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100-H Area Technical Baseline Report

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CONTENTS

1.0 INTRODUCTION 1-1

2.0 BACKGROUND 2-1
2.1 GENERAL DESCRIPTION OF 100-H AREA FACILITIES 2-1
2.2 AREA HISTORY 2-4
2.3 REACTOR DESCRIPTION AND HISTORY 2-4
2.4 REACTOR-RELATED WASTE STREAMS 2-7
2.4.1 Reactor Process Liquid Wastes and Cooling Water Effluent 2-7
2.4.2 Radioactive Sludges 2-9
2.4.3 Radioactive Solid Wastes 2-11
2.4.4 Reactor Ventilation System and Inert Gas System Wastes 2-13
2.5 SANITARY LIQUID WASTES 2-15
2.6 NONRADIOACTIVE LIQUID WASTES 2-15
2.7 NONRADIOACTIVE SOLID WASTES 2-16

3.0 SOIL AND VEGETATION SAMPLING 3-1

4.0 100-HR-1 OPERABLE UNIT 4-1
4.1 116-H-1 (107-H LIQUID WASTE DISPOSAL TRENCH) 4-5
4.2 116-H-2 (1608-H LIQUID WASTE DISPOSAL TRENCH) 4-8
4.3 116-H-3 (105-H DUMMY DECONTAMINATION FRENCH DRAINS) 4-10
4.4 116-H-4 (ORIGINAL 105-H PLUTO CRIB SITE) 4-12
4.5 116-H-5 (1904-H OUTFALL STRUCTURE) 4-15
4.6 116-H-6 (183-H SOLAR EVAPORATION BASINS) 4-18
4.7 116-H-7 (107-H RETENTION BASIN) 4-20
4.8 116-H-9 (117-H CRIB) 4-28
4.9 118-H-6 (105-H REACTOR BUILDING) 4-29
4.10 126-H-2 (126-H-2 LANDFILL, 183-H CLEARWELLS) 4-30
4.11 132-H-1 (116-H REACTOR EXHAUST STACK SITE) 4-31
4.12 132-H-3 (1608-H WASTE WATER PUMPING STATION SITE) 4-34
4.13 1607-H2 (1607-H2 SEPTIC TANK AND ASSOCIATED DRAIN FIELD) 4-35
4.14 1607-H4 (1607-H4 SEPTIC TANK AND ASSOCIATED DRAIN FIELD) 4-38
4.15 SUSPECT WASTE SITE: UNPLANNED AIRBORNE RELEASE, STACK EMISSION NO. 1 4-38
4.16 SUSPECT WASTE SITE: UNPLANNED AIRBORNE RELEASE, STACK EMISSION NO. 2 4-39
4.17 SUSPECT WASTE SITE: SWALLOW NESTS AND DROPPINGS 4-39
4.18 SUSPECT WASTE SITE: CONTAMINATED UNDERGROUND LINES 4-40
4.19 SUSPECT WASTE SITE: SOIL CONTAMINATED BY EFFLUENT LINE LEAKAGE 4-42
4.20 SUSPECT WASTE SITE: 1716-H GARAGE FUEL TANK SITE 4-43
4.21 SUSPECT WASTE SITE: 1717-H HOT SHOP, FRENCH DRAIN, AND CONTAMINATED STORAGE UNIT 4-44
4.22 SUSPECT WASTE SITE: 107-H RETENTION BASIN SLUDGE BURIAL SITE . 4-44
4.23 SUSPECT WASTE SITE: CONTAMINATED RAMP 4-46
4.24 SUSPECT WASTE SITE: FRENCH DRAIN A 4-48

CONTENTS (Continued)

4.25 SUSPECT WASTE SITE: FRENCH DRAIN B 4-48
4.26 SUSPECT WASTE SITE: FRENCH DRAIN C 4-48
4.27 SUSPECT WASTE SITE: FRENCH DRAIN D 4-48
4.28 SUSPECT WASTE SITE: EXPANSION BOX FRENCH DRAIN E 4-48
4.29 SUSPECT WASTE SITE: EXPANSION BOX FRENCH DRAIN F AND SHIELDING LEAD 4-49
4.30 SUSPECT WASTE SITE: FRENCH DRAIN G 4-49
4.31 SUSPECT WASTE SITE: SURFACE CONTAMINATION ZONE H 4-49
4.32 SUSPECT WASTE SITE: 116-H-2 OVERFLOW 4-50

5.0 100-HR-2 OPERABLE UNIT 5-1
5.1 118-H-1 (100-H BURIAL GROUND NO. 1) 5-5
5.2 118-H-2 (100-H BURIAL GROUND NO. 2) 5-8
5.3 118-H-3 (CONSTRUCTION BURIAL GROUND) 5-9
5.4 118-H-4 (BALL 3X BURIAL GROUND) 5-11
5.5 118-H-5 (THIMBLE PIT) 5-13
5.6 100-H-2 (THIMBLE GUIDE PIPE BURIAL PIT) 5-13
5.7 126-H-1 (184-H POWER HOUSE ASH PIT) 5-15
5.8 128-H-1 (128-H-1 BURNING PIT) 5-15
5.9 128-H-2 (128-H-2 BURNING PIT) 5-17
5.10 128-H-3 (BURNING PIT) 5-17
5.11 132-H-2 (117-H FILTER BUILDING SITE) 5-17
5.12 1607-H1 (1607-H1 SEPTIC TANK AND ASSOCIATED DRAIN FIELD) 5-20
5.13 1607-H3 (1607-H3 SEPTIC TANK AND ASSOCIATED DRAIN FIELD) 5-20
5.14 100-H-1 (105-H ROD CAVE) 5-21
5.15 SUSPECT WASTE SITE: TYPE UNKNOWN 5-22
5.16 SUSPECT WASTE SITE: POWER HOUSE BRINE PIT AND FRENCH DRAIN . 5-23

6.0 DIRECTORY OF 100-H AREA BUILDINGS AND FACILITIES 6-1

7.0 REFERENCES 7-1

8.0 HANFORD SITE DRAWINGS REFERENCED IN TEXT 8-1

9.0 BIBLIOGRAPHY 9-1

APPENDICES:

A SYNOPTIC CHRONOLOGY OF SIGNIFICANT 100-H REACTOR EVENTS A-1
B DORIAN AND RICHARDS (1978) SOIL SAMPLING RESULTS B-1
C OTHER SOURCES OF INFORMATION C-1
D HANFORD FACILITIESCORE INFORMATION ABOUT 100-H AREA BUILDINGS . . . D-1
E TABLE OF PHOTOGRAPHS USED E-1

CONTENTS (Continued)

FIGURES:

2-1. 100-H Reactor Site During Construction, 1948 2-1
2-2. 100-H Reactor Site During Operation, 1950 2-2
2-3. 100-H Reactor Site, 1992 2-3
2-4. 100-H Area Map 2-5
4-1. Operable Unit 100-HR-1 Waste Sites, Exclusive of Those Within the Reactor Security Fence 4-3
4-2. 116-H-3 Dummy Decontamination French Drain 4-10
4-3. 100-H Reactor Site, Showing the 116-H-4 Pluto Crib 4-14
4-4. 1904-H Outfall Under Construction, 1949 4-16
4-5. 1904-H Outfall, Newly Completed, 1949 4-17
4-6. Dimensions of the 183-H Basins 4-19
4-7. 107-H Retention Basin (116-H-7) During Construction 4-21
4-8. Soil and Vegetation Sampling Locations in the 100-H Area 4-24
4-9. 116-H-9 Crib 4-29
4-10. The 110-H, 116-H, 117-H, and 1608-H Burial Sites 4-32
4-11. The 116-H Stack Lying in Its Burial Trench 4-33
4-12. 100-H Reactor Site, 1954 4-37
4-13. 107-H Sludge Burial Trench, Retention Basin, and 116-H-1 Trench, With Underground Line Locations 4-45
4-14. Waste Sites Near the 105-H Reactor Building 4-47
4-15. Surface Contamination Zone South of the 105-H Reactor Building, 1994 4-50
5-1. Operable Unit 100-HR-2 Waste Sites 5-3
5-2. 118-H-2 Burial Ground No. 2 5-10
5-3. 118-H-4 Ball 3X Burial Ground 5-12
5-4. Suspect Waste Site: Thimble Guide Pipe Burial Pit, Surface Contamination Area 5-14
5-5. 184-H Power House with 128-H-1 Burn Pit in Background 5-16
5-6. Filter Building Before Decommissioning 5-19
5-7. Filter Building During Decommissioning 5-19
5-8. Suspect Waste Site, Rod Cave 5-22
5-9. Suspect Waste Site, Probable Septic Tank 5-24

CONTENTS (Continued)

TABLES:

2-1. Radionuclide Inventory of the Fuel Storage Basin, 1978 2-10
2-2. Summary of Statistics from 105-H Fuel Storage Basin Soil/Slurry Sampling 2-10
2-3. Summary of Statistics from 105-H Fuel Storage Basin Water Sampling 2-11
2-4. Estimated Volumes of Solid Wastes Buried at 100-H Area 2-14
2-5. Volumes of Miscellaneous Waste Buried at 100-H Area 2-14
3-1. Average Radionuclide Concentrations (pCi/g) Detected in 100-H Area Surface Soil Samples from 1981 to 1992 3-1
3-2. Average Radionuclide Concentrations (pCi/g) Detected in 100-H Area Vegetation Samples from 1981 to 1992 3-2
4-1. Operable Unit 100-HR-1 Waste Site Hazardous Ranking System Migration Scores 4-5
4-2. Estimated Radionuclide Concentrations in 116-H-1 4-6
4-3. 116-H-1 Soil Sampling Results 4-7
4-4. 116-H-2 Radionuclide Inventory 4-9
4-5. 116-H-3 Radionuclide Inventory 4-11
4-6. Well Monitoring Data, Test Well 199-H3-1, 1962 Through 1982 4-13
4-7. 116-H-7 Radionuclide Inventory Underneath the 107-H Basin 4-22
4-8. 116-H-7 Radionuclide Inventory Adjacent to the 107-H Basin 4-23
4-9. Radionuclide Concentrations (pCi/g, Dry Weight) Detected in Surface Soil at the 116-H-7 Retention Basin 4-25
4-10. Average Radionuclide Concentrations (pCi/g, Dry Weight) Detected in Surface Soil at the 116-H-7 Retention Basin from 1981 to 1986 4-25
4-11. Radionuclides (pCi/g, Dry Weight) Detected in Vegetation near the 116-H-7 Retention Basin 4-25
4-12. Average Radionuclide Concentrations (pCi/g, Dry Weight) Detected in Vegetation near the 116-H-7 Retention Basin from 1981 to 1986 4-26
4-13. Concentration of Radionuclides on Scale Samples Taken from 42-inch Effluent Lines Upstream of 107-F Retention Basin 4-40
4-14. 100-F Reactor River Discharge Line Characterization Data 4-42
5-1. 100-HR-2 Operable Unit Waste Site Hazardous Ranking System Migration Scores 5-1
5-2. Inventory of 100-H Burial Ground No. 1 (118-H-1) Contents 5-7
6-1. Buildings, Mobile Offices, Facilities, and Structures That Were Located in the 100-H Area 6-2
6-2. Buildings, Mobile Offices, Facilities, and Structures Located in the 100-H Area as of October 1994 6-7

1.0 INTRODUCTION

This document has been prepared in support of the 100 Area Environmental Restoration activity at the U.S. Department of Energy's (DOE's) Hanford Site near Richland, Washington. It provides a technical baseline and characterization of waste sites located at the 100-H Area and results from an environmental investigation undertaken by the Bechtel Hanford, Inc. Facility and Waste Site Research Office in support of the Environmental Restoration Engineering Function. It is based on the review and evaluation of numerous current and historical Hanford Site reports, drawings, and photographs, supplemented by site inspections and employee interviews. No intrusive field investigation or sampling was conducted in the preparation of this report.

Throughout this report, units of measure are provided as they appear in reference documents; they have not been converted to metric units.

Three operable units are associated with the 100-H Area. Two of these, 100-HR-1 and 100-HR-2, include liquid and solid waste disposal sites in the vicinity of, and related to, the 100-H Reactor and associated facilities. The third, 100-HR-3, addresses only groundwater. This report describes facilities and waste sites from the 100-HR-1 and 100-HR-2 Operable Units, including cribs, trenches, pits, french drains, retention basins, solid waste burial grounds, septic tanks, and drain fields. Each waste site is described separately, and photographs have been provided when available.

A comprehensive environmental summary for the area is not provided in this report. However, an excellent summary may be found in the *Hanford Site National Environmental Policy Act (NEPA) Characterization* (Cushing 1988), which describes the geology and soils, meteorology, hydrology, land use, population, and air quality of the Hanford Site.

2.0 BACKGROUND

2.1 GENERAL DESCRIPTION OF 100-H AREA FACILITIES

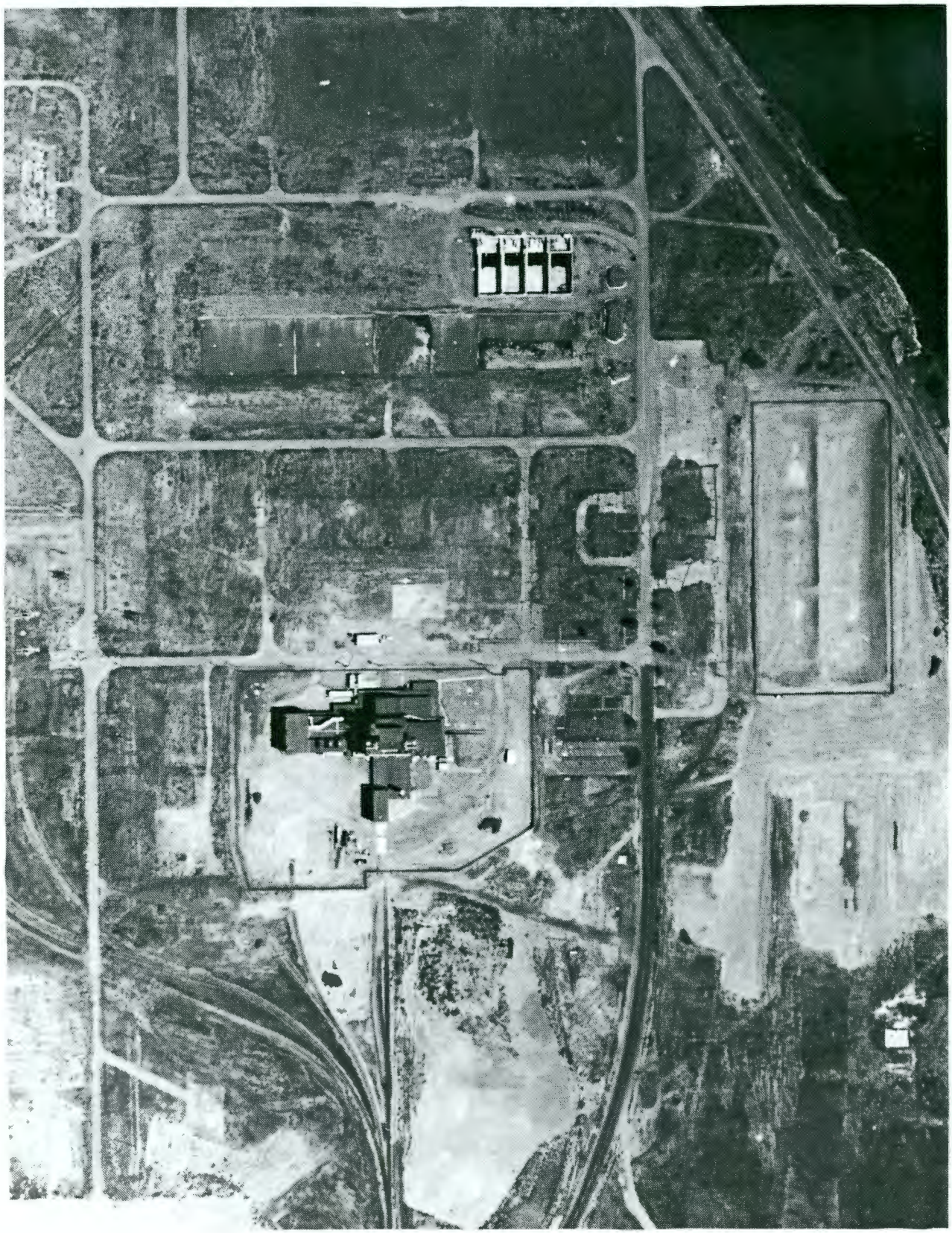
Nine uranium-fueled, graphite-moderated, and water-cooled plutonium production reactors were constructed by the U.S. Government along the Columbia River, at the Hanford Site, during the 20-year period from 1943 to 1963. These reactors are numbered 100-B, 100-C, 100-D, 100-DR, 100-F, 100-H, 100-KE, 100-KW, and 100-N. All nine are owned by the U.S. Government and are managed by DOE. The reactors have been retired from service and declared surplus by DOE; all except the 100-N Reactor are currently available for decommissioning.

The 100-H Area includes one of these reactors, 100-H, along with associated water treatment facilities, laboratories, administrative space, and various other buildings. Refer to Figure 2-1 for a 1948 photograph of the 100-H Reactor under construction, Figure 2-2 for a 1950 photograph of the 100-H Area during reactor operation, and Figure 2-3 for a 1992 photograph of the 100-H Area.

Figure 2-1. 100-H Reactor Site During Construction, 1948.

Figure 2-2. 100-H Reactor Site During Operation, 1950.

Figure 2-3. 100-H Reactor Site, 1992.



All original 100-H Area facilities have been fully deactivated, and no personnel are assigned or reside there. A mobile office, MO-348, is located in the 100-H Area for the occasional use of WHC Environmental Restoration Operations (ERO) personnel performing reactor building maintenance activities. The site is seldom visited, other than for routine security checks by Hanford Patrol and periodic radiation/contamination checks by Site safety and ERO personnel. Boaters and sports fisherman frequent the Columbia River adjacent to the site, but are prohibited by law from trespassing into the reactor area.

Refer to Figure 2-4 for a general map of the 100-H Area. This map shows all known 100-H Area waste sites except those very near the 105-B Reactor Building, which are shown in Figure 4-12.

2.2 AREA HISTORY

The area included in and immediately adjacent to the 100-HR-1 and 100-HR-2 Operable Units was irrigated farm land and livestock grazing land before its acquisition by the U.S. Army Corps of Engineers in January 1943.

In prehistoric and early historic times, the Hanford Reach of the Columbia River, which includes the 100-H Area, was heavily populated by Native Americans of various tribal affiliations. The area along the banks of the Columbia River near the 100-H Area was a favorite camping and village site for several northwestern tribes, including the Wanapums and the Yakama people of the Chamnapum band, the Palus people, and the Walla Walla and Umatilla people.

The 100-H Area is situated in what is probably the most culturally rich area of the Hanford Site and, since construction of dams elsewhere on the Columbia River system, the most archaeologically rich area in the western Columbia Plateau. Ten prehistoric archaeological sites exist within 2 km of the 100-H Area (Cushing 1988), although none has been identified within the confines of its operable units. All of these archaeological sites are included in the Locke Island archaeological district (Relander 1956).

2.3 REACTOR DESCRIPTION AND HISTORY

Construction of the 100-H Reactor began in March 1948 and was completed in October 1949. A historical photograph, showing the construction of the 100-H Reactor, is provided as Figure 2-1. The reactor first began operating on October 29, 1949.

The reactor initially operated at 400 MW (thermal) of power. Its operating limits were gradually increased over the years, until 2,140 MW was authorized in early 1965. Operations continued near that level until the reactor was shut down and deactivated in April 1965. The reactor has continued in deactivated status since that date. A synoptic chronology of significant reactor events is included as Appendix A.

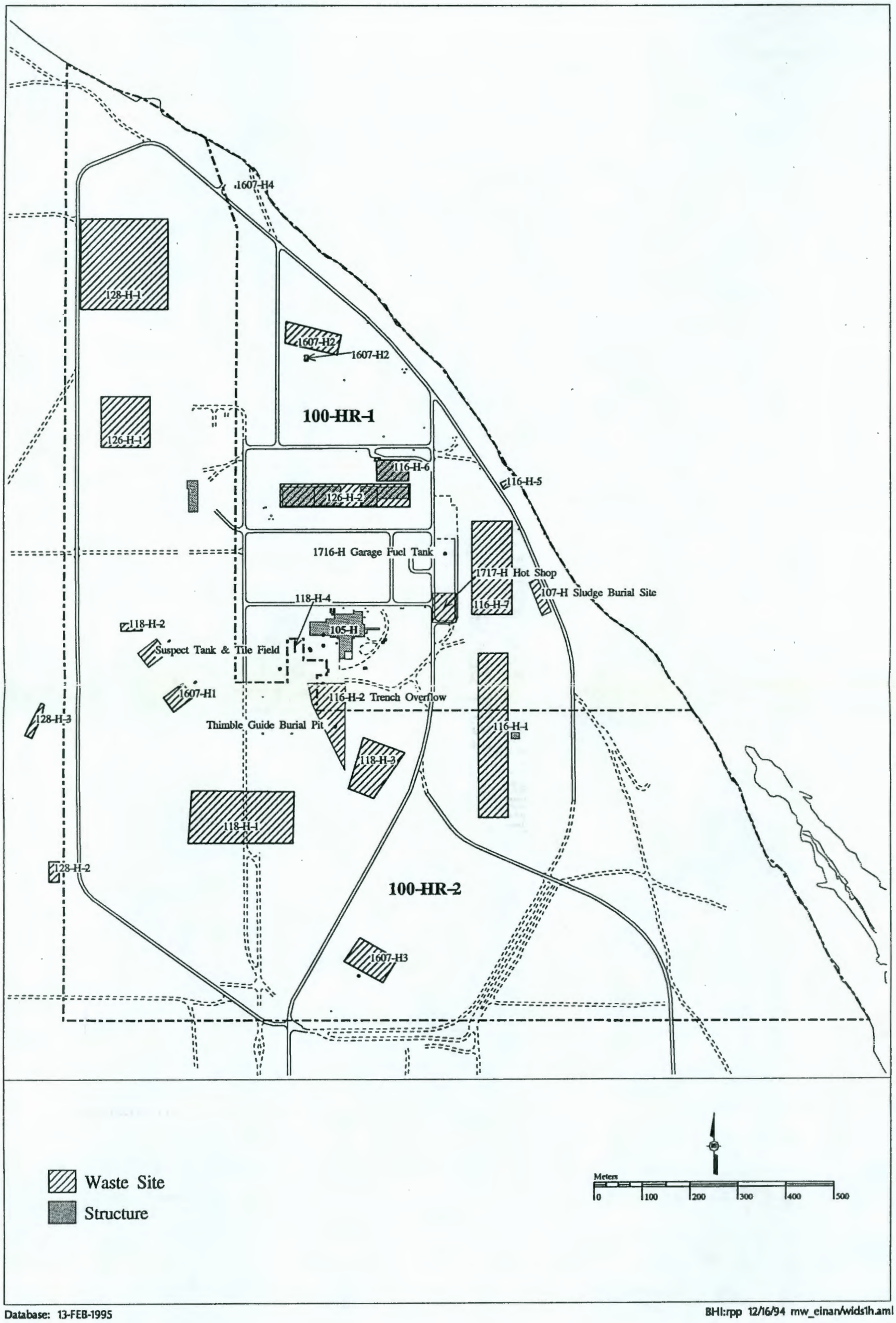


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Figure 2-4. 100-H Area Map.

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The 100-H Area included several major buildings, including the 105-H Reactor Building and several structures associated with the treatment and storage of reactor cooling water. Most were deactivated with the reactor in 1965 and have since been decommissioned. Of the dozen or so reactor-related structures that were located in the area, only the 105-H Reactor Building, the 107-H Retention Basins, the 1713 Warehouse, and portions of the 183-H water treatment and storage facilities remain standing today. A historical photograph of the 100-H Area, showing many of the facilities that existed, is provided as Figure 2-2. A recent photograph of the 100-H Area is provided as Figure 2-3.

2.4 REACTOR-RELATED WASTE STREAMS

2.4.1 Reactor Process Liquid Wastes and Cooling Water Effluent

Liquid effluents generated as a direct result of reactor operations consisted primarily of reactor cooling water, fuel storage basin water, and decontamination solutions. Documents indicate that those effluents are thought to be the most significant wastes in the 100-H Area in terms of their potential impact on the groundwater. Tens of millions of liters of this waste were disposed of directly to the soil column, both intentionally and as a result of leaks in the cooling water effluent system (DOE-RL 1992).

2.4.1.1 Reactor Cooling Water System. A continuous supply of high-quality cooling water was essential to reactor operations to prevent damage to the reactor core from excess heat generated by the fission reactions. Many of the facilities in the 100-H Area were part of this cooling water system. At a daily use rate of 50 to 100 million gal, this system generated the largest volume of effluent in the 100-H Area.

Cooling water for the 100-H Reactor was obtained from the Columbia River and treated extensively before being used. Settling, chemical treatment, filtering, and pH management were utilized to purify and prepare the water. Several chemical additives were used to treat the cooling water. These included aluminum sulfate with excess hydrated calcium oxide, which was used to enhance the removal of suspended sediment; sulfuric acid, which was used to control water pH; chlorine, which was used to control algae growth; and sodium dichromate, which was used to inhibit corrosion. The pH of the water was maintained at about 7.5, and the free chlorine residual was approximately 0.2 mg/L. Sodium dichromate was added at a rate of about 2 mg/L (Richards 1953, DOE-RL 1992).

The purified water entered the reactor; circulated in a single pass through the reactor process tubes, cooling tubes imbedded in the thermal shield, and reactor horizontal control rods (HCRs); and exited the reactor. It passed through the reactor at a rate of 46,900 gal/min until 1956, when the flow was increased to 71,000 gal/min (DeNeal 1965).

Cooling water discharged from the operating reactor was near boiling temperature, from 90°C to 95°C, having absorbed thermal energy from the nuclear process. It contained treatment chemicals that had been added to purify the raw river water before its use. Additionally, after flowing through the reactor, it contained radioactive isotopes from several sources (DOE-RL 1992).

- The high neutron flux in the reactor core activated elements in the cooling water, creating species such as ^{41}Ca, ^{51}Cr, and ^{65}Zn. Most of the species were relatively short-lived and have since decayed to negligible levels (^{41}Ca is a notable exception).

- Activation products from the graphite reactor core, other reactor components, and fuel cladding were picked up by the cooling water. Significant species included ^{3}H, ^{14}C, ^{60}Co, ^{63}Ni, ^{152}Eu, ^{154}Eu, and ^{155}Eu.

- Fuel element fission products, such as ^{90}Sr and ^{137}Cs, and transuranics, such as ^{239}Pu and ^{240}Pu, were introduced into the cooling water when fuel cladding failures occurred.

Parker (1947) states that the concentrations of radionuclides in reactor cooling water were low during normal operations, with an approximated activity of 0.2 μCi/L. The document does not address radionuclide concentrations at the elevated reactor power levels that were permitted in later years, however.

