be in accordance with applicable RCRA regulations.

E-9.5 SAMPLE DISPOSITION

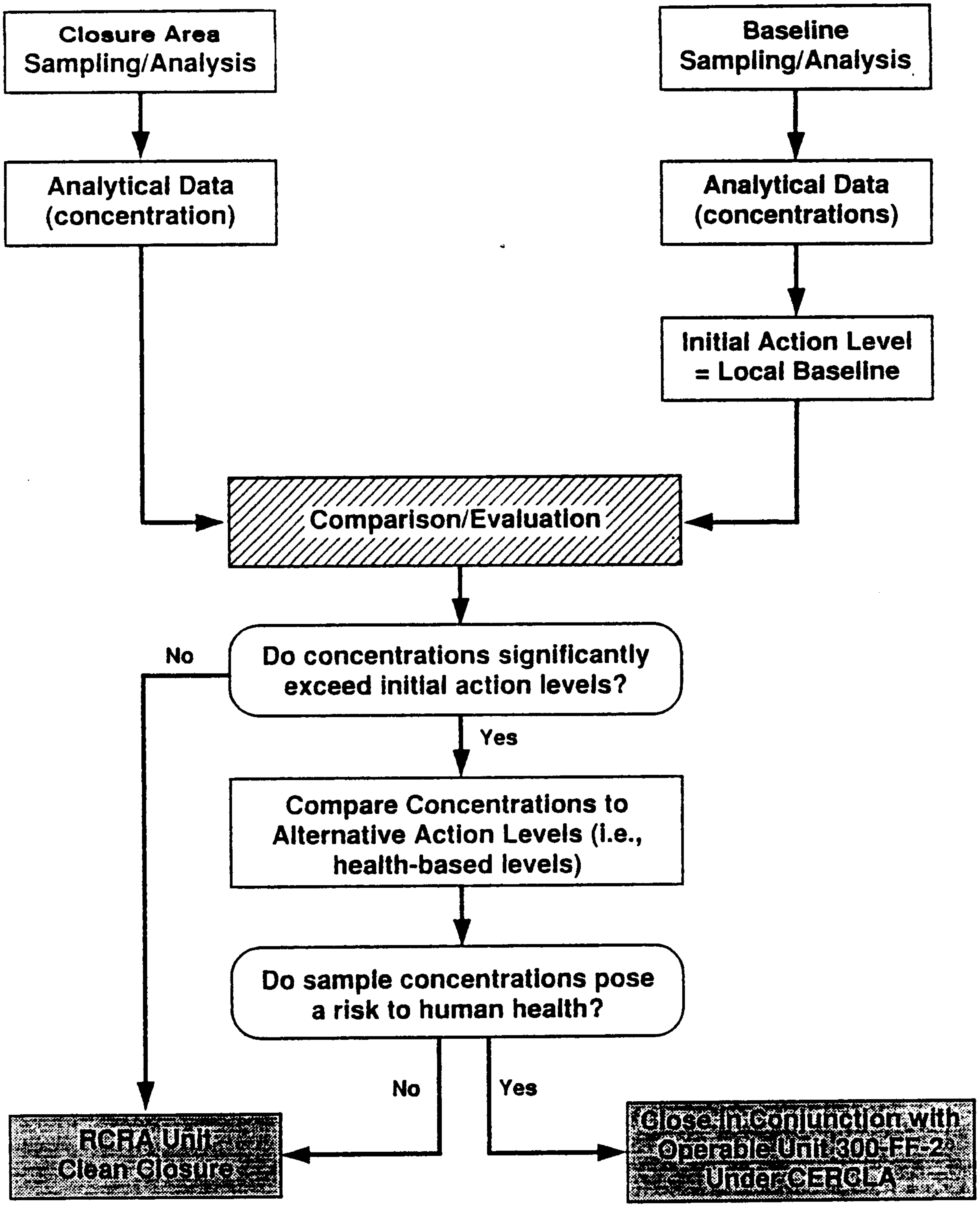
After all analyses have been completed as specified, reports will be reviewed for anomalous data. Requests for reanalysis or data checks will be made as soon as possible. At the certified completion of all analyses, the samples will be either returned to the collector, properly disposed of, or archived by the laboratory, if requested. In no case will the samples be held longer than 3 years, unless specifically designated.

E-10 INTERPRETATIONS AND STATISTICAL TREATMENT OF DATA

All data collected will be analyzed and tabulated for evaluation using the methods described in SW-846 and other guidance documents and statistical references, where applicable (e.g., Barth and Mason 1984; EPA 1986a). Laboratory data will be provided to Ecology upon completion of sampling and analysis. Data for individual constituents will be summarized and will include the following information:

- Number of 'less than' (LT) detection limit values
- Detection limit value
- Total number of values
- Mean values
- Standard deviation
- Coefficient of variation
- Minimum value
- Maximum value
- Representative uncertainties (precision).