After passing through the reactor, cooling water was transferred through effluent lines from the 105-H Reactor Building to the 107-H Retention Basin. It was held up briefly in the retention basin, for about 2.5 to 4 hours, to allow for thermal cooling and the decay of short-lived radionuclides (Healy 1951). From the retention basins, the water was transferred through large underground pipes to the 116-H-5 outfall structure and into pipes that discharged at the center bottom of the Columbia River. Overflow from the outfall would discharge directly to the river shore via the outfall spillway. Hanford Site Drawing SP-4850 provides a plan view of the waste treatment facilities downstream of the reactor.

Over the operating lifetime of the 100-H Reactor, the retention basins and effluent piping developed leaks, releasing cooling water to the area in and around the basins, lines, and river shore at a rate as high as several thousand liters per minute (Dorian and Richards 1978). Specific information on leak rates from the 116-H-7 Retention Basin is not available; however, contamination detected around the basin indicates that leakage did occur.

During reactor operations, fuel cladding failures sometimes occurred while the fuel elements were in the process tubes. The first such cladding failure at the 100-H Reactor occurred in 1951. Over the operational lifetime of the reactor, there were several hundred such cladding failures (DeNeal 1965).

When fuel cladding failed, the cooling water in the affected process tube became highly contaminated, and elevated radiation levels were observed in the water exiting the reactor core. This contaminated water was diverted through a trench to the soil column, rather than to the river via the retention basin. For this purpose, the 107-H Liquid Waste Disposal Trench (116-H-1) was excavated in 1952 in the area just south of the retention basin.

The retention basin was, by construction, divided into two compartments. When a fuel cladding failure occurred, the highly contaminated water was segregated into one of the two compartments and drained to the overflow trench via a 12-in.-diameter steel pipe that connected the basin outlet with the

north end of the trench. This practice was continued on a regular basis until 1954, when increased flows and structural stresses on the basin due to the temperature differences between the full and empty sides necessitated that both sides of the basin be used in parallel.

A second system that was briefly used for handling contaminated cooling water from fuel cladding failures was a soil column disposal site called the 105-H Pluto Crib (116-H-4). The pluto crib received the highly contaminated water that was flushed directly from the process tube affected by the fuel cladding failure before it could mix with water from unaffected tubes. The crib was used from 1950 through 1952, after which the highly contaminated cooling water was no longer segregated from the bulk of the cooling water (DOE-RL 1992).

The 107-H Liquid Waste Disposal Trench (116-H-1) and the 105-H Pluto Crib (116-H-4) are significant waste units because they consisted of direct soil column discharges of liquid wastes with presumably high contaminant concentrations (DOE-RL 1992).

2.4.1.2 Fuel Storage Basin Water. Occasionally, a fuel element in the storage basin would rupture, or an element would be found to be ruptured when discharged from the reactor core. This caused the storage basin shielding water to become highly contaminated. From the information available on the 100-H Reactor, it is not clear how often this occurred or where the contaminated water was disposed of. When the storage basin was decommissioned, the water level was drained to within 4 ft of the basin bottom and the basin was subsequently backfilled with soil, burying the sludge and miscellaneous equipment (fuel buckets and spacers, aluminum tubing, and wood floor planking) that were in the basin at the time (Dorian and Richards 1978).

2.4.1.3 Decontamination Solutions. During reactor operations and shutdowns, large quantities of decontamination solutions were routinely used to remove radionuclides from reactor equipment and facility surfaces. Decontamination activities took place at the 100-H Reactor dummy decontamination facility wash pad, which was adjacent to the fuel storage basin.

Known decontamination solutions included chromic, citric, oxalic, nitric, sulfamic, and sulfuric acids (all of which were neutralized with sodium carbonate before disposal) and sodium fluoride. Additionally, other chemicals--including organic solvents--were used for some decontamination processes. These solutions were generally disposed of in cribs, trenches, and/or french drains in the immediate vicinity of the building in which they were used. Occasionally, solutions were combined with the cooling water and discharged to the river via the 107-H Retention Basin. The solutions contained both radionuclide and chemical contaminants. Some of the compounds used in the decontamination solutions, such as oxalate and organic complexants, may have solubilized and transported radionuclides and metals. The quantities of decontamination solutions, as well as other disposal locations, are not known (DOE-RL 1992).

2.4.2 Radioactive Sludges

Several thousand tons of radioactive sludge were generated during reactor operations and accumulated in pipes in the cooling water effluent system, in the 116-H-7 Retention Basin, and in the reactor fuel storage basin. Smaller volumes of sludge also collected in water traps located in the 115-H Gas Treatment Building and in the 117-H Filter Building. The sludge consisted of diatomaceous earth that was periodically used to scour the reactor process tubes, and fine particulate matter that originated from dissolved and suspended solids in river water, pipe slag, rust, failed fuel elements, graphite

powder, and other undefined solids. The sludge was contaminated with radionuclides and various chemical contaminants. The total volume of sludge generated during reactor operation is unknown.

The bulk of the sludge accumulated in the 116-H-6 Retention Basin and the reactor fuel storage basin. In 1953, an unknown quantity of sludge was moved from the retention basin to a burial site 100 ft east of the basin and covered with 5 ft of soil. This burial site was excavated in 1965 to a depth of about 6 ft to obtain fill material for basin stabilization. There was no indication of remaining radioactivity at the excavation site, and the site was released from radiological controls (Dorian and Richards 1978, Herman Jr. 1965). Refer to Section 4.22 for more information about this burial site, which was named the 107-H Retention Basin Sludge Burial Site.

The fuel storage basin was filled with soil in 1970 (Griffin 1993). Sludge samples taken before backfilling provided the analytical data presented in Table 2-1.

Table 2-1. Radionuclide Inventory of the Fuel Storage Basin, 1978.

Radionuclide	Sludge (nCi/g)	Basin (Ci)
^{239}Pu	1.3	.065
^{137}Cs	54	2.7
^{90}Sr	9	.45

(Dorian and Richards 1978)

Samples of the soil fill in the fuel storage basin were collected in August and September 1991 and sent for analysis (Griffin 1993). The sampling data are presented in Tables 2-2 and 2-3.

Table 2-2. Summary of Statistics from 105-H Fuel Storage Basin Soil/Slurry Sampling.

Radionuclide	Mean (pCi/g)	Sample Set Std Dev	Maximum (pCi/g)	Minimum (pCi/g)
Gross alpha	7.21	±8.06	49.4	-4/8
Gross beta[a]	54.4	±124	809	0.78
Cesium-137	4.97	±17.0	103	-1.44
Protactinum-234m	63.2	±141	572	-187
Thorium-234	-1.89	±21.0	113	-35.5

[a]Gross beta occurs in two samples. (Griffin 1993)

Table 2-3. Summary of Statistics from 105-H Fuel Storage Basin Water Sampling.

Radionuclide	Mean (pCi/L)	Sample Set Std Dev	Maximum (pCi/g)	Minimum (pCi/g)
Gross alpha[a]	303	±326	863	4/7
Gross beta[a]	1,780	±4180	4180	4/7
^{137}Cs[a]	36,190	±25,100	25,100	4/7
^{234m}Pa	466,300	±1,214,270	3,220,000	-/7
^{234}Th	267	±953	2190	-/6

[a]Gross alpha and beta occur in four samples, and ^{137}Cs occurs in four samples. (Griffin 1993)

Griffin (1993) states, "The results indicate gross beta contamination at 10 feet and 17 feet in the soil in the 105-H basin. This is the only radioactive contaminant of concern in the basin. Surprisingly, the screening process did not indicate the presence of any beta emitting radionuclides." The full Griffin (1993) report is provided in Appendix C of this document.

In addition to sludge, galvanized shipping buckets, perfs, aluminum process tubing, and other miscellaneous trash are on the fuel storage basin floor (Dorian and Richards 1978).

2.4.3 Radioactive Solid Wastes

Radioactive solid wastes generally consisted of reactor components, contaminated equipment, and tools and miscellaneous contaminated items (paper, rags, structural concrete, etc.). The main source of these wastes was reactor operations, and the most highly contaminated solid wastes were the reactor components. These reactor components--including aluminum spacers, lead-cadmium reactor neutron poison pieces, boron splines, graphite, process tubes, and lead--are present in 100-H Area burial grounds. Lesser quantities of gun barrels, thimbles, control rods, nozzles, pigtails, cadmium sheets, and thermocouple wires are also present in those burial grounds (Miller and Wahlen 1987, Herman Jr. 1965).

Irradiation of elements in the reactor components caused them to become neutron activated. Nearly all of the activated reactor components consist of steel and aluminum. The removed aluminum process tubes contain more radioactivity than do all the other buried materials, and the thermocouple wires contain the highest concentration of radioactivity (Herman Jr. 1965). Predominant radionuclides associated with the components are ^{60}Co and ^{63}Ni. In addition, both the reactor components and other solid objects received surface contamination from contact with radioactive solutions and environments. Surface-contaminated materials, usually referred to in documents as miscellaneous contaminated waste, include broken hand tools, rags, light bulbs removed from the storage basin, and sheets of plastic and paper that had been used to keep floors and equipment free of contamination. Such materials were typically sealed in cardboard boxes and placed in separate trenches from the activated components (Herman Jr. 1965).

The following two reactor modification projects were responsible for much of the solid waste from the 100-H Reactor:

- The Ball 3X Project, in which the liquid boron system for emergency reactor control was modified to a system using solid boron steel and carbon steel balls

- The tube replacement project, in which about 3,700 aluminum process tubes from the 100-H Reactor were replaced between 1956 and 1965 (DeNeal 1965).

It is likely that other facilities associated with the 100-H Reactor and waste management activities generated radioactive solid wastes. Examples are air filters from the 105-H Reactor Building's gas recirculation wing and the 117-H Filter Building, equipment used in connection with the cooling water effluent system, and contaminated dirt removed from locations near the effluent lines.

The primary disposal areas for the 100-H Area were the 118-H-1 and 118-H-3 Burial Grounds, which were located in the 100-HR-2 Operable Unit. Irradiated reactor components removed during the Ball 3X System installation were buried in the 118-H-4 Burial Ground.

Radioactive solid waste buried within the boundaries of the 100-HR-1 Operable Unit includes building foundations; contaminated, concrete-lined tunnels; pieces of concrete and other materials from demolished buildings; and buried pipelines. Contamination in these cases resulted mainly from surface contact with contaminated air, dust, and liquid solutions. For cases in which decontamination and decommissioning have occurred, radiation levels are low (DOE-RL 1992).

Dorian and Richards (1978) provides the following brief outline of past 100 Area solid waste burial practices.

- <u>1944 to 1954</u>
  - No intensive segregation program existed.
  - Combustibles and noncombustibles were buried in the same trenches.
  - Burial records from this period contain minimal information.

- <u>1955 to 1965</u>
  - Alternate disposal methods and sites were studied; documented; and, in some cases, implemented.
  - Burning of combustibles in burial trenches was begun and ended.
  - Records improved.

- <u>1966 to 1973</u>
  - Centralization of burial grounds was begun and completed.
  - Measurements of burial materials improved.
  - Burial records were much more complete.
  - Some wastes were segregated by categories.

- <u>1973 to Present</u>
  - 100 Area solid wastes were transferred to 200 Area burial grounds (except for some decommissioning rubble that was dumped into the 183-H Clearwells).

Dorian and Richards (1978) states, "Since reactor operations began at Hanford, approximately 1 x 10^6 cubic feet of solid wastes containing approximately 2 x 10^6 curies have been placed into the 100 Area burial grounds. Of the 2 x 10^6 curies buried, less than 30,000 curies remained at the end of calendar year 1971. A small fraction of the 30,000 curies is long-lived (e.g., Cs-137, Sr-90, and Eu-152). Ninety-nine percent of the radioactivity excluding Ni-63 is Co-60. This radionuclide is found in a matrix of solids having diverse configurations. These solids include paper, rags, structural concrete, wood and a variety of metals such as aluminum, steel, iron and zircaloy. More than 99 percent of the Co-60 is contained in an estimated 600 tons of solid metallic matrices removed from the reactors. Based on the 105-DR Reactor core sampling performed as part of this study, Ni-63 may be present in these metallic wastes with concentrations of up to about 2 percent of the Co-60 concentrations. Less than one percent of the activity includes a minute percentage of dried salts of the activation products associated with the reactor coolant stream."

Miller and Wahlen (1987) also provides useful, if generic, information concerning the nature and volume of wastes placed in reactor site burial grounds. Tables 2-4 and 2-5 are derived from that data. While Miller and Wahlen (1987) does not provide volumetric data by reactor site or waste site, it does provide combined volumetric data for all reactor sites and also provides the estimated percentage of waste materials generated by each reactor. Table 2-4 combines this percentage data with generic volumetric data to estimate volumes unique to 100-H. Miller and Wahlen (1987) notes that most of the volumes cited are buried in the "primary (reactor site) burial ground" which, for 100-H, is the 118-H-1 Burial Ground. Table 2-5 provides volumes of miscellaneous waste buried at the 100-H Area.

Herman Jr. (1965) notes that reactor site burial grounds contain two general types of radioactive waste: neutron-activated reactor components and surface-contaminated material and equipment. The document states, "The activated components consist almost entirely of steel and aluminum and the most significant radionuclide contained in these is ^{60}Co." Surface contaminants are primarily corrosion and activation products of the reactor cooling water effluent, of which the long-life emitter is ^{65}Zn.

2.4.4 Reactor Ventilation System and Inert Gas System Wastes

Two gas systems were associated with each of the reactors: the primary ventilation system and the inert gas system. The primary ventilation system circulated fresh air through the staffed areas of the reactor buildings, into zones of increasing contamination levels, and upward past the reactors to overhead ducts. The ducts carried the air to exhaust fan systems, which were located adjacent to the exhaust stacks. Air in the reactor buildings became contaminated with radionuclides that were present as radioactive gases, entrained vapors, and particulates generated by the cascade of cooling water in the reactors. These emissions may have resulted in surface contamination in the 100-H Area, as evidenced in part by the presence of ^{14}C in vegetation. Other radionuclides associated with gaseous emissions include ^{3}H and ^{129}I.

Table 2-4. Estimated Volumes of Solid Wastes Buried at 100-H Area.

Material Type	Total at all Reactors (tons)	Volume at 100-H Reactor (tons)
Spacers	425	42.5
Lead-cadmium poison pieces	1,103	154
Splines - Aluminum Boron	62.5 8.5	6.88 .93
Graphite	.7	.06
Desiccant	6.6	.59
Process tubes (4,062)	NR	38.6
Lead	170	24.0

NR = not reported (Derived from Miller and Wahlen [1987])

Table 2-5. Volumes of Miscellaneous Waste Buried at 100-H Area.

Type of Material	Volume (tons)
Gun barrels	1.00
Horizontal control rod/vertical safety rod thimbles	2.75
Horizontal control rods	1.20
Vertical safety rods	2.20
Nozzles/pigtails	15.0
Reactor tools	0.50
Total	22.65

(Miller and Wahlen 1987)

Originally, the ventilation air was released directly from the reactor buildings to the stacks and, subsequently, to the atmosphere. In 1960, air filtering systems were added to minimize the release of radioactive matter. These filtering systems were placed below ground in the 117-H Filter Building, located southwest of the 105-H Reactor Building. The exhaust air was passed downward through ducts to a tunnel leading to the filter building. After filtration, the air was routed back through a tunnel to the exhaust stack.

Two types of filter banks were used: a high-efficiency particulate air bank and a halogen (activated charcoal) bank. Samples obtained during decommissioning of the 117-H Filter Building revealed that the inside surfaces of the concrete-lined tunnels, as well as the equipment and wall surfaces of the fan

rooms and filter chambers in the 117-H Filter Building, had low-level, surface-smearable radioactive contamination.

Contamination of the 117-H Filter Building occurred on the inside surfaces of ducts, concrete surfaces, machinery, and filters, as indicated by analysis of smear samples taken from these surfaces (Dorian and Richards 1978). The interior surfaces of the tunnel connecting the filter building to the reactor building were also radioactively contaminated (DOE-RL 1992). See Section 5.11 for more information about this contamination.

The 105-H Reactor Building's gas recirculation wing provided a closed-loop, nonreactive gas environment in the graphite cores that would remove moisture and gases from the cores and serve as a heat-transfer medium between the graphite cores and the process tubes. The system also served to detect water leaks within the reactor cores. A mixture of helium and carbon dioxide, driven at low pressure by a blower system, was circulated through the graphite piles. Filters, gas coolers, blowers, condensers, and silica gel drying towers were located in the gas recirculation wing. The system maintained gas pressure in the reactors at a slightly positive value with respect to the ventilation air, so that outside air could not make contact with the graphite cores. When a leak was detected, the gas was routed to the ventilation exhaust system.

2.5 SANITARY LIQUID WASTES

Sanitary wastes were produced in various 100-H Area buildings that were equipped with toilet facilities. These wastes were routed by sewer lines to septic tanks and drain fields. There are no records of radiological wastes being disposed of to these sewer systems, but nonsanitary wastes such as detergents, cleaning compounds, and solvents may have been disposed of in them (DOE-RL 1992). Four known septic tank systems are located within the 100-H Area. See Sections 4.13, 4.14, 5.12, and 5.13 for more information about those septic tank systems.

2.6 NONRADIOACTIVE LIQUID WASTES

Nonradioactive liquid chemical wastes, including hazardous waste substances, were disposed of in 100-H Area liquid waste sites. Contamination from liquids, including gasoline, diesel fuel, solvents, and other chemical compounds, would be expected near storage tanks and their piping systems and in areas where those materials were used or stored. Releases could have resulted from leakage, spillage, or disposal. The following activities may have resulted in the generation of nonradioactive liquid wastes and may require further investigation.

- Water treatment chemicals such as aluminum sulfate, sulfuric acid, chlorine, and sodium dichromate were used and stored at and near the 183-H and 185-H Buildings.

- Wet-type electrical transformers and hydraulic machinery containing oil contaminated with polychlorinated biphenyls (PCBs) were used at several locations within the 100-H Area. Fluids contaminated with PCBs may have been released or disposed of during operation, equipment repair, or decommissioning and demolition activities.

- Ash from the coal-fired 184-H Power House was passed as a water slurry by pipeline to the 184-H Power House Ash Pit (126-H-1). Leakage in the pipeline and seepage at the ash pit were potential liquid contamination sources.

- Boiler water treatment chemicals for the 184-H Power House included sodium sulfate, trisodium phosphate, and chromates. These chemicals were used to treat the boiler water and ended up in the boiler sludge. Disposal methods for this sludge are not known.

- Three zeolite water softeners were located in the 184-H Power House, where filtered water was treated before use in the heat exchangers. Sodium chloride (salt) solutions were used to regenerate the zeolite ion exchange beds in the water softener tanks. The salt was delivered in railcar lots to brine pits, which were located adjacent to railroad tracks just north of the power house. The disposal of the waste from this process is not known, and there is no record of leaks or spills.

- Fuel oil tanks were located both aboveground and underground in the 100-H Area.

- Oils, paints, and solvents were stored and used in the 1715-H and 1716-H Buildings.

- Automotive repair and service was performed at the 1716-H Building.

- Additional wastewater was generated from various cleaning processes. Disposal locations for these solutions are unknown (DOE-RL 1992).

2.7 NONRADIOACTIVE SOLID WASTES

Nonradioactive solid waste generated in the 100-H Area primarily included miscellaneous materials generated in the facilities, such as paper, trash, pieces of metal, and plastic parts. Some combustible wastes were disposed of in the 128-H-1 and 128-H-2 Burning Pits, and it is believed that they were also disposed of in the 128-H-3 Burning Pit (Stenner et al. 1988).

Other solid wastes consisted of relatively uncontaminated concrete, metal parts, and other materials generated during decommissioning and demolition activities. Asbestos, chemical waste, and contaminated solids were typically removed from the area to the 200 Area burial grounds during the decontamination and decommissioning work. Building materials that were not considered to be contaminated were buried in place and, in some cases, sold to salvage contractors as excess materials and removed from the site (Wahlen 1991).

Solid waste-generating operations associated with the 184-H Power House consisted of an anthracite coal storage yard and the 184-H Power House Ash Pit (126-H-1). Leachates may have entered the soil at these sites and along the coal conveyor system.

3.0 SOIL AND VEGETATION SAMPLING

Routine environmental surveillance of the 100-H Area is conducted by WHC to evaluate long-term trends in the environmental accumulation of radioactivity.

Early each summer, soil and vegetation samples are collected and analyzed for radioisotope content. The analyses include those radionuclides expected to be found in the areas sampled (i.e., gamma-emitting radionuclides, strontium isotopes, uranium, and/or plutonium isotopes). The results are compared to regional background levels, which are derived from Pacific Northwest Laboratory offsite monitoring data, to determine the difference between contributions from Hanford Site operations and contributions from natural causes and world-wide fallout. The results are also compared to soil contamination standards developed for use by WHC at the Hanford Site (Schmidt et al. 1993).

Tables 3-1 and 3-2 provide results of 100-H Area soil and vegetation sampling from 1981 through 1992. Soil samples were taken from the surface.

Table 3-1. Average Radionuclide Concentrations (pCi/g) Detected in 100-H Area Surface Soil Samples from 1981 to 1992.

Year	^{60}Co	^{90}Sr	^{137}Cs	^{238}Pu	$^{239/240}Pu$
1981	1.5 E-01	NR	9.0 E-02	NR	NR
1982	1.8 E-01	NR	3.4 E-01	NR	NR
1983	1.6 E-01	NR	4.7 E-01	NR	NR
1984	3.7 E-01	2.4 E-01	1.7 E+00	6.9 E-04	1.5 E-02
1985	1.4 E-01	9.8 E-02	2.3 E-01	1.9 E-04	5.7 E-03
1986	1.8 E-01	7.1 E-02	8.9 E-01	6.1 E-04	1.0 E-02
1987	2.8 E-01	1.9 E-01	2.0 E+00	8.5 E-04	3.1 E-02
1988	1.6 E-01	7.5 E-02	3.6 E-01	6.2 E-04	6.6 E-03
1989	2.0 E-01	5.0 E-02	5.3 E-01	9.2 E-04	6.5 E-03
1990	1.0 E-01	6.5 E-02	4.5 E-01	3.3 E-04	7.6 E-03
1991	7.8 E-02	8.1 E-02	1.6 E+00	6.0 E-04	1.9 E-02
1992	2.1 E-02	7.9 E-02	3.5 E-01	3.5 E-04	6.9 E-03

NR = not reported (Schmidt et al. 1991)

Table 3-2. Average Radionuclide Concentrations (pCi/g) Detected in 100-H Area Vegetation Samples from 1981 to 1992.

Year	^{60}Co	^{90}Sr	^{137}Cs	^{238}Pu	$^{239/240}Pu$
1981	6.8 E-01	NR	1.5 E-01	NR	NR
1982	NR	NR	NR	NR	NR
1983	1.3 E-01	NR	9.0 E-02	NR	NR
1984	1.8 E-01	2.0 E+00	1.3 E-01	2.0 E-04	1.7 E-03
1985	2.0 E-01	6.0 E-02	4.5 E-02	1.0 E-04	5.1 E-04
1986	2.2 E-01	5.3 E-01	1.3 E+00	1.3 E-04	4.4 E-05
1987	2.6 E-01	2.6 E-01	1.0 E-01	3.5 E-05	2.7 E-04
1988	9.0 E-01	3.9 E-01	1.5 E-01	2.0 E-04	1.5 E-04
1989	6.5 E-01	5.2 E-02	2.1 E-01	8.5 E-05	1.5 E-04
1990	<1.3 E-01	1.1 E-02	6.6 E-02	<1.4 E-04	3.0 E-04
1991	<2.8 E-02	5.7 E-02	3.0 E-02	4.5 E-05	5.7 E-04
1992	<2.0 E-02	6.7 E-02	<7.7 E-03	<1.5 E-06	<1.3 E-04

NR = not reported (Schmidt et al. 1991)

More tables of soil and vegetation data, broken down by sample site, are available in Schmidt et al. (1993), Greager (1981), and Jacques (1986).

4.0 100-HR-1 OPERABLE UNIT

Three operable units are associated with the 100-H Area. Two of these, 100-HR-1 and 100-HR-2, include liquid and solid waste disposal sites in the vicinity of, and related to, the 100-H Reactor and associated facilities. The 100-HR-1 Operable Unit includes the eastern portion of the 100-H Area and includes the liquid and sludge disposal sites associated with the operation of the reactor and related facilities. The 100-HR-2 Operable Unit includes the western and southern portions of the area and primarily includes solid waste burial grounds associated with the operation of the reactor.

The third operable unit, 100-HR-3, is a groundwater-only operable unit; because it addresses only groundwater, it is beyond the scope of this report and is not included.

This section describes the 100-HR-1 Operable Unit, which includes most of the 100-H Area buildings and facilities that remain intact. It includes 31 waste sites, 13 of which are addressed in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement; Ecology et al. 1989). These include decommissioned facilities, trenches, cribs, and septic tanks. Figures 4-1 and 4-12 show the locations of 100-HR-1 waste sites.

All Hanford coordinate locations are approximate and have been taken from several different maps and drawings of the 100-H Area. Coordinate locations typically represent the center of the facility or waste site, except where noted. Units of measure have typically been reported as they appear in reference documents.

Some of the 100-HR-1 waste sites have been evaluated as part of the preliminary assessment/site inspection activities performed by the DOE. They have been assigned Hazardous Ranking System (HRS) migration scores under the HRS evaluation procedures spelled out under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) in Title 40, Code of Federal Regulations (CFR), Part 300. The HRS migration scores for the 100-HR-1 sites are summarized in Table 4-1.

Each waste site is described separately in Sections 4.1 through 4.31. A site is described as "suspect" if it was not included in the Waste Information Data System (WIDS) before this report was published.