The data will be interpreted by qualified scientists and statisticians. The technical basis for establishing the baseline threshold concentrations, the methods by which significant deviation from baseline will be determined are being developed by Westinghouse Hanford Company and the U.S. Department of Energy-Richland Operations Office for the Hanford Site (WHC 1989). The use of background data in evaluating closure of the 300 ASE will involve the comparison of individual sample concentrations to a background threshold using a Tolerance Interval-type approach to the analysis (e.g., EPA 1989c). This type of comparison defines an upper concentration limit (i.e., threshold) beyond which a sample will be suspected to be contaminated. The baseline concentrations for each constituent of interest in the 300 ASE soil will be based on statistical methods frequency distribution methods (e.g., EPA 1989c; WHC 1989), or other appropriate techniques. Data evaluation will be based on statistical criteria and professional judgment, where appropriate. The decision tree for the evaluation of the compositions of soil and concrete verification samples is illustrated in Figure E-8.



39106076.2

Figure E-8. Decision Tree for Soil and Concrete Verification Samples.
(79001152.2)

E-11 REFERENCES

American Chemical Society, 1983, *Principles of Environmental Analysis*, *Analytical Chemistry*, Vol. 55, pp. 2210-2218.

ASTM, 1986, *Annual Book of ASTM Standards*, Method D 3856, Section 11.5.4, Volume 11.01, American Society of Testing Materials, Philadelphia, Pennsylvania.

Barth, D. S. and B. J. Mason, 1984, *Soil Sampling Quality Assurance User's Guide*, USEPA-600/4-84-043, U.S. Environmental Protection Agency, Las Vegas, Nevada.

Cochran, W. G. and G. M. Cox, 1957, *Environmental Designs*, 2nd Edition. John Wiley and Sons, Inc., pg. 577, New York.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, Public Law 96-510, 94 Stat. 2767, 42 USC 9601 et seq.

Ecology, 1986, *Use of EP Toxicity Test Procedures to Determine Additional Testing Requirements for Certain Waste Streams Containing Copper, Nickel, and Zinc*, Memorandum TIM No. 86-1, September 15, 1986, Washington Department of Ecology, Olympia, Washington.

Ecology, 1991, *Dangerous Waste Regulations*, WAC 173-303, Washington State Department of Ecology, Olympia, Washington.

EPA, 1979, *The Handbook for Analytical QC in Water and Waste Water Laboratories*, Third Edition, EPA-600/4-79-019, U.S. Environmental Protection Agency, Washington, DC.

EPA, 1986, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846, 3rd Edition, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

EPA, 1989a, *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual*, Part A, Chapter 6, *Exposure Assessment*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989b, *Health Effects Assessment Summary Tables*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1989c, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities-Interim Final Guidance*, PB89-151047, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1991, *Integrated Risk Information System* (IRIS), U.S. Environmental Protection Agency, Washington, D.C.

Feenstra, S and J. A. Cherry, 1988, "Subsurface Contamination by Dense Non-Aqueous Phase Liquid (DNAPL) Chemicals", *International Groundwater Symposium on Hydrogeology of Cold and Temperate Climates and Hydrogeology of Mineralized Zones*, International Association of Hydrogeologist, May, 1988, Halifax, Nova Scotia, Canada.

CRC Press, 1989, *Handbook of Chemistry and Physics*, 70th Ed., Robert C. Weast, Ed., CRC Press, Inc., Boca Raton, Florida.

Jones, T. L., 1978, *Sediment Moisture Relations: Lysimeter Project 1976-1977 Water Year*, RHO-ST-15 (pgs. 1-18 and Appendices V-1 through V-26) Rockwell Hanford Operations, Richland, Washington.

Last, G. V., P. G. Easley, and D. J. Brown, 1976, *Soil Moisture Transport During the 1974-1975 and 1975-1976 Water Years*, ARH-ST-146, Atlantic Richfield Hanford Company, Richland, Washington.

OSHA, 1989, *Hazardous Waste Operations and Emergency Response*, Title 29 Code of Federal Regulations, Part 1910.120, as amended, Federal Register, 54 FR 12792, March 28, 1989, Occupational Safety and Health Administration, Washington, DC.

PCA, 1968, Portland Cement Association, *Design and Control of Concrete Mixtures*, 11th Ed., Skokie, Illinois.

PNL, 1988, Pacific Northwest Laboratory, *Hanford Meteorology Station-Climatological Data: March, 1985*, Richland, Washington.

Resource Conservation and Recovery Act of 1976, as amended, Public Law 94-580, 90 Stat. 2795, 42 USC 6901 et seq.