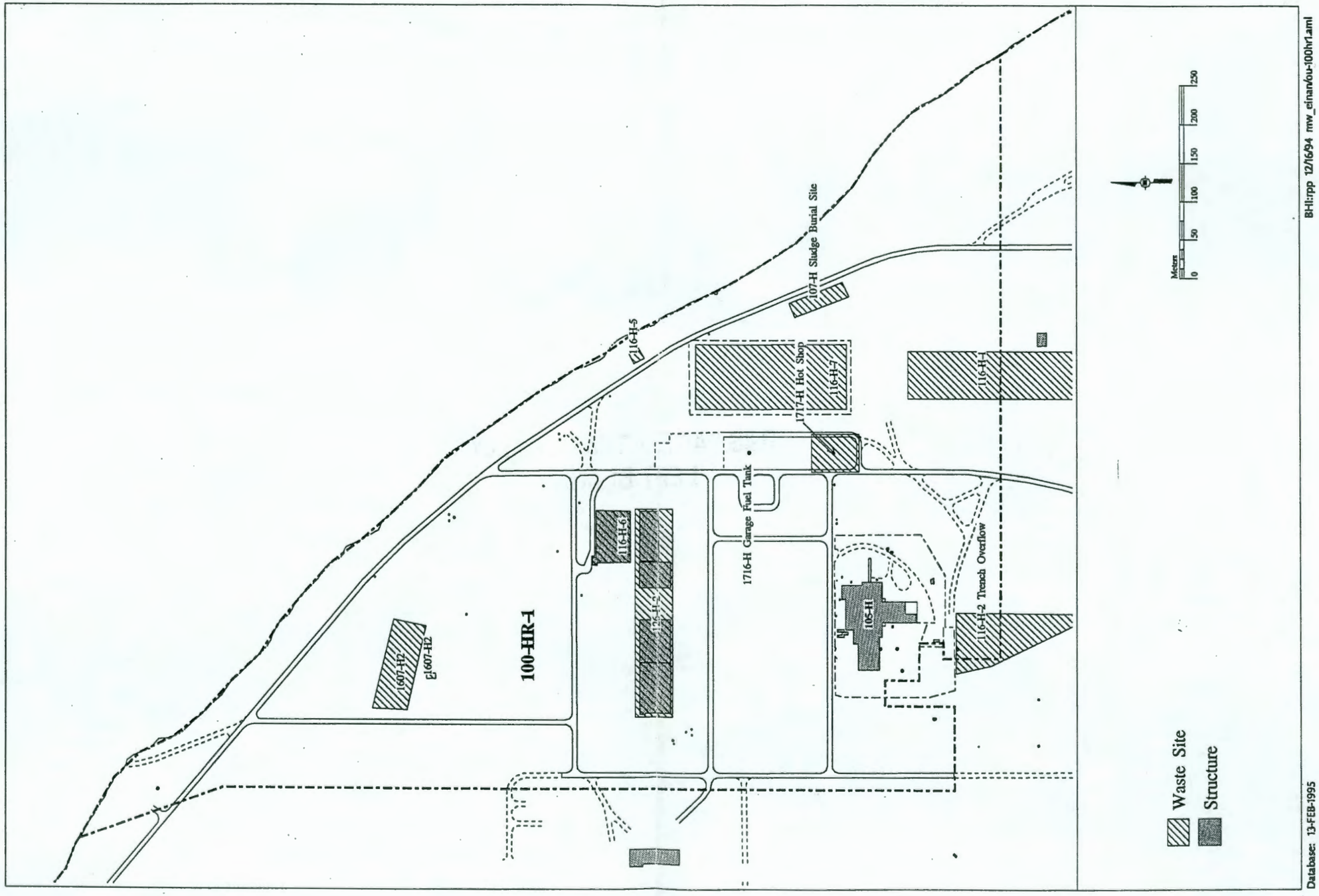

Figure 4-1. Operable Unit 100-HR-1 Waste Sites, Exclusive of Those Within the Reactor Security Fence.

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Table 4-1. Operable Unit 100-HR-1 Waste Site Hazardous Ranking System Migration Scores.

Waste Site Number	HRS Score
116-H-1	42.32
116-H-2	42.32
116-H-3	42.32
116-H-4	4.63
116-H-7	76.91
116-H-9	0.00

(Stenner et al. 1988)

4.1 116-H-1 (107-H LIQUID WASTE DISPOSAL TRENCH)

116-H-1 is an inactive, mixed liquid waste site located at Hanford coordinates N94850 W38602 and approximate Washington State plane coordinates E578081 N152315, about 350 ft south of the 107-H Retention Basin (116-H-7). This site is commonly known as the 107-H Liquid Waste Disposal Trench, although it has also been known as the 107-H Rupture Effluent Trench, the 107-H Liquid Waste Trench, and the 107-H Trench (BHI 1994). The trench operated from 1952 until 1958 (Koop 1964) to receive 90 million liters of diversion effluent from the 107-H Retention Basin during reactor outages resulting from fuel element ruptures (BHI 1994). The coolant effluent received by this trench reportedly contained fuel rupture debris (Koop 1964). Additionally, the trench received water and sludge from the 107-H Retention Basin in April and May 1965, during basin deactivation (Herman Jr. 1965).

Different measurements have been reported for this trench. Clukey (1954, 1956) state that the trench was 800 ft long, 25 ft wide, and 15 ft deep. PNL (1975) states that the bottom of the trench was 1,000 ft long, 75 ft wide, and 15 ft deep. And Stenner et al. (1988) reports that the waste site itself is 200 ft long, 25 ft wide, and 15 ft deep.

The trench was divided into three lobes that were oriented from north to south. Cluckey (1954) and aerial photographs indicate that the first lobe overflowed into the second, and the second overflowed into the third. Other sources provide smaller dimensions but appear to address only the first lobe. The second and third (overflow) lobes appear in aerial photos to have been somewhat shallower than the first (primary) lobe. The primary lobe was supplied by a 20-in. steel pipe that entered near its bottom. The pipe originated at the 1607-H Pump House, near the northwest corner of the 107-H Basin (Hanford Site Drawing P-1247).

Interviews with site personnel suggest that waste effluents may have never reached the third (downstream) lobe (Richards 1990).

Herman Jr. (1965) states that the trench was used in April and May 1965 to receive water pumped from the 107-H Basin in conjunction with its deactivation. The report further states, "After the water drained from the trench, a maximum dose rate of 20 mrad/hr . . . was observed, at contact, on the

bottom of the trench. Analysis of the surface contamination showed primarily the presence of Zn-65 and no fission products. The trench was subsequently backfilled with 6 to 10 feet of soil, and the dose rate at surface is less than 1 mR/hr."

Sixty curies of fission products liberated as a result of 43 ruptured fuel elements is estimated to have been discharged to this trench (Ruppert 1953).

The estimated radionuclide inventory for 116-H-1, in curies and calculated to account for decay through 1 April 1986, includes the following.

- ^{60}Co: 9.110 E-001
- ^{134}Cs: 4.000 E-005
- ^{137}Cs: 3.810 E+000
- ^{152}Eu: 9.200 E+000
- ^{239}Pu: 6.030 E-002
- ^{154}Eu: 5.040 E+000
- ^{155}Eu: 1.450 E-001
- ^{3}H: 3.090 E-002
- ^{238}Pu: 3.090 E-003
- ^{240}Pu: 6.690 E-003
- ^{90}Sr: 7.530 E-001
- ^{235}U: 1.390 E-003
- ^{238}U: 1.590 E-001

(Stenner et al. 1988)

In addition, 116-H-1 has a hazardous chemical inventory that includes 90 kg of sodium dichromate (Cramer 1987).

The majority of radionuclide concentrations in the liquid waste trenches at the Hanford Site are reported to exist in the immediate vicinity of the trenches and within 10 ft of the trench bottoms. Radionuclide inventories for the trenches range from 15 to 79 Ci for the 100-B, 100-D, 100-F, and 100-H Areas. It has been estimated that 116-H-1 received 33 Ci of radionuclides (Dorian and Richards 1978). The concentrations presented in Table 4-2 have been estimated to exist in trench soils.

Table 4-2. Estimated Radionuclide Concentrations in 116-H-1.

Measurement	Amount (pCi/g)
Average beta-gamma concentration	5.3×10^{2}
Maximum beta-gamma concentration	5.3×10^{3}
Average ^{238}Pu concentration	5.4×10^{-2}
Maximum ^{238}Pu concentration	3.5×10^{-1}
Average $^{239/240}$Pu concentration	1.1×10^{0}
Maximum $^{239/240}$Pu concentration	1.1×10^{1}

(Dorian and Richards 1978)

Dorian and Richards (1978) further reports the results of soil samples taken from eight 116-H-1 sample sites. It reports the contaminated soil volume as 9.0×10^5 ft^3 and mass as 6.1×10^{10} g. The full report is provided in Appendix B and is summarized in Table 4-3.

Table 4-3. 116-H-1 Soil Sampling Results.

Radionuclide	Average pCi/g	Curies
^{238}Pu	5.40 E-02	3.30 E-03
$^{239/240}Pu$	1.10 E+00	6.70 E-02
^{90}Sr	1.50 E+01	9.20 E-01
^{3}H	8.00 E-01	4.90 E-02
^{152}Eu	2.30 E+02	14
^{60}Co	4.40 E+01	2.7
^{154}Eu	1.60 E+02	9.8
^{134}Cs	1.10 E-02	6.70 E-04
^{137}Cs	7.60 E+01	4.6
^{155}Eu	7.60 E+00	4.60 E-01
U	2.60 E-01	1.60 E-01
^{14}C	–	0.0
Total Curies		33

(Dorian and Richards 1978)

The trench has been fully backfilled and stabilized with clean soil.

This site has an HRS migration score of 42.32 (Stenner et al. 1988).

116-H-1 appears today as a featureless, flat, cobble-covered field. It lies within a larger radiation zone marked by permanent concrete monuments with underground contamination warning signs. No fencing exists around the site. Two surface contamination zones have been identified within the limits of the trench and are protected by lightweight chain barriers supported on metal posts. The larger area protected by concrete monuments has been extended in two areas adjacent to the trench: a 30- by 100-ft extension at the southern portion of the western boundary (southwest corner of the zone) and a 20- by 80-ft extension to the south of the zone's southern border. The source of the surface contamination is unknown.

4.2 116-H-2 (1608-H LIQUID WASTE DISPOSAL TRENCH)

116-H-2 is an inactive, mixed liquid waste site located at Hanford coordinates N94830 W39750 and approximate Washington State plane coordinates E577733 N152407, about 250 ft south of the 105-H Reactor Building. This site is commonly known as the 1608-H Liquid Waste Disposal Trench, although it has also been known as the 1608-H Trench, the 1608 Drain Trench, and the 1608-H Crib and Trench. It operated from 1953 to 1965 to receive 600 million liters of coolant water from the reactor building during the Ball 3X System upgrade and other upgrade programs (BHI 1994). Wastes were received via the 1608-H Building through an underground, 6-in. vitrified clay pipe that is probably still in place (Hanford Site Drawings M-1904-H and P-1221). The pipe terminated at a headwall located at Hanford coordinates N91872 W39712 (Hanford Site Drawing M-1904-H, Sheet 4).

An area of uncertainty exists in the true nature of the waste site: whether it consisted of a trench or a crib. Most documents, including BHI (1994) and Koop (1964), refer to this site as a trench. PNL (1975), however, refers to the site both as a "crib" and as a "crib and trench." And Hanford Site Drawing P-1221 refers to it as an open ditch with a headwall. Because a headwall existed, and because most documents describing this site refer to a trench, it is believed that the site consisted of a trench.

Additionally, conflicting data exist concerning the trench dimensions. Stenner et al. (1988) and BHI (1994) report that the trench was 275 ft long, 100 ft wide, and 6 ft deep, oriented from east to west. Adams et al. (1984) states that the trench was 250 ft long and 75 ft wide. PNL (1975) reports that the trench was 150 ft long, 40 ft wide, and 5 ft deep. And according to Clukey (1954, 1956), the trench had bottom dimensions of 30 ft by 10 ft and was 6 ft deep. No reliable data could be located to resolve this issue with certainty, and aerial photos offer no resolution.

116-H-2 was also the site of a significant unplanned release. The trench overflowed, flooding an area that has been reported in different documents as 3/4 acre, 1/4 acre, and 300 ft by 500 ft. It is possible that the larger dimensional estimates mentioned above were made to include contaminated surface areas resulting from this flooding.

The date of the trench overflow was not recorded. It was generally contained by the railroad beds that bound the waste site on three sides. Contamination was stabilized by an application of clean soil. See Section 4.32 for more information.

The trench reportedly has average beta-gamma concentrations of 54 pCi/g and maximum beta-gamma concentrations of 120 pCi/g. Concentrations of $^{239/240}Pu$ are estimated to average 1.6×10^{-02} pCi/g, with a maximum concentration of 1.3×10^{-01} pCi/g. The total radioactive inventory has been estimated to be 1.4 Ci (Dorian and Richards 1978).

Stenner et al. (1988) reports that the estimated radionuclide inventory of this site, in curies and calculated to account for decay through 1 April 1986, includes the following.

- ^{60}Co: 9.780 E-003
- ^{134}Cs: 3.000 E-005
- ^{137}Cs: 2.560 E-001
- ^{152}Eu: 5.320 E-002
- ^{154}Eu: 1.030 E-002
- ^{155}Eu: 4.110 E-003
- ^{3}H: 2.140 E-001
- ^{239}Pu: 3.800 E-004
- ^{240}Pu: 4.000 E-005
- ^{90}Sr: 4.910 E-001
- ^{235}U: 5.000 E-005
- ^{238}U: 5.940 E-003

In addition, 116-H-2 has a hazardous chemical inventory that includes 600 kg of sodium dichromate (Cramer 1987).

Dorian and Richards (1978) further reports the results of soil samples taken from six 116-H-2 sample sites. It reports the contaminated soil volume as 3.8×10^5 ft^3 and mass as 2.6×10^{10} g. The full report is provided in Appendix B and is summarized in Table 4-4.

Table 4-4. 116-H-2 Radionuclide Inventory.

Radionuclide	Average pCi/g	Curies
^{238}Pu	NR	0.0
$^{239/240}Pu$	1.60 E-02	4.20 E-04
^{90}Sr	2.30 E+01	6.00 E-01
^{3}H	1.30 E+01	3.40 E-01
^{152}Eu	3.10 E+00	8.10 E-02
^{60}Co	1.10 E+00	2.90 E-02
^{154}Eu	7.60 E-01	2.00 E-02
^{134}Cs	1.50 E-02	4.20 E-04
^{137}Cs	1.20 E+01	3.10 E-01
^{155}Eu	4.80 E-01	1.30 E-02
U	2.30 E-01	6.00 E-03
Total Curies		33

NR = not reported (Dorian and Richards 1978)

The trench was backfilled to grade and marked with nonstandard concrete monuments (Koop 1964).

This site has an HRS migration score of 42.32 (Stenner et al. 1988).

116-H-2 appears today as a relatively flat, vegetation-free, cobble-covered field. The trench has been fully backfilled, and the area immediately above it is bermed to a level of 18 to 24 in. above grade. A single concrete benchmark identifies the approximate center of the site. The site is unfenced, but lies within a protective zone bounded by permanent concrete monuments. See Hanford Site Drawing H-1-15859.

The area of overflow flooding is also within the zone of permanent concrete monuments and is marked with underground contamination warning signs. A 5-ft by 5-ft surface contamination zone has been identified and fenced off in the southern portion of this overflow area (see Sections 4.32 and 5.6).

4.3 116-H-3 (105-H DUMMY DECONTAMINATION FRENCH DRAINS)

116-H-3 is an inactive, mixed liquid waste site that operated from 1950 until 1965 to receive waste fluids from the 105-H dummy decontamination facility on the 105-H wash pad. The site is commonly known as the 105-H Dummy Decontamination French Drains, although it has also been known as the 105-H Dummy Decontamination French Drain, the Perf Decontamination Drain, the Dummy Decontamination French Drain, and the H Reactor Dummy Decontamination Drain. It is made up of two french drains located about 200 ft east of the fuel basin portion of the 105-H Reactor Building at Hanford coordinates N95190 W39335 and N95173 W39350 (Stenner et al. 1988) and approximate Washington State plane coordinates E577858 N152492 and E577863 N152498. These coordinates place the drains approximately 23 ft apart.

The french drains are constructed of 36-in.-diameter and 15-ft-long vitreous tile pipe buried vertically and filled with gravel. The upper surface of one french drain is a few inches above grade and has recently been covered with a wooden protective structure. The other french drain is not visible, and its exact location is unclear. Adams et al. (1984) states that the drain site measures approximately 15 ft by 15 ft. Figure 4-2 shows one drain before it was covered with the wooden structure.

Stenner et al. (1988) reports that the french drains received about 400,000 L of spent nitric acid and rinse water from the decontamination of fuel element spacers, reactor process tube caps, and other reactor hardware. Additionally, Cramer (1987) states that 116-H-3 has a hazardous chemical inventory that includes 2,000 kg each of sodium dichromate, sodium oxalate, and sodium sulfamate.

Figure 4-2. 116-H-3 Dummy Decontamination French Drain.

The estimated radionuclide inventory for 116-H-3, in curies and calculated to account for decay through 1 April 1986, includes the following.

- ^{60}Co: 5.060 E-003
- ^{137}Cs: 3.310 E-002
- ^{152}Eu: 6.570 E-003
- ^{154}Eu: 1.390 E-003
- ^{155}Eu: 1.200 E-004
- ^{3}H: 8.800 E-004
- ^{239}Pu: 8.000 E-005
- ^{90}Sr: 1.400 E-004

(Stenner et al. 1988)

The waste site has average beta-gamma concentrations of 220 pCi/g and maximum beta-gamma concentrations of 360 pCi/g. Concentrations of $^{239/240}$Pu are estimated to average 2.7 x 10^{-02} pCi/g, with a maximum of 2.7 x 10^{-01} pCi/g. The total radioactive inventory is estimated at 7.0 x 10^{-01} Ci (Dorian and Richards 1978).

Dorian and Richards (1978) reports the results of soil samples taken from three 116-H-3 sample sites. It reports the volume of contaminated soil as 4.5 x 10^{3} ft^{3} and the mass as 3.1 x 10^{8} g. The full report is provided in Appendix B and is summarized in Table 4-5.

Table 4-5. 116-H-3 Radionuclide Inventory.

Radionuclide	Average pCi/g	Curies
^{238}Pu	NR	0.0
$^{239/240}$Pu	2.70 E-01	8.40 E-05
^{90}Sr	5.60 E-01	1.70 E-04
^{3}H	4.40 E+00	1.40 E-03
^{152}Eu	3.30 E+01	1.00 E-02
^{60}Co	4.70 E+01	1.50 E-02
^{154}Eu	8.70 E+00	2.70 E-03
^{134}Cs	NR	0.0
^{137}Cs	1.30 E+02	4.00 E-02
^{155}Eu	1.20 E+00	3.70 E-04
Total Curies		7.00 E-02

NR = not reported (Dorian and Richards 1978)

This site has an HRS migration score of 42.32 (Stenner et al. 1988) and is a registered Class V underground injection well (BHI 1994).

The waste site appears today as a wooden, doghouse-sized structure, about 4 ft long, 4 ft wide, and 18 in. high, with a flat roof that is covered with green asphalt roofing material. A permanent concrete benchmark with a metal identification plate is located a few feet north of the structure. Four yellow metal posts protect the site, and it is posted with surface contamination warning signs.

A 12-in.-deep earthen berm runs southward from the wooden structure for about 15 ft and may cover the second french drain.

A repair mark in the asphalt road and parking surface marks the path of the underground line running from the wash pad area of the 105-H fuel storage basin to the french drain. No drawings identifying the size and type of pipe could be located.

The waste site area is protected by the 8-ft security fence that surrounds the 105-H Reactor Building.

4.4 116-H-4 (ORIGINAL 105-H PLUTO CRIB SITE)

116-H-4 is an inactive, mixed liquid waste site that operated from 1950 to 1952 to receive about 1,000 L of contaminated cooling water from reactor process tubes containing ruptured fuel elements. The site is located at Hanford coordinates N95130 W39850 and approximate Washington State plane coordinates E577706 N152479, southwest of the 105-H Reactor Building. It was the original location of the 105-H Pluto Crib, which began operation in 1950 and was later excavated to prepare the site for construction of the 117-H Filter Building (Herman Jr. 1965).

Different dimensions have been reported for the 105-H Pluto Crib. BHI (1994) states that the crib had bottom dimensions of 4 ft by 4 ft and was 2 ft deep. PNL (1975) and Clukey (1954), however, report that the pluto crib was 10 ft long, 10 ft wide, and 10 ft deep. Clukey (1956), which erroneously reports the 105-H Pluto Crib as being the 116-H-1 site instead of the 116-H-4 site, states that the pluto crib was 10 ft deep and 10 ft in diameter.

Crib construction is uncertain, as no drawings could be located to describe its shape or construction material. Clukey (1954) notes only that this pluto crib had been partly filled with gravel. Adams et al. (1984) states that pluto cribs in the 100 Areas "were typically 10-ft by 10-ft wooden structures."

Some pluto cribs were constructed of wooden timbers to form underground vaults into which waste effluents might be drained. These vaults were typically constructed at the bottom of an excavation and rested on a layer of sand and gravel to aid in the rapid dispersion of liquids to soil. The excavation was then backfilled to provide shielding, usually leaving the upper surface of the vault at, or a little below grade. Other pluto cribs were constructed of 55-gal drums filled with gravel.

Ruppert (1953) reports that "water contaminated with an estimated 270 curies of fission products liberated as a result of 10 ruptured slugs was discharged to this crib." As mentioned, these contaminants were contained in 1,000 L of water (BHI 1994) and would have become part of a waste plume extending downward from the floor of the crib.

Well monitoring data for test well 199-H3-1, located west of the pluto crib, are provided in Table 4-6.

Table 4-6. Well Monitoring Data, Test Well 199-H3-1, 1962 Through 1982.

Year	Tritium (pCi/mL)	Nitrate (mg/L)
1962	1.30 E+02	1.20 E+01
1963	7.00 E+01	N/A
1964	4.00 E+01	N/A
1971	1.90 E+01	8.5
1972	1.70 E+01	1.10 E+01
1973	1.5O E+01	1.70 E+01
1974	1.50 E+01	1.90 E+01
1975	1.40 E+01	2.90 E+01
1976	1.30 E+01	2.60 E+01
1977	1.2O E+01	4.00 E+01
1978	1.10 E+01	6.90 E+01
1979	1.00 E+01	5.20 E+01
1980	8.8	4.10 E+01
1981	6.7	5.20 E+01
1982	7.3	5.50 E+01

N/A = not applicable (McGhan and Damschen 1979)

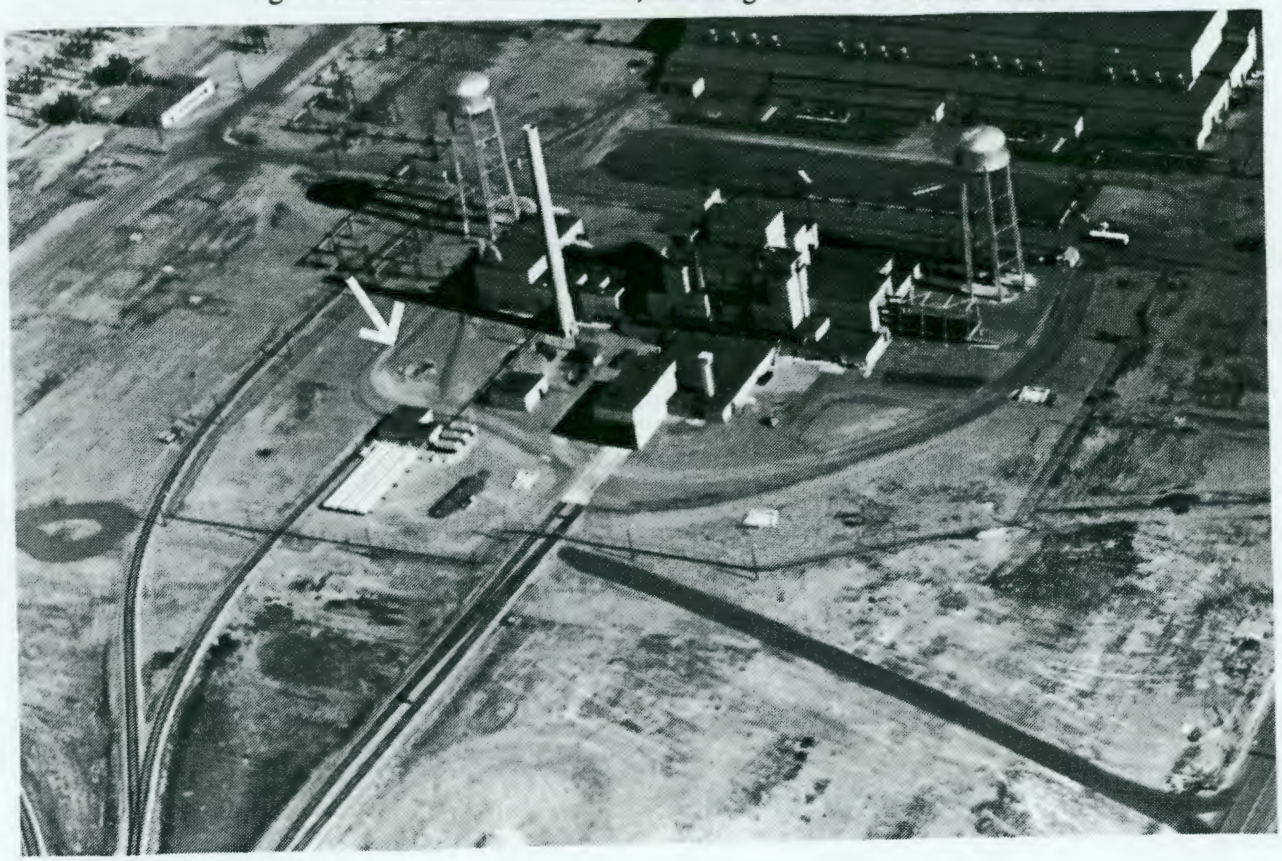
The hazardous chemical inventory for 116-H-4 includes 1,000 kg of sodium dichromate (Cramer 1987).

As mentioned, the volume of waste effluent received by the pluto crib has been estimated at 1,000 L. This is a surprisingly low estimate, considering the estimated chemical inventory of 1,000 kg of sodium dichromate. A much larger volume would seem necessary to transfer this amount of chemical. Alternatively, the chemical inventory estimate could be in error. In any case, pluto cribs at other reactor sites are typically estimated to have received more water and far less sodium dichromate than these estimates.

After its use was discontinued in 1952, this pluto crib was covered with about 10 ft of soil and marked with permanent concrete monuments (Koop 1964).

Figure 4-3 is a June 1954 photograph that shows, albeit poorly, the crib. The site appears to be a simple pit, measuring approximately 10 ft by 10 ft, and is shallow, perhaps 3 to 4 ft deep.

Figure 4-3. 100-H Reactor Site, Showing the 116-H-4 Pluto Crib.



The pluto crib was uncovered and exhumed in 1960, during construction of the 105-H confinement system (Herman Jr. 1965), so that the 117-H Filter Building could be constructed at the same location. Wastes from the site were moved to the 105-H Thimble Pit (118-H-5), where they are now buried. The pluto crib wastes are thus included in the radionuclide inventory of 118-H-5, rather than that of 116-H-4. Refer to Section 5.5 for additional information about the 118-H-5 site.

Because little information could be located to characterize the pluto crib's exhumation and reburial, it is unclear how much contaminated soil was removed. It is possible that only the wooden vault was removed, if such a vault existed. The opposite extreme would be that all contaminated soil was removed. A likely scenario is that as much soil was removed as was necessary to excavate for the 117-H Filter Building foundations, and that residual contamination remains below that level.

No soil sampling has been accomplished at this waste site, nor has a radionuclide inventory been estimated. This is probably because the crib was exhumed and moved and no radionuclides are thought to remain at the site, or because any contamination that resulted from pluto crib activity would not be distinguishable from that resulting from the 117-H Filter Building demolition.

This waste site has been assigned an HRS migration score of 4.63 (Stenner et al. 1988).

116-H-4, the original pluto crib site, appears today as an unremarkable, flat, cobble- and gravel-covered field. Little vegetation grows on its surface. No barriers or markings exist to

uniquely identify the site. It is protected by an 8-ft security fence that surrounds the 105-H Reactor Building.

4.5 116-H-5 (1904-H OUTFALL STRUCTURE)

116-H-5 is an inactive, mixed liquid waste site that is located east of the 105-H Reactor Building on the Columbia River shoreline at Hanford coordinates N96279 W38503 and approximate Washington State plane coordinates E578109 N152821. This site is commonly known as the 1904-H Outfall Structure, although it has also been known as the 116-H-5 Outfall Structure.

The outfall operated from 1949 to 1965 as a weir box to discharge 105-H Reactor coolant water to the river and to provide overflow capability in case the outfall lines became plugged. Effluent was received through two lines from the 107-H Retention Basin and one line from the area process sewer system (Herman Jr. 1965). The effluent then passed through the outfall structure into two 60-in. steel outfall lines, which connected to two 60-in. concrete outfall lines (Kachele 1986) and carried it to the bottom center of the river for release. In the event that the outfall line plugged, effluent would back up into the outfall structure and overflow into an underground concrete sluiceway that led to the river and is considered part of the outfall structure.

The outfall, exclusive of the sluiceway, was 27 ft long, 14 ft wide, and 20 ft deep. It is a compartmented, reinforced concrete box. Before decommissioning, the outfall structure covered an area of approximately 400 ft^2 (PNL 1975). The greatest volume of waste effluent came from the 107-H Retention Basin via two 60-in. steel lines. A 72-in. reinforced concrete pipe from the area process sewer also discharged into it via the 1906-H Lift Station, as did a drainage line from the 184-H Power House. Two additional lines entered the outfall from the 1908-H Effluent Monitoring Station (Herman Jr. 1965; Hanford Site Drawings P-1220, SP-4850, and P-1247). Figures 4-4 and 4-5 show historical photographs of the outfall structure and effluent lines during construction and after completion.

Hanford Site Drawings P-1220, SP-4850, and P-1247 provide details on underground lines and two junction boxes that supported the outfall structure. Several hundred feet of large underground concrete pipe is also shown, including 72- and 60-in. reinforced concrete pipe, extra strong (RCP-XS).

No records have been located to suggest that destruction or removal of lines or junction boxes occurred, so it should be assumed that the lines and junction boxes remain in place. Because the lines and junction boxes processed millions of liters of waste effluent, they should be assumed to be contaminated. See Section 4.18 for a more complete characterization.

Morgan (1985) states that the twin 60-in. lines running into the Columbia River were investigated in 1985 and found to be buried beneath 18 in. to 5 ft of river sediments along their entire lengths. However, Beckstrom and Steffes (1986) states that remote sensing data obtained in 1984 indicated that the two pipes were buried from 5 ft to 18 ft deep.

No radionuclide inventory is available for the site, nor has an HRS migration score been assigned. The dose rate at 1 ft from the bottom of the outfall structure was measured in 1965 at 30 mR/h (Herman Jr. 1965).

Figure 4-4. 1904-H Outfall Under Construction, 1949.

Figure 4-5. 1904-H Outfall, Newly Completed, 1949.

The aboveground portion of the outfall has been demolished into its base, and the base has been backfilled with soil to a level about 2 ft above grade. It lies within an area protected by permanent concrete monuments with "Caution: Underground Radioactive Material" warning signs. The slope between the outfall and the riverbank is covered with large basalt riprap boulders that have been mortared in place, extending about 80 yards north and south of the outfall. The exit end of the underground sluiceway has been covered with concrete rubble and is no longer visible. A shallow, dish-shaped concrete runoff pad extends across the beach from the sluiceway exit to the low water line. "No Trespassing" signs have been posted on the beach.

4.6 116-H-6 (183-H SOLAR EVAPORATION BASINS)

116-H-6 is an inactive, mixed liquid waste site that operated from 1973 to 1985 to process liquid 300 Area wastes. The site is commonly known as the 183-H Solar Evaporation Basins, although it has also been known as the 116-H-6 Retention Basins. It is centered at approximate Washington State plane coordinates E577771 N152857.

During reactor operations, 16 flocculation and sedimentation basins were used to prepare Columbia River water for use as reactor coolant. In 1973, 4 of the 16 basins were designated for use as solar evaporation basins. Their purpose was to provide a means of waste reduction, by natural evaporation, of liquid chemical wastes resulting from 300 Area fuel fabrication operations in support of the 100-N Reactor. The site at which these basins were located has an area of 26,400 ft^2 (BHI 1994).

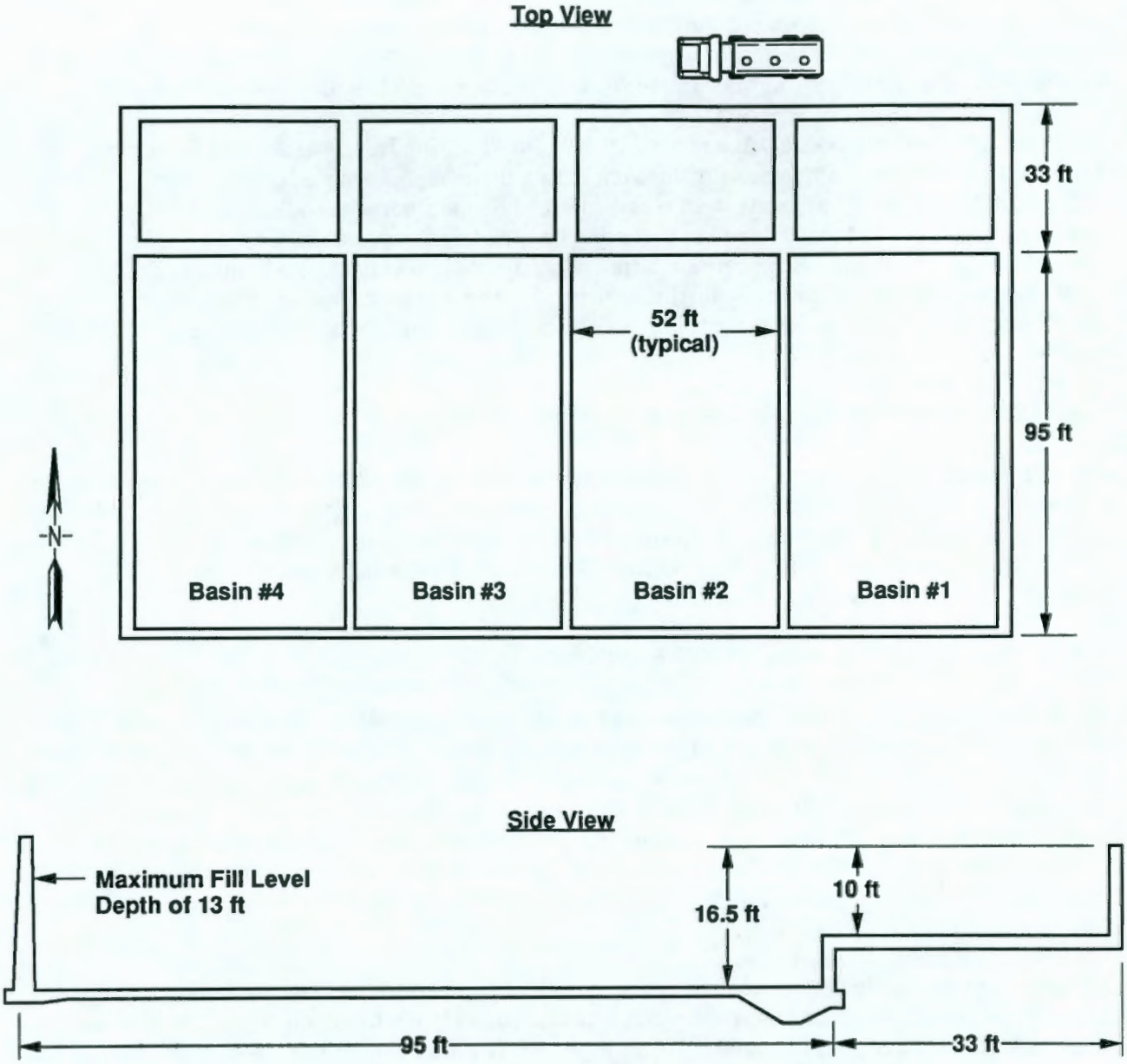
Demolition of the 183-H Filter Plant was initiated in the spring of 1974. The 183-H Head House, 12 of the flocculation and sedimentation basins, the filter building, and the clearwell pump room were demolished, and the underground portions were backfilled to ground level. The clearwells were left intact for future use as a disposal site for clean debris (DOE-RL 1988).

The facility now consists of four of the original 16 basins. Each consists of a deep subsidence section and a shallow flocculation section. The flocculation section is 45 ft long, 33 ft wide, and 10 ft deep and was separated from the subsidence section by a redwood-plank weir. The subsidence section is 95 ft long, 53 ft wide, and 16.5 ft deep at the north end and 15.5 ft deep at the south end. The basins were filled to a maximum depth of 13 ft, as measured at the south end of the subsidence section. The basins have an earthen berm on the east and west sides and an asphalt-covered berm on the north side that was used for tank truck unloading (see Figure 4-6).

Waste effluents were transported to the site in tank trucks and discharged directly into the basins. Solar evaporation reduced the waste effluents to a sludge that was packaged, mixed with grout, and transported to the 200 West Area Central Waste Complex for storage and eventual burial. The wastes are classified as mixed and transuranic. All wastes have been removed from the basins.

This waste site received no radioactive elements other than limited quantities of unirradiated, low-enrichment uranium. AEC-RL (1974) states that 0.02 Ci of unirradiated, low-enrichment uranium was received.

Figure 4-6. Dimensions of the 183-H Basins.



According to DOE-RL (1988), the basins received routine and nonroutine chemical wastes. Routine wastes consisted of spent acid etch solutions, primarily nitric, sulfuric, hydrofluoric, and chromic acids, generated by nuclear fuel fabrication processes. These acidic solutions were reacted with excess sodium hydroxide before being transported to the 183-H Basins. Metal constituents, including copper, silicon, zirconium, nickel, aluminum, chromium, manganese, and uranium, were in the form of precipitates. Nonroutine wastes consisted of unused chemicals and spent solutions from miscellaneous processes. The reader is referred to the referenced document for a detailed process description and a waste site characterization, both of which are too lengthy to be included here.

Contaminated chemical sludge was removed from basin #1 during July, August, and September 1985. Continuous and ambient air samples were taken during the process. Jacques (1986) states, "The data indicate that some basin sediments were resuspended while the sludge was being removed. The ambient air samples contained less-than-detectable or very low concentrations of the chemical components of the sludge. Resuspension of the chemical waste was primarily limited to the immediate basin air . . . [indicating that] the chemical waste was contained within the basin during the cleanup work." Chemicals present in the air samples and, thus, the sludge were Cu^{+2}, F^-, NO_3^-, and SO_4^{-2} (Jacques 1986).

No HRS migration score has been assigned to this site.

116-H-6 appears today as a typical reactor site flocculation and settling basin facility, except that only 4 of the original 16 basins remain. The basins are proposed for demolition, with resulting rubble to be buried in the 183-H Clearwells dump site (126-H-2). The basins are protected by an 8-ft chain-link fence, and "Radioactive Surface Contamination" warning signs are posted.

4.7 116-H-7 (107-H RETENTION BASIN)

116-H-7 is an inactive, mixed liquid waste site that operated from 1949 to 1965 (Kachele 1986) and was an integral component of the 100-H Reactor cooling system. The site is commonly known as the 107-H Retention Basin, although it has also been known as the 107-H Basin, 107-H, and the 116-H-7 Retention Basin. It is located about 1/4 mile east of the 105-H Reactor Building. It is centered at approximate Washington State plane coordinates E578074 N152650, and its northwest corner is at Hanford coordinates N96000 W38740. The basin's location with respect to its permanent concrete monuments is described on Hanford Site Drawing H-1-15245, and the basin is also shown on Hanford Site Drawing P-2026.

The retention basin held reactor cooling water for a brief period of time, allowing radioactive decay and thermal cooling to occur before the water was discharged to the Columbia River. It received nearly all of the water used to cool the 100-H Reactor. The total volume of cooling water held at this basin over the years has not been estimated, but the flow rate ranged between 41,000 and 78,000 gal/min. When operating, the retention basin had the capacity to hold 24,240,000 gal of cooling water.

The rectangular, reinforced concrete basin was 600 ft long, 273 ft wide, and 20 ft deep, and was divided lengthwise into two chambers. The concrete varied from 8 in. to 1 ft, 8 in. thick. The basin was an open-topped reservoir with a volume of 120,000 yd^3 (Kachele 1986). The site at which it is located covers 163,800 ft^2 (BHI 1994). Figure 4-7 shows the basin under construction.

Figure 4-7. 107-H Retention Basin (116-H-7) During Construction.

According to Kachele (1986), the retention basin had "a concrete overflow flume in the center constructed of reinforced concrete." Additionally, "The majority of the walls were 1 ft, 6 in. thick at the base and sat on a foundation. The bottom slab of the basin is 8 in. thick."

Cooling water flowed from the reactor into the south end of the basin through two 60-in. steel lines, from the north end of the basin to the 116-H-5 Outfall Structure through two 60-in. steel lines, and from the outfall structure into the river through two 60-in. steel and concrete river discharge lines. Refer to Section 4.5 for more information about the outfall structure.

Six junction boxes are located along the underground effluent lines. Two are within the 100-H Reactor exclusion area, two are located near the 1717-H Building site, and two are located between the north end of the 107-H Basin and the 1904-H Outfall Structure (Herman Jr. 1965).

Section 2.4.1 of this report describes the nature and source of liquid waste reaching the basin.

Dorian and Richards (1978) reports the results of numerous soil samples taken from sample sites at and near the basin. It records the volume of contaminated soils adjacent to the basin as 9.9×10^4 ft^3 with a mass of 1.4×10^{11} g. It records the volume of contaminated soils underneath the basin as 5.2×10^5 ft^3 at the 0- to 3-ft level and 1.2×10^6 ft^3 at the 3- to 10-ft level. The full report is provided in Appendix B and is summarized in Tables 4-7 and 4-8.

Table 4-7. 116-H-7 Radionuclide Inventory Underneath the 107-H Basin.

Radionuclide	Average pCi/g at 0 to 3 ft	Average pCi/g at 3 to 10 ft	Curies
^{238}Pu	--	--	0.0
$^{239/240}Pu$	--	9.00 E-02	7.40 E-03
^{90}Sr	1.50 E+00	2.40 E+00	2.50 E-01
^{3}H	1.00 E+01	[a]	1.2
^{152}Eu	4.40 E+01	3.30 E+00	1.8
^{60}Co	4.30 E+01	5.50 E+00	2.0
^{154}Eu	1.50 E+01	1.10 E+00	6.20 E-01
^{134}Cs	--	--	0.0
^{137}Cs	1.80 E+02	7.70 E+00	6.9
^{155}Eu	9.30 E-01	7.90 E-02	3.90 E-02
U	3.00 E-01	[a]	3.50 E-02
^{14}C	7.20 E-01	[a]	8.40 E-02
Total Curies			13.00 E+00

[a]Concentrations conservatively assumed to be the same as 0- to 3-ft interval for total curies calculation.

Table 4-8. 116-H-7 Radionuclide Inventory Adjacent to the 107-H Basin.

Radionuclide	Average pCi/g	Curies
^{238}Pu	1.20 E-02	1.60 E-03
$^{239/240}Pu$	3.50 E-01	4.80 E-02
^{90}Sr	1.90 E+00	2.60 E-01
^{3}H	5.70 E-01	7.80 E-02
^{152}Eu	1.60 E+01	6.8
^{60}Co	3.70 E+01	5.0
^{154}Eu	1.60 E+01	2.2
^{134}Cs	5.80 E-03	7.90 E-04
^{137}Cs	1.30 E+01	1.8
^{155}Eu	2.90 E+00	3.90 E-01
U	3.50 E-01	4.80 E-02
^{14}C	4.10 E-01	5.60 E-02
Total Curies		17.00 E+00

(Dorian and Richards 1978)

Additional soil and vegetation sampling was performed in 1986 in support of environmental surveillance. Surface samples of stabilizing soils were taken from two locations within the basin, and vegetation samples were taken from two locations near the basin. Sampling locations are shown in Figure 4-8. Tables 4-9 through 4-12 provide analytical results from the sampling.

Figure 4-8. Soil and Vegetation Sampling Locations in the 100-H Area.

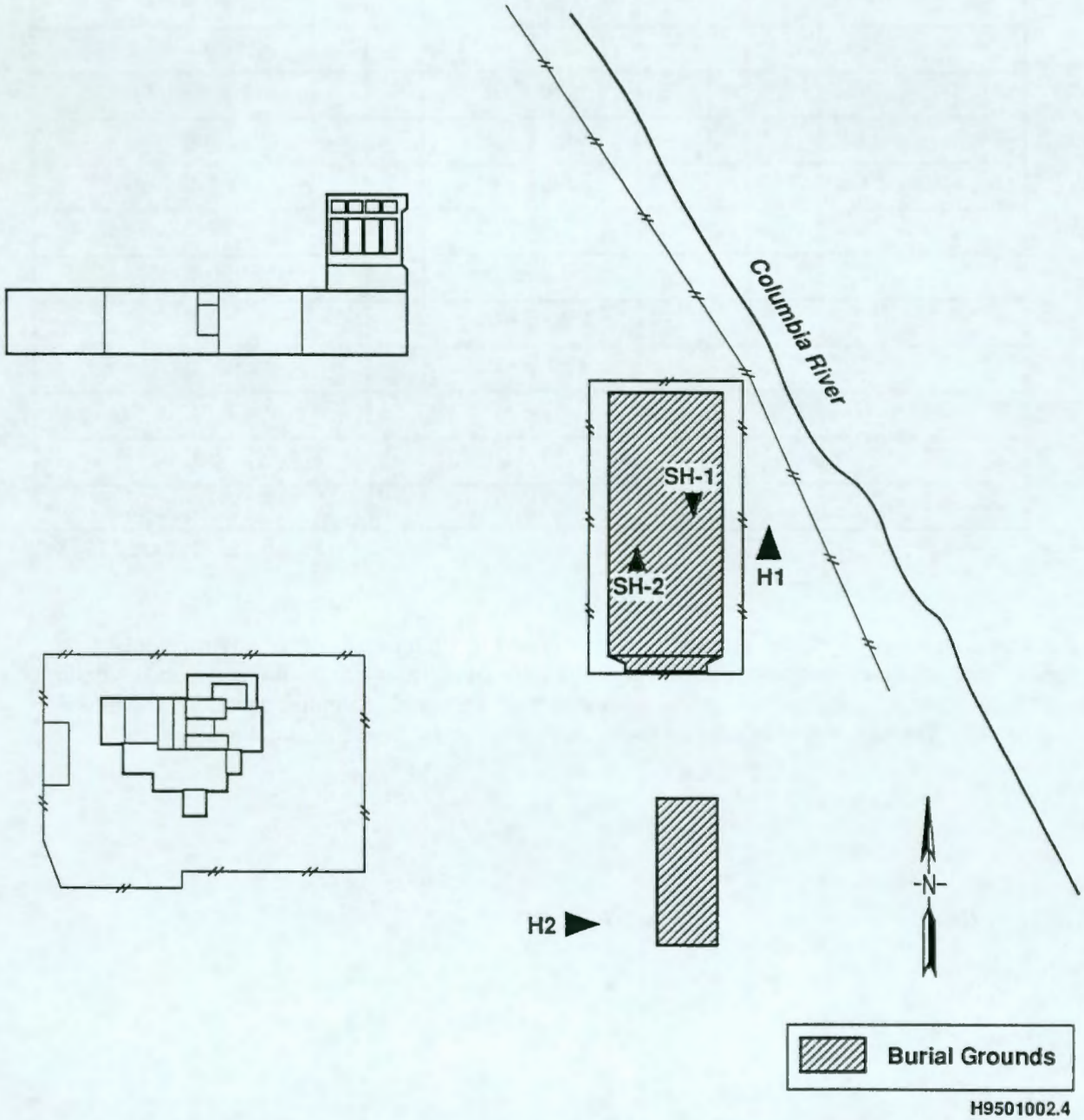


Table 4-9. Radionuclide Concentrations (pCi/g, Dry Weight) Detected in Surface Soil at the 116-H-7 Retention Basin.

Location	^{60}Co	^{90}Sr	^{137}Cs	^{238}Pu	$^{239/240}Pu$
Site 1	.16	.052	.58	.00032	.0085
Site 2	.19	.089	1.2	.0009	.012
Average	.18	.071	.89	.00061	.010
Hanford Site Average[a]	NR	.42	2.3	NR	.035
Offsite Average[a]	NR	.26	.56	NR	.012

NR = not reported (Jacques 1987)
[a]Average Hanford Site and offsite values were obtained from PNL (1986).

Table 4-10. Average Radionuclide Concentrations (pCi/g, Dry Weight) Detected in Surface Soil at the 116-H-7 Retention Basin from 1981 to 1986.

Year	^{60}Co	^{90}Sr	^{137}Cs	^{238}Pu	$^{239/240}Pu$
1981	.15	NR	.090	NR	NR
1982	.18	NR	.34	NR	NR
1983	.16	NR	.47	NR	NR
1984	.37	.24	1.7	.00069	.015
1985	.14	.098	.23	.00019	.0057
1986	.18	.071	.89	.00061	.01

NR = not reported (Jacques 1987)

Table 4-11. Radionuclides (pCi/g, Dry Weight) Detected in Vegetation near the 116-H-7 Retention Basin.

Location	^{60}Co	^{90}Sr	^{137}Cs	^{238}Pu	$^{239/240}Pu$
V-1	.12	.11	.98	<.00013	<.000088
V-2	.31	.96	1.6	<.00013	<0.0
Average	.22	.53	1.3	<.00013	.000044
Hanford Site Average[a]	NR	.36	.062	NR	.0016
Offsite Average[a]	NR	.22	.018	NR	.00046

NR = not reported (Jacques 1987)
[a]Average Hanford Site and offsite values were obtained from PNL (1986).

Table 4-12. Average Radionuclide Concentrations (pCi/g, Dry Weight) Detected in Vegetation near the 116-H-7 Retention Basin from 1981 to 1986.

Year	^{60}Co	^{90}Sr	^{137}Cs	^{238}Pu	$^{239/240}Pu$
1981	.68	NR	.15	NR	NR
1982	NR	NR	NR	NR	NR
1983	.13	NR	.090	NR	NR
1984	.18	2.0	.13	.0002	.0017
1985	.20	.06	.045	.0001	.00051
1986	.22	.53	1.3	.00013	.000044

NR = not reported (Jacques 1987)

The basin leaked at numerous points in its walls, bottom, and effluent lines, resulting in the radionuclide inventory reported above. The basin and its effluent lines leaked at a rate of up to 10,000 gal/min during part of its operating life (Stenner et al. 1988). Sample holes drilled through the basin floor indicate that the majority of contamination from basin leakage is contained within a few feet below the basin floor.

Underground contamination appears to be greatest along the basin's east wall, on the river side. In 1975, contaminated soil was detected 25 ft below grade in a sample hole located 45 ft away from the basin east wall. A reading of 1,000 c/m was detected with a P-11 probe at this sample hole. A 35-ft-deep sample well drilled 115 ft away from the east wall showed no measurable contamination with a Geiger-Mueller (GM) probe. Contamination spread along the basin west wall appears to be less extensive. Sample holes drilled just off of the inlet and outlet ends of the basin revealed no contamination measurable with a GM probe.

Sludge taken from the basin floor had GM probe readings up to 20,000 c/m. Average and maximum beta-gamma concentrations in the sludge were 3.1×10^4 and 1.0×10^5 pCi/g, respectively. Concentrations of $^{239/240}Pu$ in basin sludge ranged up to 200 pCi/g and averaged 57 pCi/g.

Herman Jr. (1965) estimates that 300 tons of sludge remains in the bottom of the basin. Radionuclide concentrations in the fill dirt covering the basin sludge, and in the soil adjacent to and underneath the basin, are two orders of magnitude less than the concentrations in the sludge.

Dorian and Richards (1978) indicates that approximately 80% of the basin radionuclide inventory is within the basin, including its 7,000 yd^3 of concrete. The basin contains an estimated radioactive inventory of approximately 118 Ci, distributed as follows.

- Sludge 60 Ci
- Soil Fill Less Sludge 18 Ci
- Concrete 13 Ci
- Soil Under Basin 10 Ci
- Soil Adjacent to Basin 17 Ci

TOTAL 118 Ci

Also, according to Dorian and Richards (1978), additional 4.1 Ci of the radionuclide inventory is estimated to reside along the basin inlet distribution chamber floor.

Kachele (1986) provides a different estimate of the total activity "in, below, and around" the 107-H basin and other 107 basins, stating that it is "typically about 64 curies."

It is estimated that 1,000 to 2,000 Ci of radioactive material was discharged to the basin as the result of an unplanned release in 1955 (Selby and Soldat 1958).

In 1953, some sludge and wastes from the retention basin were removed and buried in a nearby trench. Refer to Section 4.22 for more information about the 107-H Retention Basin Sludge Burial Site.

According to Herman Jr. (1965), "After the H reactor was shut down, water was pumped out of the retention basin to the rupture effluent trench. As the water level was lowered, the exposed walls were washed down by hosing with water. The baffles were demolished and the resulting debris left on the basin floor along with the radioactive sludge already present. The inlet opening was blanked off at the mixing chamber with a steel plate. Debris and sludge on the basin floor were then covered with 5 to 10 ft of earth fill, which also sealed the outlet opening. Portions of the walls which extended above the fill were spray-coated with asphalt to confine the small amount of contamination which remained on them after they were washed down."

Kachele (1986) states that, shortly after the final shutdown of the 100-H Reactor, "the instrument room and masonry baffle walls were knocked into the basin and the basin was partially backfilled with enough clean earth to prevent the spread of residual radionuclides . . . The retention basin floor has been covered with approximately 4 ft of earth and the interior walls had earth pushed against them to provide radiological contamination control."

During further decommissioning from October through December of 1985, the upper 10 ft of the basin's vertical walls were demolished and pushed onto the basin floor. Kachele (1986) notes that "The exterior wall baseline was where the 8-in. thick sloping bottom wall [joined] the 1-ft, 6-in. thick upper wall." Richards (1990) notes that the walls were coated with asphalt before demolition. After the walls were demolished, the inlet and outlet diversion boxes were demolished; the rubble was "disposed of in situ and stabilized with a 1 ft minimum layer of [compacted] backfill" (Kachele 1986).

Kachele (1986) states that "No radioactive waste [from the decommissioning work in 1985] was shipped to burial and no asbestos, mercury, or any other nonradioactive hazardous materials were found within the structure."