Routson, R. C., W. H. Price, D. J. Brown and K. R. Fecht, 1979, *High-Level Waste Leakage from the 241-ST-106 Tank at Hanford*, RHO-ST-14, Rockwell Hanford Operations, Richland, Washington.

Sax, N.I. and Lewis, R.J., 1987, *Hawley's Condensed Chemical Dictionary*, 11th ed., Van Nostrand Reinhold Company, New York, p. 806.

Urban, M. J., J. S. Smith, E. K. Schultz, R. K. Dickinson, 1989, *Volatile Organic Analysis for Soil, Sediment, or Waste Sample*, Proceedings: Fifth Annual Waste Testing and Quality Assurance Symposium, July, 1989, U.S. Environmental Protection Agency sponsored, Washington, D.C.

Vershueren, K., 1983, *Handbook of Environmental Data on Organic Chemicals*, Van Nostrand Publ. Co., Inc., New York, New York.

Welty, J. R., C. E. Wicks, and R. E. Wilson, 1989, *Fundamentals of Momentum Heat, and Mass Transfer*, John Wiley & Sons, New York, pp. 482-491.

WHC, 1989, *Environmental Investigation and Site Characterization Manual* (EII), WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990, *Engineering Study for Purge Water Treatment*, WHC-SD-EN-ES-001, p. 61, Westinghouse Hanford Company, Richland, Washington.

APPENDIX F

AIR QUALITY MONITORING RECORDS AT THE 300 AREA SOLVENT EVAPORATOR

CONTENTS

HANFORD ENVIRONMENTAL
HEALTH FOUNDATION

Dist: B. D. Breitenstein, M.D.
B. D. Reinert

October 17, 1979

CO 5220

UNC Nuclear Industries
1109-N Building, 100-N Area

Attn: E. M. Greager

AMBIENT SOLVENT CONCENTRATIONS NEAR THE 333 BUILDING WASTE SOLVENT EVAPORATION BIN

On September 11, 1979, ambient air sampling for organic solvent vapors was conducted at the waste solvent evaporation bin located outdoors east of the 333 Building. The bin is essentially an open metal industrial refuse bin fitted with a rain canopy that receives organic solvent wastes from the 333 Fuels Building. Purpose of the sampling was to determine what, if any, effect this evaporation facility has on surrounding ambient air quality.

Past degreasing operations in the 333 Building have utilized trichloroethylene as the degreasing solvent. Trichloroethylene has since been phased out and replaced with perchloroethylene. Sampling was performed for both solvent vapors at two locations, one approximately 4 feet above ground level and 6 feet south of the bin, the other approximately 3 ft above ground level and 45 feet south of the bin. Samples were collected over a 90-minute sampling duration (12:30 pm-2:00 pm) by drawing air through charcoal tubes using precalibrated portable sampling pumps. Weather conditions were warm and sunny, with air temperatures in the upper 70's to mid-80's and a gentle breeze from north to south.

Samples were analyzed by gas chromatography. As expected, no trichloroethylene vapors were detected at either sampling location. Perchloroethylene vapors were detected only at the location nearest the bin and then at the very low concentration of 0.07 ppm. Although no ambient air standard exists for perchloroethylene vapors, the prescribed DOE occupational exposure limit* would allow an 8-hour time-weighted average exposure of 100 ppm to which it is considered nearly all workers could be exposed for a normal 8-hour workday or 40-hour workweek, day after day, without adverse effect.

The concentration of perchloroethylene measured is insignificant both due to its low magnitude and physical remoteness from workers. No detrimental air quality effects are indicated. If you have any further questions, please contact Environmental Health Sciences.

L. J. Maas
Environmental Health Sciences

mg

1/ ACGIH Threshold Limit Values, 1979.

HANFORD ENVIRONMENTAL
HEALTH FOUNDATION

August 1, 1984 CO 8734

UNC Nuclear Industries
3707-D Bldg.
300 Area

Attn: Barry Vedder

WASTE SOLVENT EVAPORATION VAPORS - 333 BUILDING

This will document the results of two air samples collected[1] July 18, 1984, to measure methyl chloroform (1,1,1, trichloroethane) and perchloroethylene vapor concentrations at and near the 333 Building outdoor waste solvent evaporator. Both samples were collected down wind of the evaporator, one 2.5 ft. from the evaporator opening, the other 13 ft. from the opening. The ambient air temperature at the time of sampling was approximately 90 °F.

The sample results indicate that vapor concentrations were less than 1 ppm for each solvent at both sample locations.

Should you have any questions regarding these results, please contact Environmental Health Sciences.

C. H. St. John
Environmental Health Sciences

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[1] By use of pre-calibrated battery operated pumps and charcoal sorption tubes.