In March 1993, radiological surveys were performed over the 107-H Retention Basin surface contamination area. The resulting report, Wendling (1993), provides graphic depictions of the results that include a composite survey track map of the entire area surveyed, a radiological contour of areas found with elevated readings, and a three-dimensional graphical interpretation of the counts per minute (cpm) data collected. The maximum count detected during the surveys was 273,600 cpm (Wendling 1993).

This site has an HRS migration score of 76.91 (Stenner et al. 1988).

The basin appears today as a two-chambered, dirt- and cobble-filled depression. It is void of vegetation and is protected by an 8-ft chain-link security fence. Gates exist at the north and south ends of the site. Surface and underground contamination warning signs are in place, and permanent concrete monuments identify the greater basin area as a radiation zone. Monument placement is described in Hanford Site Drawing H-1-15859.

4.8 116-H-9 (117-H CRIB)

116-H-9 is an inactive, low-level liquid waste site that is located about 300 ft southwest of the 105-H Reactor Building at Hanford coordinates N94710 W40117 and approximate Washington State plane coordinates E577643 N152437. It consists of a crib that operated from 1960 to 1965 to receive 300,000 L of drainage from the 117-H Filter Building confinement system seal pits. The crib is commonly known as the 117-H Crib, although it has also been known as 117-H.

The crib is small, about 10 ft long, 10 ft wide, and 10 ft deep, and is gravel filled. Koop (1964) states that it "was constructed in 1960 as part of the confinement system. Drainage from the filter seal would contain serious quantities of radioactive materials following some reactor accidents. To date, no significant drainage has been experienced at this site."

Hanford Site "As-Built" Drawings H-1-19825 and H-1-19824 show the crib to have a 20-ft by 20-ft bottom dimension and to be 15 ft deep, the bottom 13 ft of which is filled with various grades of gravel. A black polyethylene vapor barrier is placed over the gravel bed and beneath the fill material. A perforated, 36-in. steel vent pipe and/or test well rises from the crib bottom to a point 4 ft above grade. The crib is supplied by a 4-in. asbestos cement pipe.

Dorian and Richards (1978) reports that the crib received "radioactive effluents which had short half-lives and . . . [the site was] released from controls prior to 1967." Herman Jr. (1965) states that "any radioactive material drained to this site had a short half-life and has decayed to the point where it is no longer of concern. As a consequence, the site has been released."

Although this waste site remains a registered Class V underground injection well (BHI 1994), it has been released from radiation zone status.

The site has an HRS migration score of 0.00 (Stenner et al. 1988).

116-H-9 may be easily recognized by its large, circular, mushroom-shaped metal vent that stands about 4 ft above grade in a sage- and grass-covered field. No warning signs are posted (see Figure 4-9).

Figure 4-9. 116-H-9 Crib.

4.9 118-H-6 (105-H REACTOR BUILDING)

118-H-6, commonly known as the 105-H Reactor Building, is an inactive facility that is located at Hanford coordinates N95400 W39600 and approximate Washington State plane coordinates E577777 N152530. It is approximately 1/3 mi from the Columbia River shoreline at milepoint 372. The reactor began operating on December 10, 1949, to produce plutonium. It ceased operation on April 12, 1965 (PNL 1975). The 105-H Reactor Building is considered to be a mixed solid waste site (BHI 1994) and has an area of 62,000 ft^2 (PNL 1975).

Refer to Section 2.3 for a general description of the 100-H Reactor. More detailed information can be found in Adams et al. (1984) and BHI (1994), among other documents.

Contaminated components at this site include the reactor block with biological and thermal shields, pressure tubes, and safety and control systems; a storage basin for irradiated fuel; reactor gas recirculation systems; and other contaminated portions of the reactor building. The building contains an estimated 15,000 Ci of radionuclides, 112 tons of lead, less than 100 ft^3 of asbestos, and 20 lb of cadmium (Cramer 1987). Some leakage to soil has occurred from the fuel storage basin; the leak rate was small, and the location of the leak was never identified (BHI 1994).

A survey and report of contamination levels in the deactivated reactor building was prepared in 1965. Consult Herman Jr. (1965) for further information, as the data are too extensive to summarize here.

Contamination and sample analysis data regarding the fuel storage basin were also prepared in 1965 and presented in Copeland and Owen (1965).

No HRS migration score has been assigned to this site. Because more than 90% of the radionuclide inventory is bound in activated metal and graphite, it is believed that this site has a minimal release potential (Cramer 1987).

Because reactor building remediation will not be accomplished as part of the current remediation activities at the 100-HR-1 Operable Unit and the reactor building is described in Chapter 2.0, no further description is provided here.

4.10 126-H-2 (126-H-2 LANDFILL, 183-H CLEARWELLS)

126-H-2, also known as the 126-H-2 Landfill, is a nonhazardous and nonradioactive solid waste site that consists of the deactivated 183-H Clearwells. This site is located approximately 900 ft north of the 105-H Reactor Building, at the site of the 183-H Water Treatment Facility, at Hanford coordinates N96150 W39600 (BHI 1994) and approximate Washington State plane coordinates E577768 N152797.

The clearwells consist of two covered, reinforced concrete basins with the capacity to hold 10 million gallons of water. The entire facility was 750 ft long and 135 ft wide and appears to be about 18 ft deep. The clearwells were separated in the center by a pump room. The clearwell roof was constructed of reinforced concrete (BHI 1994).

When operating, the clearwell facilities held clean, uncontaminated water. They are now being used for the disposal of nonhazardous and nonradioactive demolition and inert waste from demolished facilities such as 190-H, 151-H, and 1701-D (BHI 1994).

The aboveground portion of the pump room has been demolished, and the belowground portion has been filled with pump room rubble and backfill material. The clearwell roof is being demolished, as needed, to allow dumping into the clearwell. Approximately 50% of the east clearwell basin contains waste. The west basin remains intact (BHI 1994).

No HRS migration score has been assigned to this site.

126-H-2 is protected only by a lightweight chain and "Danger" warning signs that warn not to walk on the roof.

4.11 132-H-1 (116-H REACTOR EXHAUST STACK SITE)

132-H-1 is a low-level solid waste site that is located at Hanford coordinates N95240 W39850 and approximate Washington State plane coordinates E577733 N152507. It might be best described as a burial ground; however, it is commonly known as the 116-H Reactor Exhaust Stack Site and has also been known as the 132-H-1 Reactor Exhaust Stack Site. When the reactor exhaust stack, also known as the 116-H Stack, was demolished in 1983, it was felled into a trench that had been prepared for that purpose. The trench was immediately backfilled to grade (BHI 1994). Refer to Figure 4-10 for a drawing that shows the orientation of the trench relative to the reactor building, and Figure 4-11 for a photograph showing the stack lying in the trench.

The stack operated from 1945 until 1965 to duct reactor building ventilation air to the atmosphere. It was 200 ft tall, had a diameter of 16.58 ft at its base, and was constructed of reinforced concrete. Powers and Steffes (1986) states that the stack "had exhaust ventilation ductwork attached approximately 20 ft above the stack base." Hanford Site Drawings P-1008 and P-4675 show the stack to have been at Hanford coordinates N95210.00 W39750.58. The stack was located immediately south of the west wing of the reactor building and was felled to the west.

The burial site is approximately 220 ft long, 25 ft wide, and 10 ft deep, and is located between the 117-H and 1608-H Buildings.

Reactor building air was unfiltered prior to 1960, passing from the least contaminated zones through increasingly contaminated zones before being discharged through the stack. Because unfiltered air reached the stack, the presence of contamination would be expected inside the stack. The 117-H Filter Building, which was installed in 1960, greatly reduced the level of contaminants reaching the stack and the atmosphere (PNL 1975, BHI 1994). After flowing through filters, air would pass through below- and abovegrade concrete ducts and into the exhaust stack (BHI 1994).

Prior to the demolition of the stack, its interior walls were found to be contaminated. Thus, stack rubble may be presumed to be equally contaminated. Dose rates at the base of the stack prior to demolition were less than 1 mR/h. General background levels within the stack bottom were found to be about 1,000 c/m with a GM probe. Low-level smearable alpha contamination was present, measuring up to 130 dpm/100 cm^2 and averaging about 30 dpm/100 cm^2. Smearable beta contamination ranged from 100 to 5,000 dpm/100 cm^2 (Dorian and Richards 1978).

Radiocontaminants identified on the interior stack surfaces included up to 2.10×10^6 pCi/100 cm^2 of ^{14}C (averaging a few thousand pCi/100 cm^2) and ^3H ranging from 4.0×10^0 cm^2 to 1.30×10^4 pCi/100 cm^2. Beta-gamma activity was found to be primarily from ^{60}Co and ^{137}Cs, with trace elements of ^{134}Cs, ^{152}Eu, ^{154}Eu, and ^{155}Eu (Dorian and Richards 1978).

No HRS migration score has been assigned to this site.

The waste site today cannot be visually identified. The burial trench was backfilled to grade, and the entire area has been subsequently stabilized with additional layers of clean soil. No markers or signs identify the site, although it is within the greater area of permanent concrete markers and security fencing that protects the 105-H Reactor Building.

Figure 4-10. The 110-H, 116-H, 117-H, and 1608-H Burial Sites.

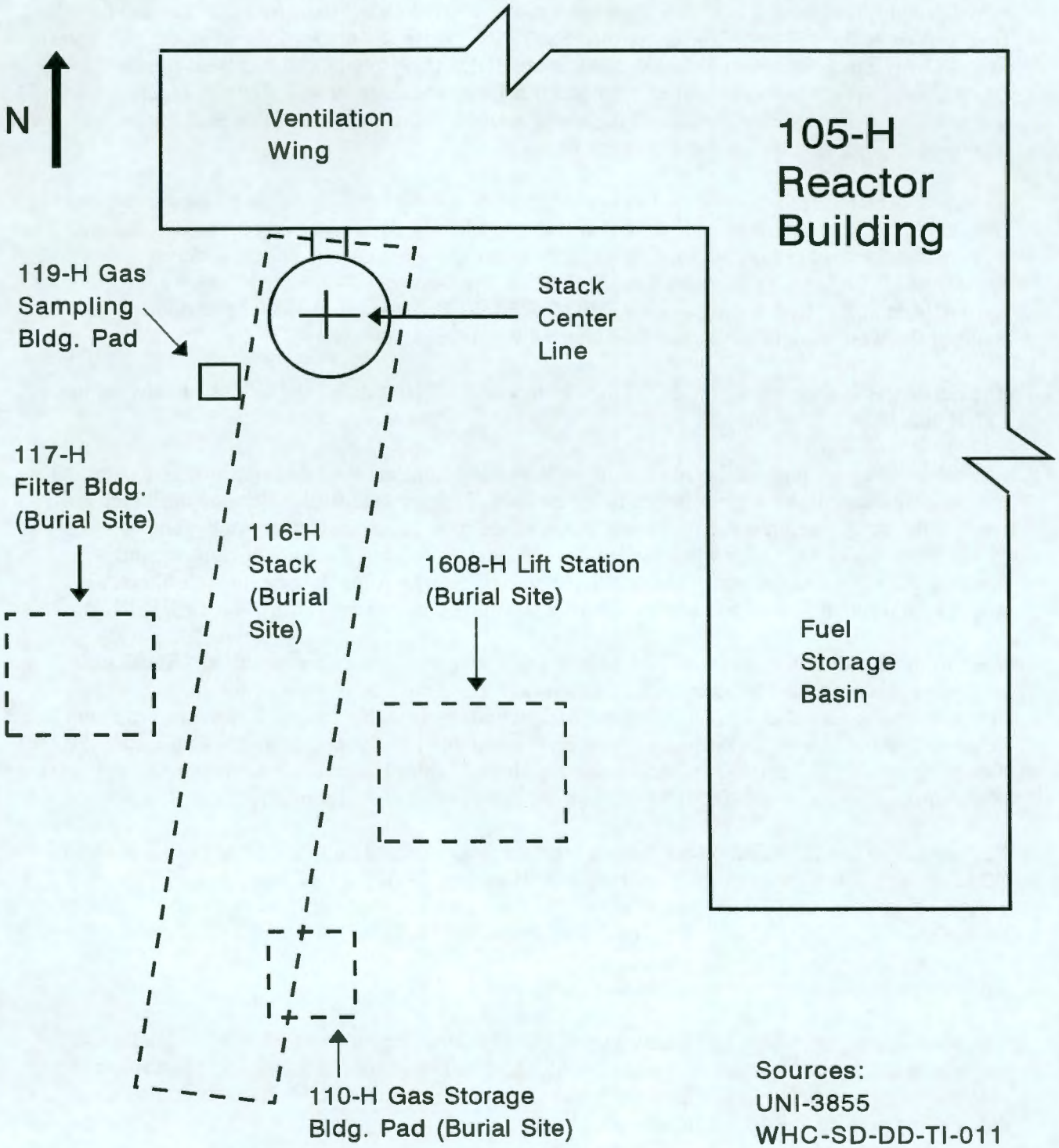
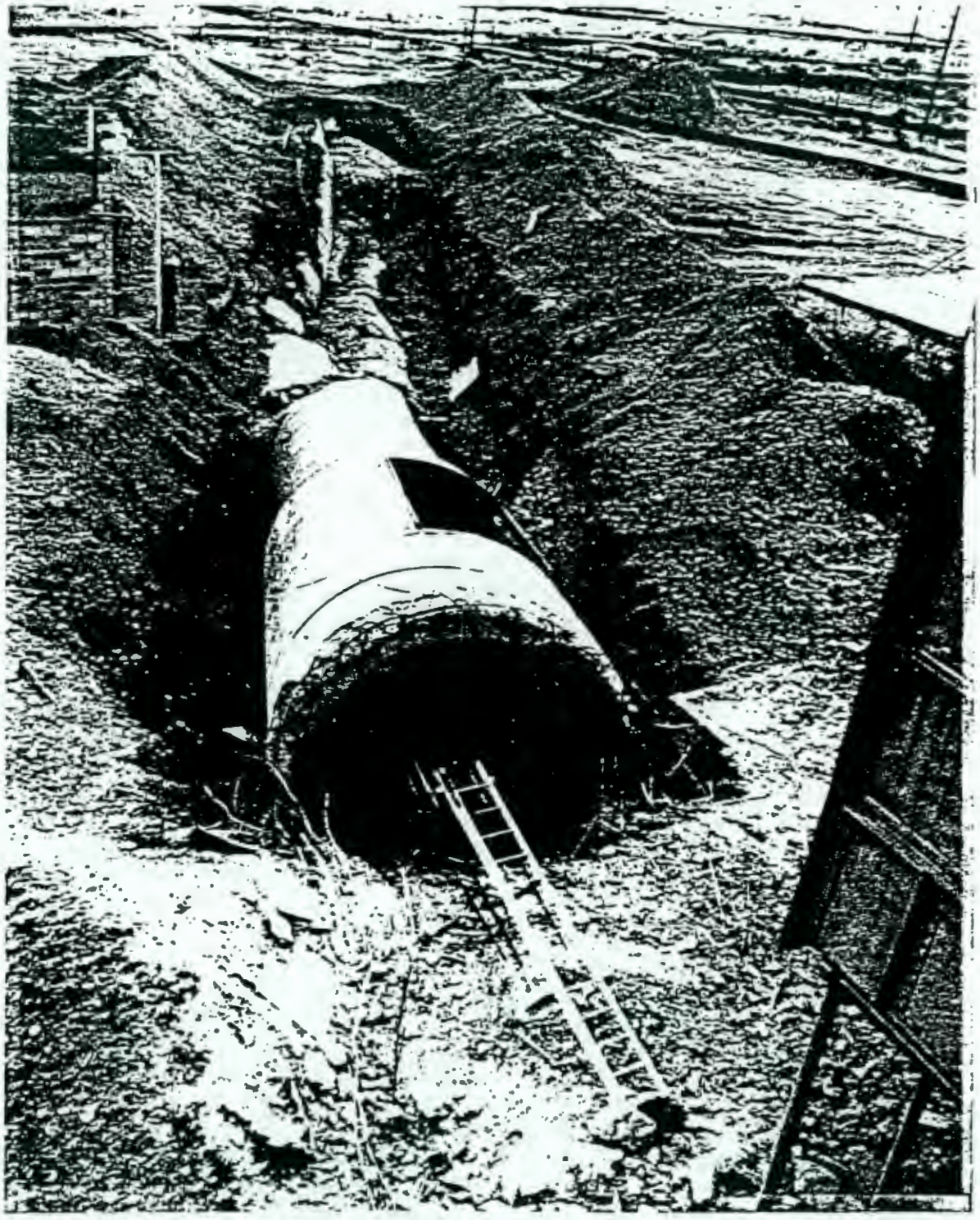


Figure 4-11. The 116-H Stack Lying in Its Burial Trench.



4.12 132-H-3 (1608-H WASTE WATER PUMPING STATION SITE)

132-H-3 is an inactive, radiologically contaminated, low-level solid waste burial site located at Hanford coordinates N95150 W39825 and approximate Washington State plane coordinates E577733 N152486, immediately west of the reactor fuel storage basin. It is commonly known as the 1608-H Waste Water Pumping Station Site, although it has also been known as the 1608-H Effluent Water Pumping Station Site, the 1608-H Lift Station Site, the 1608-H Site, and the 132-H-3 Waste Water Pumping Station Site. The waste water pumping station was originally numbered 116-H-8; it was later renumbered 132-H-3. It operated from 1949 to 1965 (BHI 1994).

Adams et al. (1984) states that the pumping station collected low-level waste water from 105-H Reactor Building sumps and pumped it into either the 1608-H Liquid Waste Disposal Trench (116-H-2) or the reactor effluent lines, which discharged to the Columbia River. Another source, Cummings (1987), states that the facility instead "functioned as a lift station to pump effluents collected from various drain systems to the 107-H retention basin."

The station was 36 ft long, 34 ft wide, and 44 ft high, 32 ft of which was below grade (Adams et al. 1984). Cummings (1987) states that the facility consisted of two parts: "an above-grade concrete structure with concrete block walls, a reinforced concrete floor, and a roof constructed of reinforced concrete deck with composition surface" as well as "a below-grade structure of reinforced concrete . . . [that] extended 12 ft above grade, 32 ft below grade, and was 36 ft in length and 34 ft in width." The major equipment contained within the pumping station was "two 2,000 gpm vertical submerged sump pumps, their associated controls and electrical switch gear, and their respective driving motors." One of the pumps was driven by an electric motor, and the other by a steam turbine. The building also contained a 500-gal/min pump driven by an electric motor (Cummings 1987).

Liquid wastes received at this site included unspecified quantities of water from reactor building and fuel storage basin drains and sumps. This water contained trace amounts of low-level radionuclides and decontamination chemicals, including sodium fluoride, oxalic acid, and citric acid. One document states that the water also contained "Turco" (Turco is a registered trademark of Turco Products, Inc.), but does not give an identifying number for the chemical. There are 50 different Material Safety Data Sheets for Turco products, and each product listed has an identifying number; this author was unable to determine which Turco product was present in the water. A Site employee stated that "at 100-N they used Turco 4512-A," which was "inhibited phosphoric acid," and indicated that perhaps it was also used in the 100-H Area.

Radionuclides present in the water received at this site were primarily activation and fission products.

Decommissioning activities began in 1987. An initial survey of the facility with a thin-window-pancake-style GM probe and an Eberline BNW-1 count rate meter indicated that radioactive contamination was present. Cummings (1987) states that "A survey of the wall, ceiling, and floor areas of the equipment room, and upper- and lower-level floors and walls indicated that general surface contamination levels were less than 200 cpm direct. Contamination was detected around the equipment pedistals on the lower-level floor. The majority of this area contained contamination levels in the range of 300-500 cpm direct. However, one small area contained contamination levels in the range of 1000 to 3500 cpm direct. . . . A survey of the sumps' concrete surfaces indicated that all of the sump floors contained contaminated levels in the range of 10K to 60K cpm direct. All of the

sump walls below the water line mark contained contamination levels in the [range of] 2K to 5K cpm direct. The sump walls above the water line all contained contamination levels of <200 to 1000 cpm direct. A survey of iron surfaces (i.e., distribution gates, ladder rungs) that were below the water line indicated that these surfaces were contaminated to a level of 3K to 5K cpm direct."

A total of 136 ft^3 of asbestos was removed from the facility at the start of decommissioning activities. Sump pump assemblies and related piping were also removed. Cummings (1987) states that the "sump coverplates, motors, pumps, and drive shafts were removed as a unit through the removable roof hatches and contained in a specially-made, long, plastic sleeve. . . . The units were stored in the 105-H Transfer Bay until they were sectioned, packaged in three 458 metal burial containers and shipped to the 200 Area burial grounds for disposal."

Water and sludge were removed from the facility for disposal elsewhere, and all incoming piping was sealed prior to demolition (BHI 1994). Approximately 79,750 gal of water was removed from the sumps and transported to the 1325-N Liquid Waste Disposal Facility; the total inventory of radionuclides present in the water was approximately 0.3 mCi of ^{137}Cs and 12 mCi of ^{3}H. Due to a final equivalent concentration of lead phosphate that was determined to be 1276 ppm, the sludge was classified as "Extremely Hazardous Waste" under WAC-173-303 and "radioactive mixed waste." It was shoveled into twenty 55-gal drums and stabilized with "floor-dry" (Cummings 1987).

BHI (1994) states that the pumping station was demolished in situ and backfilled with a minimum of 5 m of clean fill material. Cummings (1987) goes into more detail, stating that "Demolition was initiated on June 11, 1987. The wrecking ball was used to punch holes in the bottom of each sump before any walls were demolished in order to simplify breaking the sump floors for drainage. The above- and below-grade structure was then demolished to a minimum of five meters below grade. The voids were backfilled with soil. Dampening the soil, backfilling, and compacting continued until the excavation was covered with soil. Seventy loads (1250 yd^3) of fill dirt were hauled to the site to allow grading to conform with surrounding terrain."

No HRS migration score has been assigned to this site.

The waste site cannot be visually identified. No markers or signs exist to mark its location.

4.13 1607-H2 (1607-H2 SEPTIC TANK AND ASSOCIATED DRAIN FIELD)

1607-H2 is a nonhazardous and nonradioactive liquid waste site located about 200 ft northwest of the 182-H Reservoir at Hanford coordinates N98050 W39800. The site is commonly known as the 1607-H2 Septic Tank and Associated Drain Field, although it has also been known as 124-H-2 (BHI 1994) and as the 1607-H2 Sanitary Sewer System. It operated from 1949 until 1965 to receive sanitary wastes from the 182-H, 183-H, and 190-H Buildings, as well as from other 100-H Area office and maintenance buildings (Gano and Hall 1987, BHI 1994).

The site includes a concrete septic tank and a large clay pipe drain field. According to Day (1990), the septic tank was approximately 40 ft long and 10 ft wide, and the drain field was 300 ft long and 100 ft wide. Hanford Site Drawing P-1269 provides more construction details. When operating, the septic system had a 500-person capacity.

A ground penetrating radar study of the 1607-H2 and 1607-H4 sites was performed in 1990. The resulting report, Wray (1990), states the following about the 1607-H2 septic tank site.

> "Interpretation of Ground Penetrating Radar (GPR) data at this site clearly indicates the presence of the suspected septic tank. The suspected manhole south of the septic tank is also clearly visible along with a connecting underground line running north into the south end of the septic tank. Septic tank boundaries are easily distinguished in the GPR data. A suspected underground line detected to the northeast of the septic tank is not consistently identifiable."

Wray (1990) reports that "GPR data collected along transects at the suspected tile field site clearly displays a distinct pattern of underground anomalies. These anomalies are interpreted to be the lateral lines of the tile field." The approximate depth of lateral lines detected by GPR varied from 1 ft to 4 ft; the lines appeared to be spaced 8 ft apart. Because sections of the lines were not detectable, "it is not clear if the actual tile field laterals are still intact . . . portions of these lines may have collapsed or were removed some years ago . . . [and] data interpreted to be underground lines could possibly be only indicating the presence of the related trenches if the lines were indeed removed at some point in time" (Wray 1990).

Refer to Day (1990) for detailed information about the 1607-H2 Septic Tank and Associated Drain Field. Both Day (1990) and Wray (1990) provide drawings that show the orientations and locations of the tank and drain field.

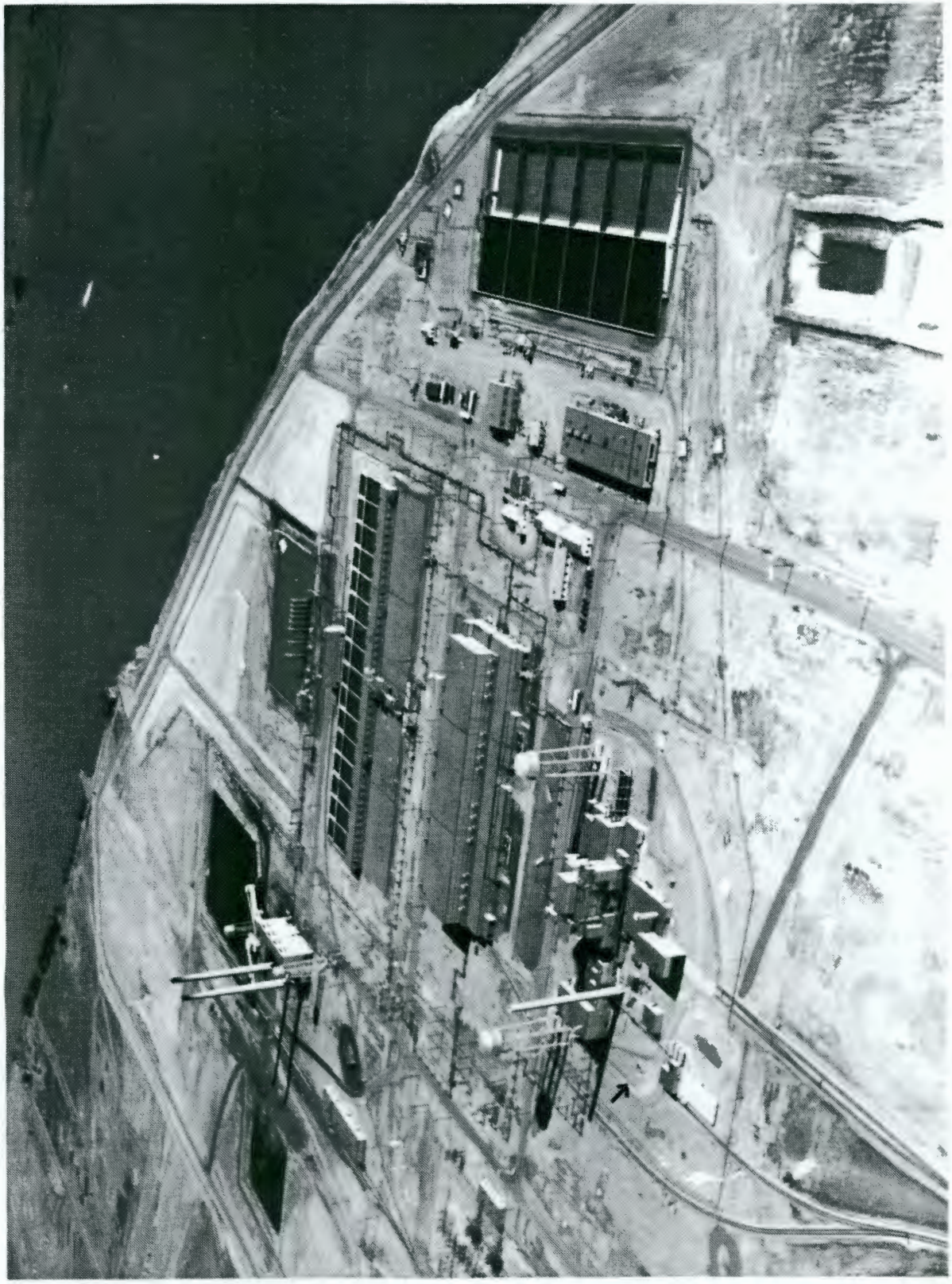
Isaacson (1990) notes that personnel decontamination was frequently accomplished in change room sinks and showers that drained to sanitary sewage systems, not to process sewers. Thus, the lines from change room sinks and showers to the sanitary sewage systems should be suspected of containing low-level contaminants.

No HRS migration score has been assigned to this site.

The site appears today as a flat, gravel-covered field on which grass and sagebrush have begun to grow. The upper surface of the septic tank is partially visible.

Refer to Figure 4-12 for an aerial photograph that clearly shows the tank and drain field.

Figure 4-12. 100-H Reactor Site, 1954.



4.14 1607-H4 (1607-H4 SEPTIC TANK AND ASSOCIATED DRAIN FIELD)

1607-H4 is a nonhazardous and nonradioactive liquid waste site located at Hanford coordinates N98260 W39800 and approximate Washington State plane coordinates E577536 N153431, southeast of the 181-H Pump House. It operated from 1948 until 1965 to receive sanitary wastes from the 1701-H, 1709-H, and 1720-H Buildings, as well as from the 181-H Pump House. The site is commonly known as the 1607-H4 Septic Tank and Associated Drain Field, although it has also been known as 124-H-4 (BHI 1994).

The site includes a concrete septic tank and a clay or concrete pipe drain field. When operating, the septic system had a six-person capacity.

A ground penetrating radar study of the 1607-H2 and 1607-H4 sites was performed in 1990. The resulting report, Wray (1990), states the following.

> "Interpretation of GPR data at this site does not clearly indicate the presence of either a septic tank or related tile field. Underground lines detected appear to end abruptly and no subsurface pattern is consistently discernable that would clearly indicate the presence of a tile field or septic tank in the area of study."

Refer to Wray (1990) and Day (1990) for more information about the procedures performed in conducting the study and the data obtained.

Isaacson (1990) notes that personnel decontamination was frequently accomplished in change room sinks and showers that drained to sanitary sewage systems, not to process sewers. Thus, the lines from change room sinks and showers to the sanitary sewage systems should be suspected of containing low-level contaminants.

No HRS migration score has been assigned to this site.

No sign of the tank and drain field are visually evident. The site is a grass- and sage-covered field on the bluff above the Columbia River and immediately south of the asphalt access road to the 181-H Power House site.

The tank and drain field are visible in the extreme upper portion of aerial photograph 4045 (see Figure 4-12).

4.15 SUSPECT WASTE SITE: UNPLANNED AIRBORNE RELEASE, STACK EMISSION NO. 1

In 1955, a 100-H stack emission contaminated area surfaces. Selby and Soldat (1958) provides the following description.

> "The 105-H stack emitted about 0.06 curie of filterable gross beta (calculated from ground deposition) on May 3, 1955, when two ruptured slugs were removed from the reactor. However, the emission was unnoticed until general contamination was found in the fan cells. A spot check was then made of the 100-H Area, and the

> few particles detected were thought to be from previous emissions. On May 25 and 26, after analysis of the particulates indicated the presence of short-lived isotopes, an extensive ground survey was made. Ground contamination was located in the northwest corner of 100-H Area, with concentrations as high as 20 particles per 100 square feet. The Meteorology Tower reported a wind from the northwest during the time of the stack emission; however, during periods of light winds, 100-H Area frequently experiences a different wind direction than is recorded at Meteorology. Six particles were detected in 10,000 square feet surveyed along the Wahluke Slope road opposite 100-H Area."

This unplanned release is arbitrarily described with 100-HR-1 Operable Unit suspect waste sites, although it affected 100-HR-2 as well.

4.16 SUSPECT WASTE SITE: UNPLANNED AIRBORNE RELEASE, STACK EMISSION NO. 2

Another 100-H stack emission contaminated area surfaces in 1955. Selby and Soldat (1958) provides the following description.

> "Another emission from the 105-H stack occurred on November 1, 1955, while a ruptured slug burned briefly during discharge from the reactor. Approximately 0.8 curie of filterable gross beta, mostly barium and rare earths plus yttrium, was emitted from the stack. An estimated 1,000 to 2,000 curies of radioactive material were released to the effluent water retention basins as a result of this incident. The south one-third of the 100-H Area was found contaminated with concentrations as high as 12 particles per 100 square feet. The contamination level was 1,000 to 10,000 c/m, with isolated particles as high as 100 mrad/hr. One particle, found at the 100-H Gatehouse, had a dose rate of 700 mrad/hr. The contamination was found to have spread south of the 100-H Area, covering an area of approximately seven square miles."

Richards (1990) confirms this contamination spread and also reports that a second, similar contamination may have occurred in 1962. This author was unable to confirm the second event.

This unplanned release is arbitrarily described with 100-HR-1 Operable Unit suspect waste sites, although it affected 100-HR-2 as well.

4.17 SUSPECT WASTE SITE: SWALLOW NESTS AND DROPPINGS

In 1956, it was discovered that swallows were making nests out of contaminated mud taken from the 107-H Liquid Waste Disposal Trench (116-H-1). Isolated cases of personnel and vehicle contamination were detected in May 1956. The contaminated mud was dropped around the 100-H water towers and at scattered locations over the swallows' flight path to the bluffs across the river. Concentrations ranged from 0 to 6 particles per 100 ft^2, with a maximum reading of 150 mRad/h (Selby and Soldat 1958).

4.18 SUSPECT WASTE SITE: CONTAMINATED UNDERGROUND LINES

Numerous underground lines remain in place in the 100-HR-1 Operable Unit and must be assumed to be radioactively and/or chemically contaminated. These include process sewer lines to waste sites, 1608-H Lift Station lines, cooling water lines to and from the retention basin, and numerous other lines that were left in place when their associated facilities were decommissioned.

No records have been located to indicate that any lines or junction boxes have been destroyed or removed. Additionally, interviews with personnel of WHC Deactivation and Decommissioning Engineering suggest that underground lines were typically left in place during deactivation and/or decommissioning. Therefore, it should be assumed that the lines and junction boxes remain in place.

The lines vary widely in size, material, and depth below grade. Most are identified on current or historical Hanford Site drawings, but others are probably undocumented. Little information exists to characterize radiological and chemical contaminants in the lines and junction boxes. Because the lines and junction boxes are known to have transported millions of liters of waste effluent, they should be assumed to be contaminated.

Dorian and Richards (1978) reports the results of scale sampling performed in the 107-F Effluent Line upstream of the 107-F Retention Basin (see Table 4-13). This material is presented here in the assumption that conditions in the 100-H effluent lines are similar to those in the 100-F effluent lines. It seems likely that the discharge lines downstream from the 107-H Retention Basin would be similarly contaminated, but at lower levels, since effluents were held up in the retention basin before entering the downstream lines, allowing radioactive decay and settling to occur. Also, according to Beckstrom and Steffes (1986), the 100-F Reactor river discharge lines had an approximate total length of 450 ft and were 42 in. in diameter; the 100-H Reactor river discharge lines had an approximate total length of 700 ft and were 60 in. in diameter.

Table 4-13. Concentration of Radionuclides on Scale Samples Taken from 42-inch Effluent Lines Upstream of 107-F Retention Basin.

Radionuclide	Concentration (pCi/g)
^{152}Eu	< Detection limits
^{60}Co	1.70 E+02
^{154}Eu	< Detection limits
^{137}Cs	2.50 E+02
^{155}Eu	4.90 E+02

(Dorian and Richards 1978)

A more recent document, Beckstrom and Steffes (1986), presents the results of work done in 1984 to physically and radiologically characterize the deactivated retention basin discharge lines, also known as river discharge lines, in the 100 Areas. In the 100-H Area, two 60-in.-diameter lines extended from the 1904-H Outfall Structure (116-H-5) to the center of the Columbia River. They were constructed of concrete pipe connected to steel pipe of the same diameter. The concrete pipe extends from the site of the now-demolished outfall structure to the river bottom level, then connects to steel pipe that runs from that point to the center of the river. The "approximate total length" of the 100-H Area lines is 700 ft. By the early 1960's, trapped air in the 100-H Area river discharge lines had floated them out of place, so they were reanchored and reburied. In 1984, remote sensing data indicated that the 100-H pipes were buried between 5 ft and 18 ft deep (Beckstrom and Steffes 1986).

Beckstrom and Steffes (1986) states that pipe sections were removed from all of the 100 Area river discharge lines except those in the 100-H Area, where "turbulent conditions prevented the use of heavy equipment and a diver." Thus, no characterization data was obtained for the 100-H lines. According to Beckstrom and Steffes (1986), "No contamination was found on the exterior surface of any pipe . . . All identified material was located on the interior surfaces and in the loose scale (sediment) from inside the inactive pipe." The contact dose rates on the exterior surfaces of the pipes was zero, and the contact dose rates on the interior surfaces were less than 1 mrem/hr. The predominant isotopes found inside the lines were ^{152}Eu and ^{154}Eu, and higher concentrations were found in scrapings from the inside surfaces (Beckstrom and Steffes 1986). Refer to Beckstrom and Steffes (1986) and Hanford Site Drawing P-4319 for additional details about the 100-H Area river discharge lines.

Table 4-14 presents data that were obtained from the 1984 radiological and physical characterization of the 100-F Reactor river discharge lines and was presented in Beckstrom and Steffes (1986). Again, this material is presented because the radiological condition of 100-F Reactor river discharge lines may be similar to that of the 100-H Reactor river discharge lines.

Site personnel recall evidence of leakage in the reactor effluent lines (see Section 4.19).

Characterization unique to 100-H effluent lines is offered by Reid (1967) as follows. "The radioactivity in these lines [100-H and 100-F effluent lines] did not decay as rapidly as was originally expected when it was assumed the activity was due to Zn-65. There is apparently substantial amounts of Co-60 and Eu-152, because the above ground lines at 100-F still show 10,000 c/m at the outside of the 1/2 in. thick pipe from the interior contamination."

Isaacson (1990) notes that personnel decontamination was frequently accomplished in change room sinks and showers that drained to sanitary sewage systems, not to process sewers. Thus, the lines from the change room sinks and showers to the sanitary sewage systems should also be suspected of containing low-level contaminants.

Table 4-14. 100-F Reactor River Discharge Line Characterization Data.

Sample	Isotopic analysis		Activity level (beta-gamma)	
	Isotope	pCi/g	dpm/probe[a]	dpm/100 cm^2
Pipe section, inner surface	N/A	N/A	33,000	6,700
Loose scale[b]	^{60}Co ^{152}Eu ^{154}Eu ^{155}Eu	150 3,400 580 51	N/A	N/A
Pipe scrapings[c]	^{60}Co ^{152}Eu ^{154}Eu ^{155}Eu	600 7,700 1,300 150	N/A	N/A

[a]Nomial efficiency for the P-11 probe used for these results is 10%.
[b]Loose scale samples taken from sediment lying in the underwater pipe.
[c]Pipe scrapings were taken from the inner surface of the cut pipe section after removal from the river. (Beckstrom and Steffes 1986)

4.19 SUSPECT WASTE SITE: SOIL CONTAMINATED BY EFFLUENT LINE LEAKAGE

Richards (1990) describes evidence of leakage in the underground 60-in. steel lines that carried reactor cooling effluent to the 107-H Retention Basin. Although little detail is available, at least one employee recalls steam rising from soil above the effluent lines. Soil subsidence occurred at a site along the northern effluent line at a point immediately east of the reactor area security fence. This subsidence is thought to have resulted from line leakage (Richards 1990). A field survey by this author found no current evidence of subsidence, the general area having been paved as a parking lot.

A second data source, Denton (1990), confirms leakage along this effluent line, but comments that the primary--and perhaps only--leak was at an expansion box inside the reactor security fence.

During radiological characterization studies performed in 1971, backhoe sampling was performed outside three 100-H concrete junction boxes, where effluent lines enter and leave. Sample holes were dug deep enough to completely expose the points at which the effluent lines joined the junction boxes. No activity measurable with a GM probe was detected in the excavated soil. Direct GM readings taken at the sides of the bared effluent pipes were up to 4,000 c/m from the contamination inside the pipes. Gamma analysis performed for these samples averaged 14 pCi/g; the maximum reading obtained was 40 pCi/g.

Two 30-ft-deep sample holes drilled in 1975 along the effluent lines also failed to identify any significant contamination from line leakage.

Dorian and Richards (1978) reports that inlet effluent line scale samples were measured and found to have a beta-gamma concentration of 6.8 x 10^3 pCi/g. Sludge along the distribution chamber floor has

a $^{239/240}Pu$ concentration of 230 pCi/g and a beta-gamma concentration of 3.7 x 10^5 pCi/g. The estimated radionuclide inventory of inlet distribution chamber sludge is 4.1 Ci. About 3 mCi of $^{239/240}Pu$ is also present in the sludge (Dorian and Richards 1978).

A more recent document, Beckstrom and Steffes (1986), presents the results of work done in 1984 to physically and radiologically characterize the deactivated retention basin discharge lines, also known as river discharge lines, in the 100 Areas. In the 100-H Area, two 60-in.-diameter lines extended from the 1904-H Outfall Structure (116-H-5) to the center of the Columbia River. They were constructed of concrete pipe connected to steel pipe of the same diameter. The concrete pipe extends from the site of the now-demolished outfall structure to the river bottom level, then connects to steel pipe that runs from that point to the center of the river. The "approximate total length" of the 100-H Area lines is 700 ft. By the early 1960's, trapped air in the 100-H Area river discharge lines had floated them out of place, so they were reanchored and reburied. In 1984, remote sensing data indicated that the 100-H pipes were buried between 5 ft and 18 ft deep (Beckstrom and Steffes 1986).

Beckstrom and Steffes (1986) states that pipe sections were removed from all of the 100 Area river discharge lines except those in the 100-H Area, where "turbulent conditions prevented the use of heavy equipment and a diver." Thus, no characterization data was obtained for the 100-H lines. According to Beckstrom and Steffes (1986), "No contamination was found on the exterior surface of any pipe . . . All identified material was located on the interior surfaces and in the loose scale (sediment) from inside the inactive pipe." The contact dose rates on the exterior surfaces of the pipes was zero, and the contact dose rates on the interior surfaces were less than 1 mrem/h. The predominant isotopes found inside the lines were ^{152}Eu and ^{154}Eu, and higher concentrations were found in scrapings from the inside surfaces (Beckstrom and Steffes 1986). Refer to Beckstrom and Steffes (1986) and Hanford Site Drawing P-4319 for additional details about the 100-H Area river discharge lines.

4.20 SUSPECT WASTE SITE: 1716-H GARAGE FUEL TANK SITE

The 1716-H Garage Building operated from 1949 through 1965 as an automotive service station and repair facility. Part of the garage area was converted to electrical and electronic maintenance activity at an unspecified date. The entire structure has since been demolished; no sign or remnant is visible today.

The automotive service area included gas pumps with underground storage tanks and, possibly, an oil pit (Richards 1990). No records could be located to determine whether the fuel tanks have been removed.

Hanford Site Drawing P-3132 describes an aboveground, 150-gal prestone tank that is associated with the 1716-H Building. The tank was removed when the 1716-H Garage Building was torn down.

The building was located immediately west of the 107-H Retention Basin at approximate Hanford coordinates N95900 W38800. It is clearly visible on all but the most recent 100-H Area aerial photographs. Building details and the locations of its gas pumps are provided on Hanford Site Drawings P-1897 and P-4273. Unfortunately, no drawing could be located to confirm the existence or location of underground fuel tanks.

4.21 SUSPECT WASTE SITE: 1717-H HOT SHOP, FRENCH DRAIN, AND CONTAMINATED STORAGE UNIT

The 1717-H Maintenance Shop was equipped with medium-duty machine tools and shop facilities to support various 100-H Area nonradioactive maintenance requirements. However, Richards (1990) reports that a portion of the shop area was used, for a time, to work on "very low level radioactive" materials.

Hanford Site Drawing SK-1-7325 provides a floor plan of the building and designates two "hot shops" separated by a hallway. A "radiation detector" is shown positioned in the hall between the shops, and a decontamination tank and decontamination exhaust are shown in the space labeled "fabrication shop." Drawing SK-1-7328 shows a proposed addition to the south end of the building. The addition is designated as a "hot shop," and it appears in 1954 aerial photographs to have been completed.

Richards (1990) also states that the shop was supported by a french drain at an unknown location. The report suggests that the drain might be easily located by scraping the site's surface with a blade. Hanford Site Drawing P-9343 shows its location, referring to it as an "existing drywell."

Hanford Site Drawing SK-1-7325 also shows a contaminated storage facility located east of the southeast corner of the building.

No records were located that characterize contaminants, if any, existing in the building, flooring, french drain, or storage facility before or after the building was demolished. Baker and Lange (1974) characterize the building as "empty" and uncontaminated.

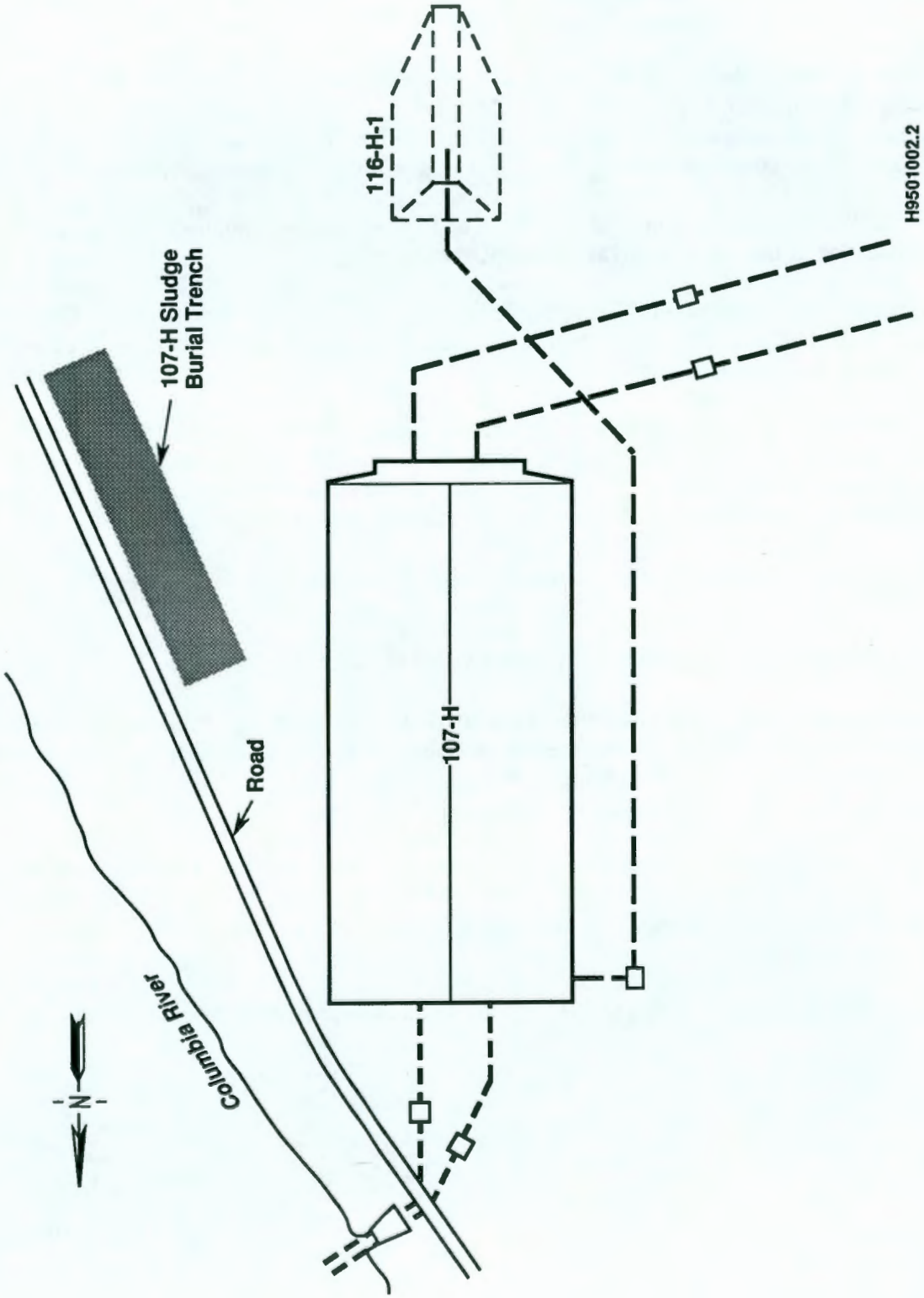
The building was located immediately west of the 107-H Retention Basin and south of the 1716-H Building at approximate Hanford coordinates N95700 W38800. It is visible in Figure 4-12.

4.22 SUSPECT WASTE SITE: 107-H RETENTION BASIN SLUDGE BURIAL SITE

An unknown quantity of sludge and waste was removed from the 107-H Retention Basin during repair work in the spring of 1953 and deposited in a trench 100 ft east of the southeast corner of the basin. The trench is commonly known as the 107-H Retention Basin Sludge Burial Site, although it has also been known as the 107-H Buried Sludge Site and as the 107-H Grave. It is at approximate Hanford coordinates N95500 W36600. The location and relative size of the trench are depicted in Figure 4-13, which is derived from Dorian and Richards (1978) and confirmed by Richards (1990). Other sources, however, place the burial ground farther north, immediately adjacent to the 107-H Retention Basin, parallel to and approximately centered on the basin's east wall (Denton 1990).

The trench is approximately 150 ft long and 15 ft wide (Clukey 1956). Prior to backfilling, it was 15 ft deep (Clukey 1956, Richards 1990).

Figure 4-13. 107-H Sludge Burial Trench, Retention Basin, and 116-H-1 Trench, With Underground Line Locations.



As described in Section 4.7, sludge taken from the basin floor had GM probe readings of up to 20,000 c/m. Average and maximum beta-gamma concentrations in the sludge were 3.1 x 10^4 pCi/g and 1.0 x 10^5 pCi/g, respectively. Concentrations of $^{239/240}Pu$ in the basin sludge ranged up to 200 pCi/g and averaged 57 pCi/g (Dorian and Richards 1978). Sludge deposited in this trench would presumably have had similar readings at the time of burial.

Herman Jr. (1965) reports that the trench "was originally covered to grade with 5 ft of soil and marked with 2 nonstandard monuments. In May 1965, the location was excavated to a depth of approximately 6 ft to obtain fill material for the 107-H basin. There was no indication of remaining radioactivity and consequently the site has been released [from radiological controls]."

Soil sampling accomplished in 1976 to a depth of 15 ft revealed no significant radioactive contamination at the trench site (Dorian and Richards 1978).

This waste site is mentioned in WIDS, but only as characterizing data for the 116-H-7 Retention Basin. It has not been assigned its own WIDS identifying number and is not recognized in the system as a unique waste site (BHI 1994).

Although the site was released from being a radiologically controlled zone in 1965, it seems appropriate that the site be reinvestigated due to the long half-lives of the isotopes reported to have been deposited there ($^{239/240}Pu$). It is possible that the limited sampling accomplished there was either mislocated or did not penetrate deep enough to reach contaminated soils.

The site appears today as a flat, vegetation-free, cobble-covered field. It is unfenced and unmarked.

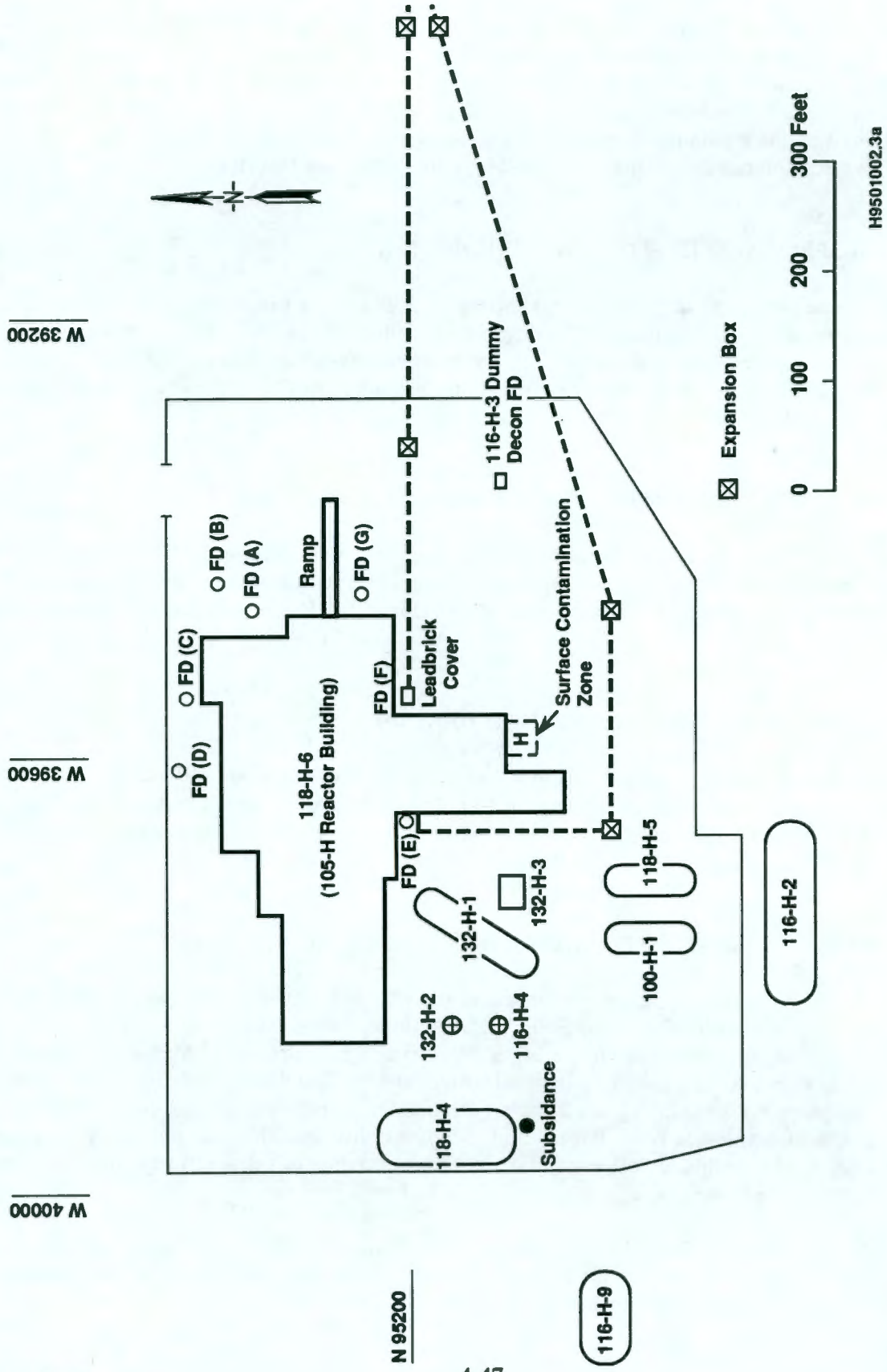
4.23 SUSPECT WASTE SITE: CONTAMINATED RAMP

A concrete ramp exists on the east side of the 105-H Reactor Building. The ramp slopes downward from ground level to the reactor basement at the minus 12-ft level. The ramp is 104 ft long and 6 ft wide and is enclosed in heavy wire mesh. Surface contamination signs have been posted on the wire mesh. See Figure 4-14 for the location of this ramp.

Site personnel believe that the wire mesh was installed to preclude tumbleweeds from accumulating in the ramp area. They believe that contaminants, if any, are probably of low level and may have been deposited there when equipment and materials were transported from the reactor basement for use or disposal elsewhere.

Hanford Site Drawings P-1756 and P-1759 provide dimensional details about the ramp.

Figure 4-14. Waste Sites Near the 105-H Reactor Building.



4.24 SUSPECT WASTE SITE: FRENCH DRAIN A

A suspect waste site exists at a point approximately 18 ft east of the east wall and 60 ft south of the northeast corner of the 105-H Reactor Building. Potentially a french drain, it is a vertical, 30-in.-diameter, vitrified concrete pipe with a metal lid. Its upper surface is approximately at grade. A 2-1/2 in. steel pipe exits and runs down the reactor building wall to grade at a point in line with the drain, suggesting the possibility of drainage from the reactor building to the french drain. No signs or markings exist on the drain. See Figure 4-14 for the location of this site.

4.25 SUSPECT WASTE SITE: FRENCH DRAIN B

A suspect waste site exists at a point approximately 30 ft east of the east wall and 10 ft south of the northeast corner of the 105-H Reactor Building. Potentially a french drain, it is a vertical 36-in.-diameter concrete pipe with a steel lid. Its upper surface is approximately at grade and it is filled with gravel to within 8 in. of its top. No signs or markings exist on the drain. See Figure 4-14 for the location of this site.

4.26 SUSPECT WASTE SITE: FRENCH DRAIN C

A suspect waste site exists at a point near the north wall, and approximately 90 ft west of the northeast corner, of the 105-H Reactor Building. Potentially a french drain, it is a vertical 24-in.-diameter concrete pipe and has no signs or markings. See Figure 4-14 for the location of this site.

4.27 SUSPECT WASTE SITE: FRENCH DRAIN D

A suspect waste site exists at a point approximately 25 ft north of the north wall and at the approximate center point of the 105-H Reactor Building. Potentially a french drain, it is a vertical, buried, 48-in.-diameter vitrified clay pipe with a steel lid. No signs or markings exist on the drain. See Figure 4-14 for the location of this site.

4.28 SUSPECT WASTE SITE: EXPANSION BOX FRENCH DRAIN E

A suspect waste site exists in the corner formed by the west wall of the south wing and the south wall of the west wing of the 105-H Reactor Building. A 30-in.-diameter steel manhole set in a concrete pad provides access to a french drain at a lower level. The french drain is located at the bottom of a concrete expansion box, in which a 60-in. steel reactor effluent line makes a 45-degree turn from south to southwest. The drain appears to have been installed to provide drainage for any leakage that might occur in the expansion box. Information about the dimensions and construction of the drain could not be located by this author, nor could any characterization of waste effluents that may have reached the drain be found.

Hanford Site Drawings P-1758, P-1759, and P-1756 show the locations of the expansion box, drain, and manhole. See Figure 4-14 for the location of this site in relation to the other suspect waste sites. This site is similar to that described in Section 4.29.

4.29 SUSPECT WASTE SITE: EXPANSION BOX FRENCH DRAIN F AND SHIELDING LEAD

A suspect waste site exists in the corner formed by the east wall of the south wing and the south wall of the east wing of the 105-H Reactor Building. A 30-in.-diameter steel manhole set in a concrete pad provides access to a french drain at a lower level. The french drain is located at the bottom of a concrete expansion box, in which a 60-in. steel reactor effluent line makes a 90-degree turn from south to east. The drain appears to have been installed to provide drainage for any leakage that might occur in the expansion box. The dimensions and construction of the drain could not be located, nor could any characterization of waste effluents that may have reached the drain be found.

The surface of the concrete pad in which the manhole is set is covered with lead brick, and the manhole is completely covered. Site personnel report that the lead brick was installed as shielding from the nominally high dose rates coming from within the expansion box.

Hanford Site Drawings P-1758, P-1759, and P-1756 show the locations of the expansion box, drain, and manhole. See Figure 4-14 for the location of this site in relation to the other suspect waste sites. This site is similar to that described in Section 4.28.

4.30 SUSPECT WASTE SITE: FRENCH DRAIN G

A suspect waste site exists at a point 18 ft south of the ramp mentioned in Section 4.23 and 20 ft east of the east wall of the 105-H Reactor Building. Potentially a french drain, it is a 48-in.-radius vitrified clay pipe with a metal lid. A second lid is found 6 in. below the upper lid. Available Hanford Site drawings do not identify the drain.

A 2-1/2-in. stainless steel pipe emerges from the reactor building wall, runs downward to the surface, and disappears at a point in approximate alignment with the suspect site. A repair mark runs through the asphalt surface from the point where the pipe enters the ground to the suspect site, suggesting the possibility of drainage from the reactor building to the waste site. See Figure 4-14 for the location of this site.

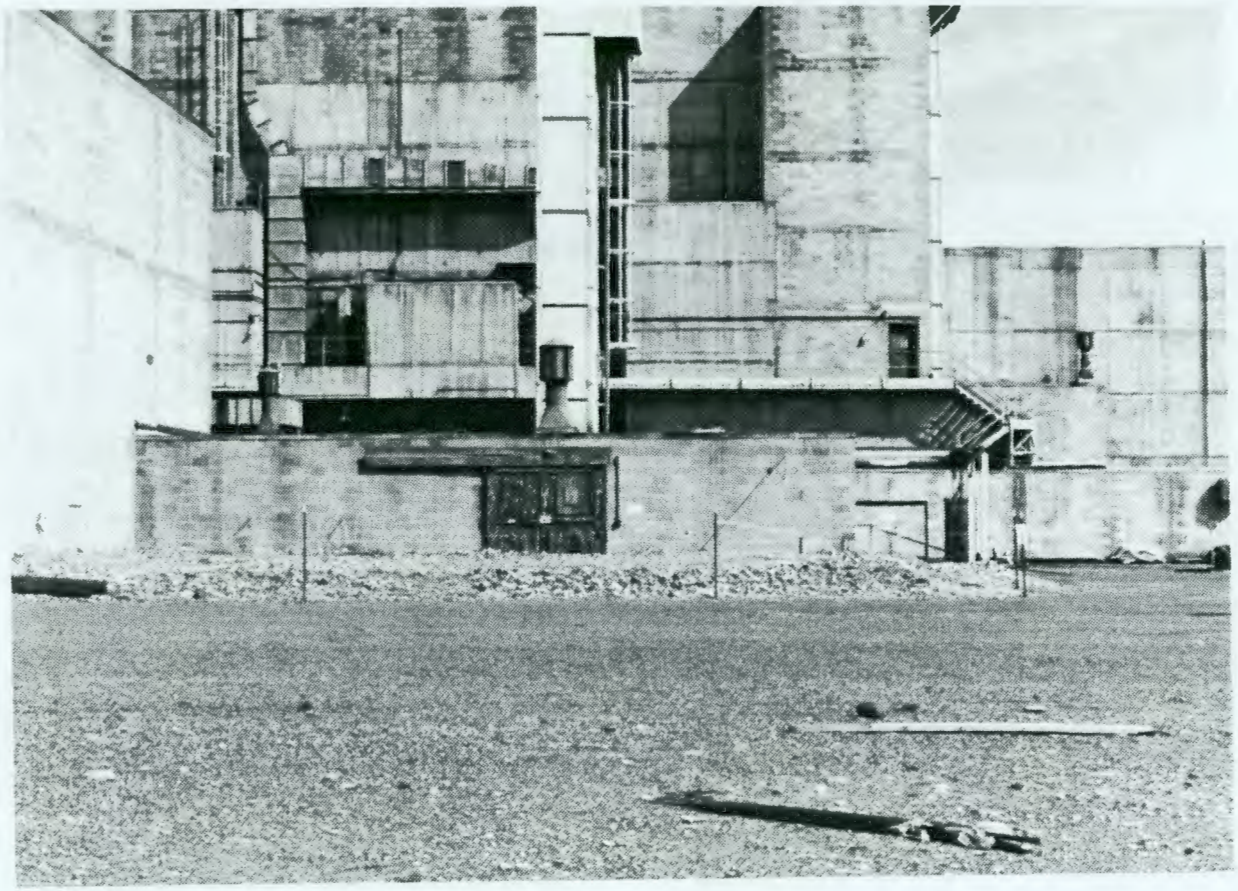
4.31 SUSPECT WASTE SITE: SURFACE CONTAMINATION ZONE H

A suspect waste site exists in the area defined by the south wall of the 105-H Reactor Building fuel retention basin wing and the east wall of the high bay fuel transfer wing. It is a surface contamination zone that has been stabilized with 18 to 24 in. of gravel and is protected by lightweight chain barriers and "Caution: Underground Radioactive Material" signs. A "Surface Contamination" sign is posted on the wooden door to the retention basin wing. It is unclear whether this sign refers to the contaminated surface zone on the outside or to contaminated surfaces inside the building.

No records could be located to describe or characterize the contaminants.

See Figure 4-15 for the location of this site.

Figure 4-15. Surface Contamination Zone South of the 105-H Reactor Building, 1994.



4.32 SUSPECT WASTE SITE: 116-H-2 OVERFLOW

An unplanned release occurred in 1953 at a 2-acre tract located immediately south of the 1608-H Liquid Waste Disposal Trench (116-H-2). The trench overflowed and flooded the triangular area bounded on the north by the trench and on the east, west, and south by railroad tracks. Various dimensions have been reported for the overflow area (Clukey et al. 1954), but a calculation based on this author's observations shows it to be about 7,900 m^2, or 2 acres.

The entire area has been stabilized with a layer of clean soil and cobbles. Contaminant levels are undocumented, but might be expected to approximate or be less than those identified in the 116-H-2 Trench. See Section 4.2 for a list of contaminants associated with the 116-H-2 Trench.

A 5-ft by 5-ft surface contamination zone exists near the southern limit of the contamination zone. It has been identified and protected with a lightweight chain on metal posts with surface contamination warning signs. The suspect waste site described in Section 5.6 is also located in the overflow area.

The area appears as a level, vegetation-free, cobble-covered field. It is protected on all sides by permanent concrete monuments that are described on Hanford Drawing H-1-15859.

5.0 100-HR-2 OPERABLE UNIT

Three operable units are associated with the 100-H Area. Two of these, 100-HR-1 and 100-HR-2, include liquid and solid waste disposal sites in the vicinity of, and related to, the 100-H Reactor and associated facilities. The 100-HR-1 Operable Unit includes the eastern portion of the area and includes the liquid and sludge disposal sites associated with the operation of the 100-H Reactor and related facilities. The 100-HR-2 Operable Unit includes the western and southern portions of the area and primarily includes solid waste burial grounds associated with the operation of the reactor.

This section describes the 100-HR-2 Operable Unit, which covers the western and southern portions of the 100-H Area and primarily includes solid waste burial grounds that supported reactor operations. It includes 16 waste sites, 12 of which are included in the Tri-Party Agreement (Ecology et al. 1989). These sites include burial grounds, pits, a trench, septic tanks, and suspect waste sites. Figure 5-1 is a drawing that shows all waste sites in the 100-HR-2 Operable Unit except those included in Figure 4-14, "Waste Sites Near the 105-H Reactor Building."

All Hanford coordinate locations are approximate and have been taken from several different maps and drawings of the 100-H Area. Coordinate locations typically represent the center of the facility or waste site, except where noted. Units of measure have typically been reported as they appear in reference documents.

Some of the 100-HR-2 waste sites have been evaluated as part of the preliminary assessment/site inspection activities performed by the DOE. They have been assigned HRS migration scores under the HRS evaluation procedures spelled out under CERCLA in 40 CFR 300. HRS migration scores for the 100-HR-2 sites are summarized in Table 5-1.

Table 5-1. 100-HR-2 Operable Unit Waste Site Hazardous Ranking System Migration Scores.

Waste Site Number	HRS Score
118-H-1	1.75
118-H-2	1.17
118-H-3	1.17
118-H-4	1.17
118-H-5	1.17
128-H-1	.08

(Stenner et al. 1988)

Each waste site is described separately in Sections 5.1 through 5.16. A site is described as "suspect" if it was not included in the Waste Information Data System (WIDS) before this document was published.

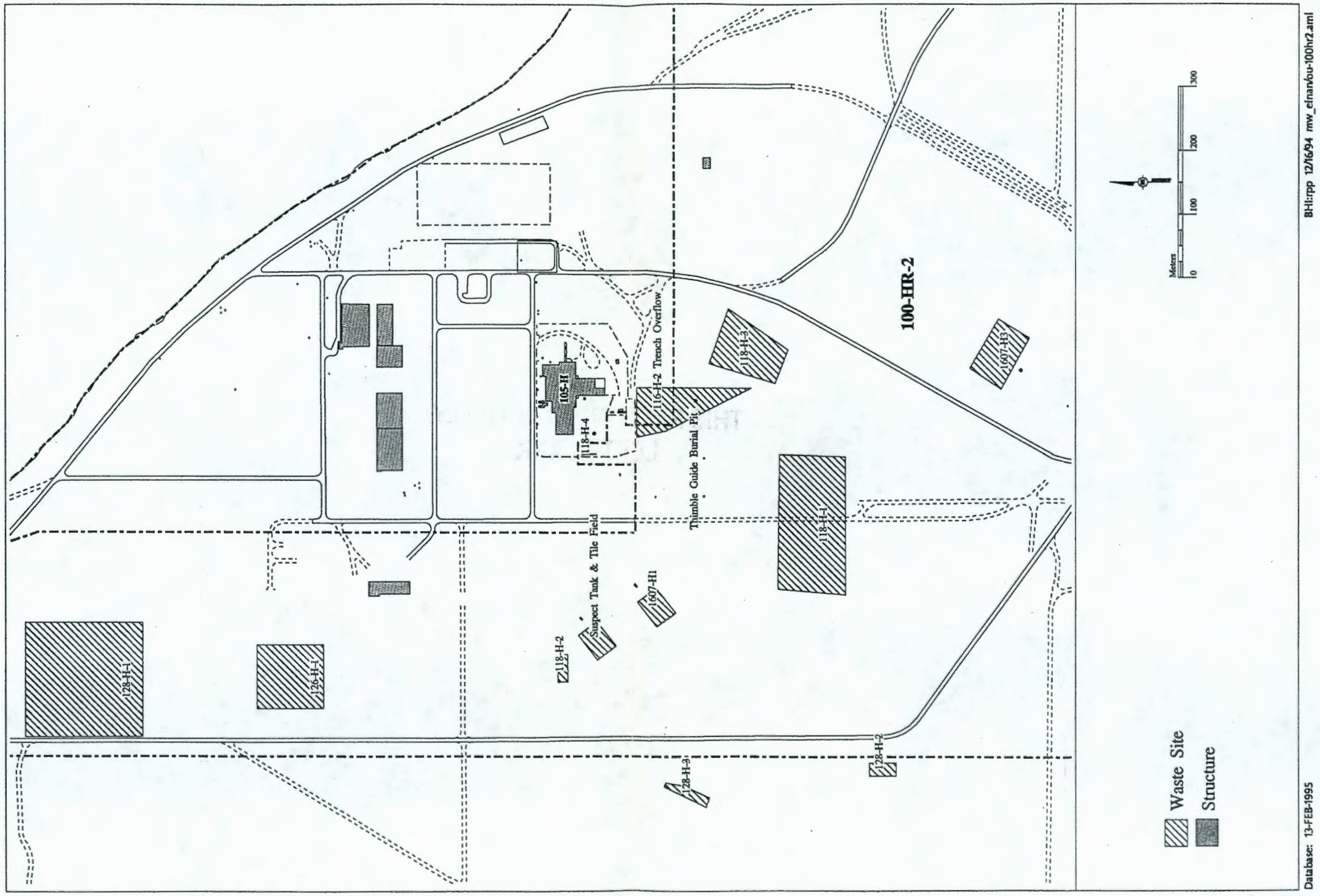


Figure 5-1. Operable Unit 100-HR-2 Waste Sites.

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5.1 118-H-1 (100-H BURIAL GROUND NO. 1)

118-H-1 is an inactive, mixed solid waste burial site that is recognized as having been the primary burial ground for the 100-H Area. The site is commonly known as 100-H Burial Ground No. 1, although it has also been known as the Solid Waste Burial Ground. It is located about 1,300 ft southwest of the 105-H Reactor Building, with its northwest corner at Hanford coordinates N94185 W40650, and is centered at approximate Washington State plane coordinates E577554 N152138. This site operated from 1949 until 1965 to receive 10,000 m^3 of wastes from 100-H Reactor operations, including reactor process tubing, dummy fuel elements, contaminated lead brick, and other reactor hardware.

This burial ground was enlarged in 1955 (Herman Jr. 1965). It measures 700 ft long and 350 ft wide and was 20 ft deep before closure. The numerous trenches in the east/west-oriented burial ground run north to south. Trench layout details may be seen on Hanford Site Drawing H-1-13484. Cross-sectional details and wooden crib design data are provided on Hanford Site Drawing P-3475.

Herman Jr. (1965) characterizes the burial ground as follows:

> "This burial ground, formerly called 'solid waste burial ground,' was opened in 1949 and enlarged in 1955. Prior to 1965, a number of large trenches and pits containing dummy (reactor fuel) elements, process tubing, and miscellaneous wastes were backfilled to grade with 6 feet of soil cover. Near the southwest corner, portions of several horizontal control rods are buried in slit trenches with 2 to 4 feet of soil cover. Two trenches were used during the deactivation of H plant for burial of dummy elements and miscellaneous solid waste, and subsequently backfilled to grade with 4 to 6 feet of soil cover. Dose rate at surface of the ground is less than 1 mR/hr. The boundaries of this burial ground are permanently marked with posts numbered H-65-1 through H-65-23."

The exact location of each post is described on Hanford Site Drawing H-1-14732.

Stenner et al. (1988) and BHI (1994) report that the estimated radionuclide inventory for 118-H-1, in curies and calculated to account for decay through 1 April 1986, includes the following.

- ^{14}C: 6.600 E-001 Ci
- ^{60}Co: 6.100 E+002 Ci
- ^{137}Cs: 1.000 E+000 Ci
- ^{152}Eu: 1.420 E+001 Ci
- ^{154}Eu: 2.510 E+001 Ci
- ^{3}H: 3.500 E+000 Ci
- ^{90}Sr: 1.000 E+000 Ci

No soil sampling is known to have been accomplished at any of the 100-H burial grounds. However, sampling accomplished at the 118-B-1 Burial Ground may, to some extent, be representative of conditions at 118-H-1. Some general results of this sampling from six 118-B-1 sample holes are as follows (Dorian and Richards 1978).

- No measurable migration of radionuclides was indicated by data.
- The maximum $^{239/240}Pu$ concentration detected in samples was 1 pCi/g. $^{239/240}Pu$ is generally not detectable.

- The primary radionuclide identified was ^{60}Co, although ^{152}Eu, ^{154}Eu, ^{134}Cs, ^{137}Cs, ^{90}Sr, and ^{63}Ni were also present.

- The maximum beta-gamma concentration detected in samples was 1.80×10^5 pCi/g, of which 1.70×10^5 was ^{60}Co.

- Up to 7.50×10^1 pCi/g of ^{63}Ni was detected. Based on data obtained by analyzing samples from the 105-DR Reactor core, considerably higher ^{63}Ni concentrations are probably present in metallic wastes within the 118-B-1 Burial Ground.

- Specific activities of samples taken in older trenches used before reactor power upgrade modifications were made are considerably less than for trenches used after the reactor power operating levels were increased.

Dorian and Richards (1978) also notes that, as of 1971, 100-H burial grounds contained a combined inventory of 3,500 Ci of ^{60}Co. The greater portion of this, presumably, would be found in the 118-H-1 Burial Ground. The same document provides the following inventory of metallic wastes for 100-H burial grounds; the majority of these wastes would also, presumably, be found in 118-H-1.

• Aluminum Tubes	24 tons
• Irradiated Facilities	190 lb
• Expendables	60 tons
• Thermocouples	23 lb
• Aluminum HCRs	1,130 lb
• Aluminum Thimbles	3 tons

Dorian and Richards (1978) provides additional burial ground content data, which are shown in Table 5-2.

Vertical safety rods (VSRs) and HCRs are included in the 118-H-1 inventory.

Miller and Wahlen (1987) notes that the 100-H Reactor had 55 VSRs that were made of chrome-plated carbon steel tubing; each contained a nominal 2.8-in.-diameter core made of 5% boron and 95% graphite. The "active" or "poison" portion of each VSR was about 32 ft long and 3 in. in diameter. It was assembled in three 10-ft sections.

The reactor had 15 HCRs that were "used to control the nuclear reaction in the reactor core. Routine maintenance required replacing the rod tips infrequently. The rod tip sheath is a closed, rectangular tube measuring about 40 ft by 3.5 in. by 1.5 in. The sheath is made from 63-ST-S aluminum. Smaller inlet and outlet aluminum cooling tubes were inside the tip for cooling purposes. Donut-shaped boron rings sized to fit inside the sheath surrounded the cooling tubes for the full length of the rod tip section. The rod tip weighed about 80 lbs. and was assembled to a drive mechanism to run the rod in and out of the reactor core" (Miller and Wahlen 1987).

Table 5-2. Inventory of 100-H Burial Ground No. 1 (118-H-1) Contents.

Type of Material	^{3}H	^{14}C	^{60}Co	^{63}Ni	^{59}Ni	^{90}Sr	^{137}Cs	^{152}Eu	^{154}Eu	^{133}Ba	^{41}Ca	^{108}Ag
Aluminum tubes and tube film	-	-	155	203	1.6	.02	.02	1.8	1.0	-	-	-
Aluminum spacers	-	-	.01	-	-	-	-	-	-	-	-	-
Irradiated lead-cadmium	-	-	1.1	-	-	-	-	-	-	.35	-	6.6
Splines	-	-	.8	-	-	-	-	-	-	-	-	-
Broach dust	.27	.15	.004	.01	-	-	.001	.002	.001	.001	.007	-
Desiccant	1.1	.04	-	-	-	-	-	-	-	-	-	-
Lead	-	-	.1	.1	-	.1	.1	.1	.2	-	-	-
Misc. waste[a]	-	-	42	60	.5	-	-	-	-	-	-	-
Soft waste[b]	-	-	9.9	13.1	-	.01	.01	-	-	-	-	-

[a]Includes gun barrels, nozzles, pigtails, HCRs, VSRs, aluminum thimbles, and miscellaneous reactor maintenance tools.
[b]Includes paper, masking tape, plastic, wiping rags, etc.

(Miller and Wahlen 1987)

Miller and Wahlen (1987) provides an additional breakdown of materials included in the burial ground and the radiological content of each, as shown in Table 5-2. The total inventory, presented in curies and calculated to account for decay through June 1, 1987, was estimated to be approximately 500 Ci.

This waste site was assigned an HRS migration score of 1.75 (Stenner et al. 1988).

118-H-1 appears today as an unremarkable, cobble-covered, open field. It is unfenced but is protected by permanent concrete monuments and underground radioactive material warning signs. Its surface is approximately 3 ft above grade at center, tapering to 1 ft above grade at its borders. A frequently used gravel road crosses the burial ground from north to south across its approximate center.

Hanford Site Drawing H-1-15859 shows the burial ground's exact location and dimensions, as well as the arrangement of its protective concrete markers.

5.2 118-H-2 (100-H BURIAL GROUND NO. 2)

118-H-2 is an inactive, mixed solid waste burial ground located about 1,500 ft west of the 105-H Reactor Building. It is centered at approximate Washington State plane coordinates E577336 N152527, and its northwest corner is at Hanford coordinates N95318 W41130. This site is commonly known as 100-H Burial Ground No. 2, although it has also been known as the H-1 Loop Burial Ground and as the P-13 Burial Pit (BHI 1994; Hanford Site Drawings H-1-4047 and H-1-15397).

This site operated from 1955 to 1965 to receive a small volume of contaminated and activated test material and contaminated pipe. The burial ground was about 140 ft long, 50 ft wide, and 15 ft deep when excavated in 1955. Two concrete vaults were placed in the excavation to receive activated and contaminated hardware associated with an experimental reactor test facility, reportedly on behalf of the U.S. Navy. The easternmost vault was used for this purpose in 1955 when a test loop, or "stainless steel double tube" (Koop 1964), was transferred from the reactor to this vault for burial after several years of irradiation. The second vault, constructed in 1958 to the west of the first vault, was intended for a similar use but was not used in that program. A "small quantity of contaminated pipe" was placed in it at the time of reactor deactivation in 1965. Both vaults were filled with gravel, and the excavation was backfilled to grade. Additional clean soil has since been added to form a berm that rises to 30 to 36 in. above grade over the burial ground.

Herman Jr. (1965) characterizes the site by writing:

> "Two concrete-lined vaults are located in an approximate east-west line. The east vault contains a stainless steel, double tube removed from the reactor in 1955 after several years of irradiation. It is covered to grade with about 12 feet of soil. Within the area, there are also solutions which were used to clean the tube and miscellaneous capsule components. The west vault was constructed in 1958 to receive a smaller facility, but was never used for that purpose. During the deactivation of H plant, it was used for burial of a small amount of contaminated pipe and subsequently covered to grade with about 12 feet of soil cover. Dose rate

at surface of ground is less than 1mR/hr. The boundaries of the area are permanently marked with posts numbered H-65-24 through H-65-29."

The exact location of each post is detailed on Hanford Site Drawing H-1-14732.

According to Miller and Wahlen (1987), 0.3 tons of waste are buried at this burial ground. Stenner et al. (1988) states that the estimated radionuclide inventory of the burial ground, in curies and calculated to account for decay through 1 April 1986, includes 1.0 Ci of ^{60}Co.

This site has been assigned an HRS migration score of 1.17 (Stenner et al. 1988).

118-H-2 appears today as a cobble-covered field, mounded 30 to 36 in. above grade at center. It is unfenced and is protected by six permanent concrete monuments with "Caution: Underground Radioactive Material" warning signs. A metal sign identifies it as the "118-H-2 Solid Waste Burial Ground #2" (see Figure 5-2).

Hanford Site Drawing H-1-15859 shows the burial ground's exact location and dimensions, as well as the arrangement of its protective concrete markers. The burial ground's appearance before backfilling is visible, although poorly, on Hanford aerial photograph 4045.

5.3 118-H-3 (CONSTRUCTION BURIAL GROUND)

118-H-3, commonly known as the Construction Burial Ground, is an inactive, mixed solid waste burial ground located about 800 ft southeast of the 105-H Reactor Building at Hanford coordinates N94400 W39400 and approximate Washington State plane coordinates E577831 N152243. It operated from 1953 to 1957 to receive 3,000 m^3 of reactor components and hardware, including lengths of contaminated 16-in. pipe that were used as chutes for the removal of reactor VSR thimbles and other components from reactor modification programs (BHI 1994, Herman Jr. 1965, Miller and Wahlen 1987, Koop 1964).

The burial ground is 300 ft long, 200 ft wide, and 20 ft deep. It consists of multiple north/south-oriented trenches that have been backfilled to grade with approximately 6 ft of soil. Koop (1964) states that two trenches were located at this site. However, Hanford aerial photographs suggest that there were at least three separately fenced trenches during the burial ground's operational years.

Stenner et al. (1988) states that the estimated radionuclide inventory for the site, in curies and calculated to account for decay through 1 April 1986, includes 1.0 Ci of ^{60}Co.

This site has been assigned an HRS migration score of 1.17 (Stenner et al. 1988).

Figure 5-2. 118-H-2 Burial Ground No. 2.

All the 118-H-3 trenches are now part of a common burial ground area, which is protected by permanent concrete monuments with "Caution: Underground Radioactive Material" warning signs. The site appears today as an unremarkable, fenced, flat, cobble-covered field. A small amount of steel debris (i.e., rebar, pipe, old radiation warning signs, and cable) is evident on its surface near the eastern edge.

5.4 118-H-4 (BALL 3X BURIAL GROUND)

118-H-4 is an inactive, mixed solid waste burial ground that operated during 1953 to receive reactor solid waste related to the Ball 3X Project. The site is commonly known as the Ball 3X Burial Ground because the reactor core thimbles, guides, and other related hardware that were replaced by the Ball 3X System are buried there. It is located at Hanford coordinates N95300 W39600 and approximate Washington State plane coordinates E577675 N152487, about 100 ft west of the 105-H Reactor Building.

The site consisted of a single trench that was oriented from north to south. The trench was 150 ft long, 30 ft wide, and 10 ft deep before it was backfilled to grade in 1953.

Aluminum thimbles were used in the VSR channels to provide an enclosed access space for the rods.

After some years of operation, high thimble corrosion rates made the reliability of the liquid boron system questionable, so the liquid boron safety system was replaced with one that used steel-jacketed boron- and carbon-steel balls. The thimbles were buried in the 118-H-4 Burial Ground when removed.

The quantity of waste that resulted from removing the thimbles and the boron solution system is estimated as follows.

- The thimbles were about 35 ft long and 3.5 in. in diameter, with a wall thickness of 0.15 in.
- Each thimble weighed about 90 lb.
- When thimbles were eliminated from use, 55 were removed from the reactor core and buried. Six more had been previously replaced for maintenance purposes. Thus, a total of 61 thimbles were removed from the reactor and potentially buried at this site.
- Calculation: 61 thimbles x 90 lb = 5,490 lb removed and buried.

It is unclear whether or not all 61 thimbles were buried in the 118-H-4 Burial Ground. It seems likely that 55 of the thimbles were buried in the trench at the time of the Ball 3X Project. However, the six thimbles removed for maintenance purposes are believed to have been buried at the 118-H-1 Burial Ground.

Other irradiated materials, particularly guides from the 105-H Reactor Building, were also buried in the 118-H-4 Burial Ground (Herman Jr. 1965).

Stenner et al. (1988) states that the estimated radionuclide inventory for this burial ground, in curies and calculated to account for decay through 1 April 1986, includes 1.0 Ci of ^{60}Co.

The thimbles and other materials placed in the trench were covered to grade with approximately 5 ft of soil (Herman Jr. 1965).

This site has been assigned an HRS migration score of 1.17 (Stenner et al. 1988).

118-H-4 appears today as a vegetation-free, gravel- and cobble-covered field. Railroad ties and rails have been placed on the surface, with the rails parallel to the north/south axis of the burial ground. The north and south ends of the site are marked by permanent concrete monuments, each of which is about 25 ft from, and inside of, the reactor building security fence. A 36-in.-diameter and 24-in.-deep surface subsidence is evident at the south end of the site, a few feet south of the southern monument (see Figure 5-3 for a recent photograph of this site).

Figure 5-3. 118-H-4 Ball 3X Burial Ground.

5.5 118-H-5 (THIMBLE PIT)

118-H-5 is an inactive, mixed solid waste burial ground that operated in 1953 to receive a single experimental thimble assembly, and again in 1960 to receive contaminated soil from the original 105-H Pluto Crib site (116-H-4). This site is commonly known as the Thimble Pit and as the 118-H-5 Burial Ground, although it has also been known as the 105-H Thimble Pit and the H Reactor Thimble Pit. It is located at Hanford coordinates N95000 W39750 and approximate Washington State plane coordinates E577735 N152440, about 200 ft south of the 105-H Reactor Building.

The 30-ft-long, 2-ft-wide, and 5-ft-deep trench was opened in 1953 to receive a single piece of activated reactor hardware, a thimble assembly from the "B hole of the X Level." It was subsequently backfilled to grade. Nonstandard concrete monuments were used to mark the site (Heid 1956, Herman Jr. 1965, Koop 1964).

Immediately before burial, the thimble assembly read 600 R/h at a distance of 1 ft (Heid 1956).

In 1960, the trench was reopened to receive contaminated soils from the original 105-H Pluto Crib site (116-H-4). The crib had been excavated to allow for the construction of the 117-H Filter Building, and its soils were removed and buried at the 118-H-5 site (see Section 4.4 for more information about the pluto crib).

Stenner et al. (1988) states that the estimated radionuclide inventory for this site, in curies and calculated to account for decay through 1 April 1986, includes 1.0 Ci of ^{60}Co.

An HRS migration score of 1.17 has been assigned to this site (Stenner et al. 1988).

118-H-5 appears today as a gravel- and cobble-covered field with limited sagebrush growth. It is protected by a lightweight chain-link fence that forms a 90-ft^2 radiation protection zone. "Caution: Underground Radioactive Material," "Crib," and radiation area warning signs are posted. Three regulated vehicles were parked within the fenced zone on the date of this author's visit: a Caterpillar tractor and two tanker trailers.

Two concrete monuments are visible. One is within the fenced radiation zone, and the other is located south of the zone and adjacent to the reactor area security fence. Sources suggest that these markers identify the actual location of the original trench.

A shielded rod cave is also located inside the 118-H-5 radiation zone. See Section 5.14 for more information about the rod cave. Also within the zone is a 6-ft-long, 3-ft-wide, and 4-ft-high red metal storage box; it has "Radioactive Material" inscriptions but no standard radiation warning signs. Steel plating has been placed on the ground's surface immediately west of the rod cave and within the radiation zone. No markings are visible on the plating, and its purpose could not be determined by this author.

5.6 100-H-2 (THIMBLE GUIDE PIPE BURIAL PIT)

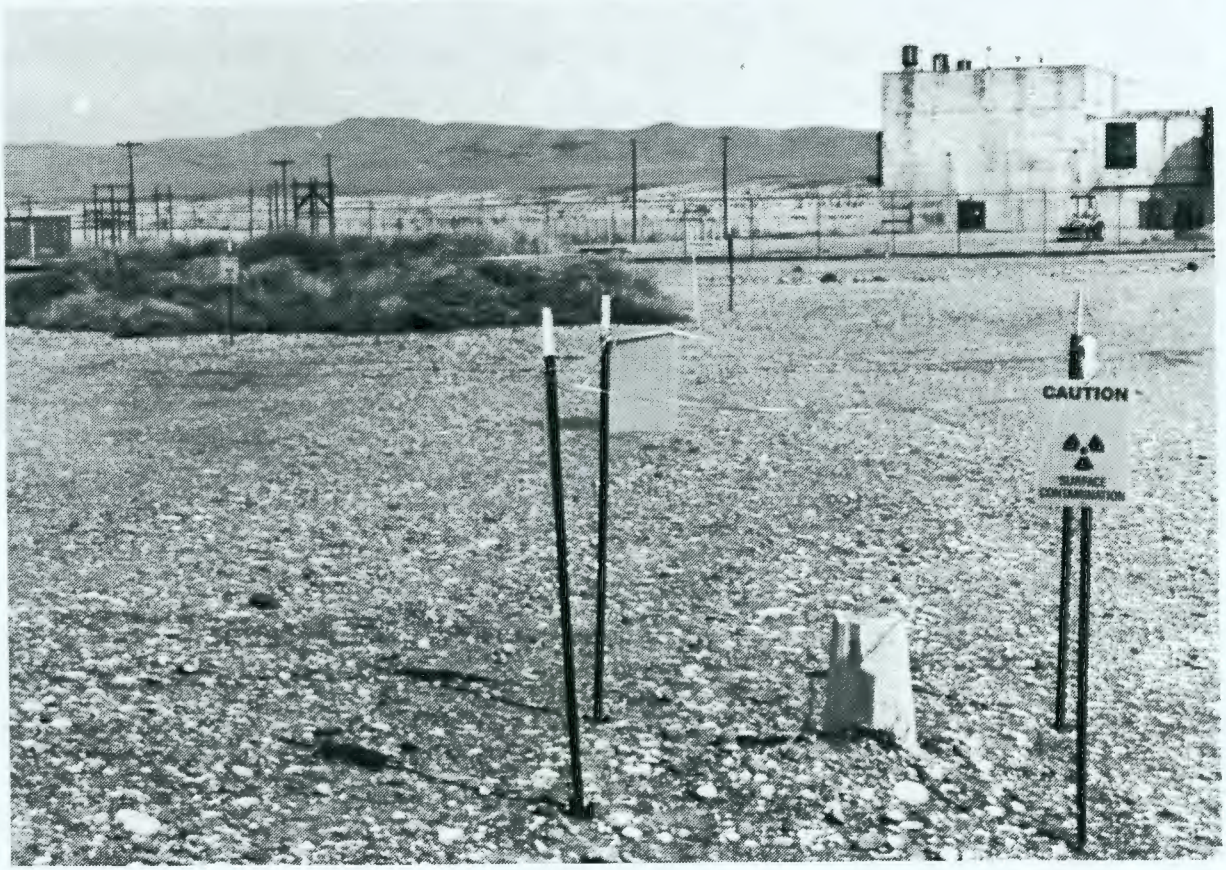
100-H-2 is an inactive, low-level solid waste burial ground that is located about 70 yd south of the reactor south security fence in the southern portion of a wedge formed by railroad tracks to the east, west, and south. It is between approximate Hanford coordinates N94500 W39700 and N94400

W39700. The site is commonly known as the Thimble Guide Pipe Burial Pit, although it has also been known as the Buried Thimble Site and the 100-H-2 Burial Ground. It consisted of at least two north/south-oriented trenches that have since been backfilled.

The trenches were excavated to bury a vertical safety rod thimble and/or lengths of thimble guide pipe used in thimble removal. Koop (1964) confirms the existence of the site, describing the contents as "several sections of 16-inch pipe used in 1953 as chutes for removal of thimbles from 105-H." The document also notes that the pipe was "buried and the two trenches covered with six feet of soil" (Koop 1964).

The site appears today as a flat, cobble-covered field that is bounded on three sides by railroad tracks. A lightweight chain-link fence forms a 5-sq-ft barricade in the area. Within the barricade is a square, unmarked concrete monument of the type used for survey benchmarks and, less commonly, to mark burial sites. The barricade is posted with "Radioactive Surface Contamination" signs. See Figure 5-4 for a 1994 photograph of this site; the tumbleweeds in the background of the photograph have been removed since the photograph was taken.

Figure 5-4. Suspect Waste Site: Thimble Guide Pipe Burial Pit, Surface Contamination Area.



5.7 126-H-1 (184-H POWER HOUSE ASH PIT)

126-H-1 is an inactive, nonhazardous and nonradioactive solid waste site that operated from 1948 to 1965 to receive ash from the 184-H Power House. This site is located west of the power house and is at Hanford coordinates N96600 W41150 and approximate Washington State plane coordinates E577312 N152945. It is commonly known as the 184-H Power House Ash Pit, although it has also been known as the 188-H Ash Disposal Area.

The power house provided steam and emergency backup power for the 100-H Area. It had multiple coal-fired boilers. The resulting ash was sluiced in slurry form to the ash pit.

The pit received large, but unspecified, quantities of ash. The ash was mixed with river water in the power house and pumped through steel lines to the pit. Extraction procedure toxicity tests were conducted, in accordance with Washington Administrative Code (WAC) 173-303. No hazardous materials were identified by this testing (BHI 1994).

No HRS migration score has been assigned to this site.

126-H-1 remains an open pit that is about 250 ft long, 250 ft wide, and 12 ft deep. It is divided into two parts by an 8-ft-high earthen berm that runs east to west. Its floor is covered with evenly distributed ash and cinder, and some light vegetation is evident.

5.8 128-H-1 (128-H-1 BURNING PIT)

128-H-1 is an inactive, hazardous solid waste site that operated from 1949 to 1965. The site is located northwest of the 100-H Area, about 50 ft east of the perimeter road, at Hanford coordinates N97750 W41200 and approximate Washington State plane coordinates E577306 N153278. It was used for the burning and disposal of nonradioactive, combustible materials such as paint waste, office waste, chemical solvents, and ash from the 148-H Power House (BHI 1994).

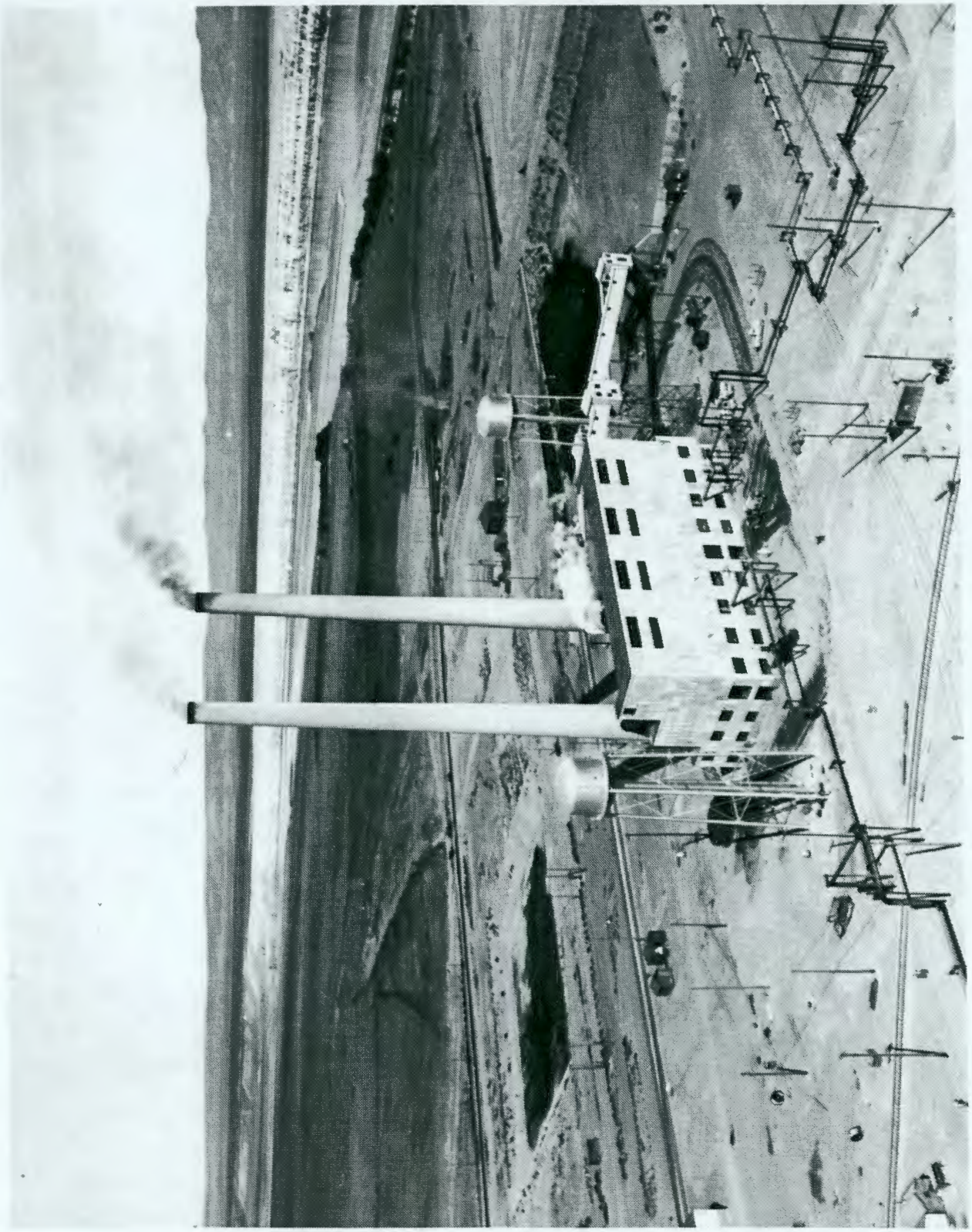
Figure 5-5 provides a 1949 photograph showing smoke rising from the burn pit. See the area immediately above the silver water tower on the right center portion of the photograph.

The burning pit is about 300 ft long, 300 ft wide, and 10 ft deep. It is partially divided by a north/south-oriented earthen berm. Two 10-in. steel lines enter the pit from the south wall and terminate in an earthen mound. These may have carried ash in slurry form from the power house to the pit. The entire pit floor is covered with evenly distributed ash and cinder similar to that found in the 126-H-1 Ash Pit.

Evidence of burning exists along the western edge of the pit, and a wooden stake near the northwest corner is marked "burn pit." Light vegetation growing on its floor includes field grasses and weeds. No fencing or warning signs exist.

No HRS migration score has been assigned to this site.

Figure 5-5. 184-H Power House with 128-H-1 Burn Pit in Background.



5.9 128-H-2 (128-H-2 BURNING PIT)

128-H-2 is an inactive, hazardous solid waste burning pit that operated until 1965. The site is located at approximate Hanford coordinates N94400 W41800 and approximate Washington State plane coordinates E577171 N152026, about 75 ft west of the southwest corner of the 100-H Area perimeter road. It is commonly known as the 128-H-2 Burning Pit.

This site received unknown quantities of combustible materials, such as vegetation, office waste, paint waste, and chemical solvents, for burning and burial (BHI 1994). It has been backfilled to grade. Its original size and depth is unknown, but the area with disturbed soil measures about 135 ft by 170 ft.

Site personnel verify that the site was used as a burn pit (BHI 1994).

No HRS migration score has been assigned to this site.

The site appears today as a shallow cobble- and gravel-covered depression with little vegetation growing on its surface. Occasional pieces of charcoal and fire-scarred rock provide evidence of past burning. No fencing or warning signs exist.

5.10 128-H-3 (BURNING PIT)

128-H-3 is suspected to be an inactive, hazardous solid waste burning pit. It is commonly known as the Burning Pit, and is also known as 100-H Burning Ground #3. The pit is about 350 ft north of the 128-H-2 Burning Pit and about 135 ft west of the perimeter road. It is located at approximate Hanford coordinates N94500 W42000 and approximate Washington State plane coordinates E577135 N152329 (BHI 1994).

The pit has been backfilled to approximate grade, and its original dimensions are unclear. The area of graded soil is about 180 ft by 75 ft, trending north to south. A 15-ft-long, 4-ft-wide, and 4-ft-deep trench runs west from its southwest corner.

Past Hanford Site employees were interviewed by this author, but were unable to verify that this site was used as a burn pit. Additionally, no records could be located to document the nature of the wastes disposed of at this pit. Some evidence of burning can be seen in the surface rock and gravel, including a few fire-scarred rocks and infrequent charcoal remnants.

This site has not been assigned an HRS migration score.

5.11 132-H-2 (117-H FILTER BUILDING SITE)

132-H-2 is the site of the 117-H Filter Building, which operated from 1961 to 1965 to filter reactor building air before releasing it through the 116-H Stack. It is an inactive, low-level solid waste site that is located about 80 ft southwest of the 105-H Reactor Building at Hanford coordinates N95400 W39600 and approximate Washington State plane coordinates E577707 N152476. The filter building was demolished in situ in 1984.

This site also encompasses the original site of the 116-H-4 Pluto Crib, which was excavated in 1960 and moved to a different location (see Section 4.4 for additional information about the pluto crib).

Measurements of radioactive contamination were taken in several areas of the 117-H Filter Building prior to that building's decommissioning. Dose rates in the filter cells were less than 1 mR/h. Direct GM readings on the inlet surfaces of the filters were about 2,000 c/m. Smearable contamination along the floors, walls, and filter surfaces generally ranged from 1,000 to 2,000 c/m. No alpha contamination was detected with portable survey instrumentation (i.e., less than 100 dpm was found using a portable alpha meter). Low-level alpha contamination was detected using proportional counter analysis of the standard smears.

Standard smears of floors and walls taken from the inlet sides of the filter cells had beta counts ranging from less than 200 to over 16,000 dpm/100 cm^2. Dose rates in the inlet tunnels running from the reactor building to the 117-H Filter Building were on the order of 1 mR/h. Floors and walls within the inlet tunnels were dusty, with accumulations up to 1/16 in. thick. Low-level smearable contamination on floors, walls, and turning vanes averaged 3,000 to 10,000 c/m.

Contamination levels were lower in the exhaust tunnels running from the 117-H Filter Building to the stack. Direct GM readings on qualitative smears were generally a few hundred counts per minute, with a maximum of 600 c/m.

From 10 to 1,000 dpm/100 cm^2 of low-level smearable alpha contamination was present in inlet tunnels. Smearable beta contamination in the inlet tunnels ranged between 1×10^3 and 1×10^4 dpm/100 cm^2. Smearable beta contamination in the exhaust tunnels was about 1×10^2 dpm/100 cm^2. Smearable alpha contamination was generally not detectable in the exhaust tunnel (Dorian and Richards 1978).

Beckstrom (1984) states that the 117-H Filter Building has a total radionuclide inventory of 0.41 mCi. The radionuclides detected during sampling were ^{3}H, ^{14}C, ^{60}Co, ^{137}Cs, ^{90}Sr, ^{154}Eu, ^{152}Eu, and $^{239/240}Pu$ (Beckstrom 1984).

The site was decommissioned using allowable residual contamination level methodology. Filters and fixtures from the 117-H Filter Building were removed, packaged, and buried in the 200 West Area burial grounds. The building itself was then decontaminated, demolished, and buried in place (Wahlen 1991). Ducts were excavated and demolished in situ. Contaminated rubble was buried at least 1 m deep, except for rubble from the seal pits, which was buried under a minimum of 5 m of clean soil (Kiser 1988, Beckstrom 1984, BHI 1994).

Figures 5-6 and 5-7 show a filter building, similar to 117-H, before and during demolition.

No HRS migration score has been assigned to this waste site.

The site appears today as a level, gravel-covered field located west of the 105-H Reactor Building. It is within the reactor building security fence, but has no unique markings or fencing.

Figure 5-6. Filter Building Before Decommissioning.

Figure 5-7. Filter Building During Decommissioning..

5.12 1607-H1 (1607-H1 SEPTIC TANK AND ASSOCIATED DRAIN FIELD)

1607-H1 is an active, nonhazardous and nonradioactive liquid waste site that has operated since 1948 to receive sanitary sewage from the 151-H and 105-H Buildings. It is located west of the reactor area, near the 118-H-2 Burial Ground and south of the 1713-H Building, at Hanford coordinates N95200 W40800 and approximate Washington State plane coordinates E577411 N152502. The location of this site may be seen on Hanford Site Drawings P-1041, P-1221, and M-1904-H, Sheet 3. The site is commonly known as the 1607-H1 Septic Tank and Associated Drain Field, although it has also been known as 124-H-1, the 1607-H1 Sanitary Sewer System, and the 1607-H1 Septic Tank.

The septic tank and drain field at this site receive sanitary sewage from the 151-H and 105-H Buildings (Gano and Hall 1987, BHI 1994). BHI (1994) states that the system has a flow capacity of 140 gal/day. Hanford Site Drawing P-1269, which provides construction details, shows the system to have a 50-person capacity.

Isaacson (1990) notes that personnel decontamination was frequently accomplished in change room sinks and showers that drained to sanitary sewage systems, not to process sewers. Thus, the lines from change room sinks and showers to the sanitary sewage systems should be suspected of containing low-level contaminants.

No HRS migration score has been assigned to this site.

Because the upper surface of the septic tank is at grade and may be plainly seen from the dirt perimeter road west of the reactor site, the site may easily be located. It is protected by a lightweight chain-link fence with metal posts.

5.13 1607-H3 (1607-H3 SEPTIC TANK AND ASSOCIATED DRAIN FIELD)

1607-H3 is an inactive, nonhazardous and nonradioactive liquid waste site that operated from 1948 to 1968 to receive sanitary sewage from the 1701-H Badge House, the 1709-H Fire Station, and the 1720-H Patrol Office. The site is located about 1/4 mi south of the 105-H Reactor Building, and a few yards northwest of the 1720-HA Arsenal, at Hanford coordinates N92974 W39634 and approximate Washington State plane coordinates E577763 N151818. Hanford Site Drawings P-1041, P-1230, and M-1904-H, Sheet 6, show its location. The site is commonly known as the 1607-H3 Septic Tank and Associated Drain Field, although it has also been known as 124-H-3, the 1607-H3 Sanitary Sewer System, and the 1607-HR Septic Tank.

The septic tank and drain field at this site received unknown amounts of sanitary sewage. The system had a 100-person capacity and an average detention period of 24 h (BHI 1994).

The tile field was constructed of either 4-in. vitrified clay pipe, concrete pipe, or drain tile, with 8 lin ft/capita (Hanford Site Drawing P-1269 R5).

Isaacson (1990) notes that personnel decontamination was frequently accomplished in change room sinks and showers that drained to sanitary sewage systems, not to process sewers. Thus, the lines from change room sinks and showers to the sanitary sewage systems should be suspected of containing low-level contaminants.

No HRS migration score has been assigned to this site.

The site may be easily located by eight 4-in. vitrified clay vent pipes that mark the north end of the drain field. A thin layer of soil and grass covers the septic tank, however, so it is not easily identified. The site is not protected by fencing or signs, but yellow metal posts that once marked the tank are still visible lying on their sides in the grass.

A trench that is 100 yd long, 3 ft wide, and 18 in. deep runs north from a 40-in.-wide headwall that is located a few yards west of the septic tank. A 6-in. vitrified clay pipe terminates at the headwall. This pipe carried storm drainage from nearby asphalt parking areas and buildings.

5.14 100-H-1 (105-H ROD CAVE)

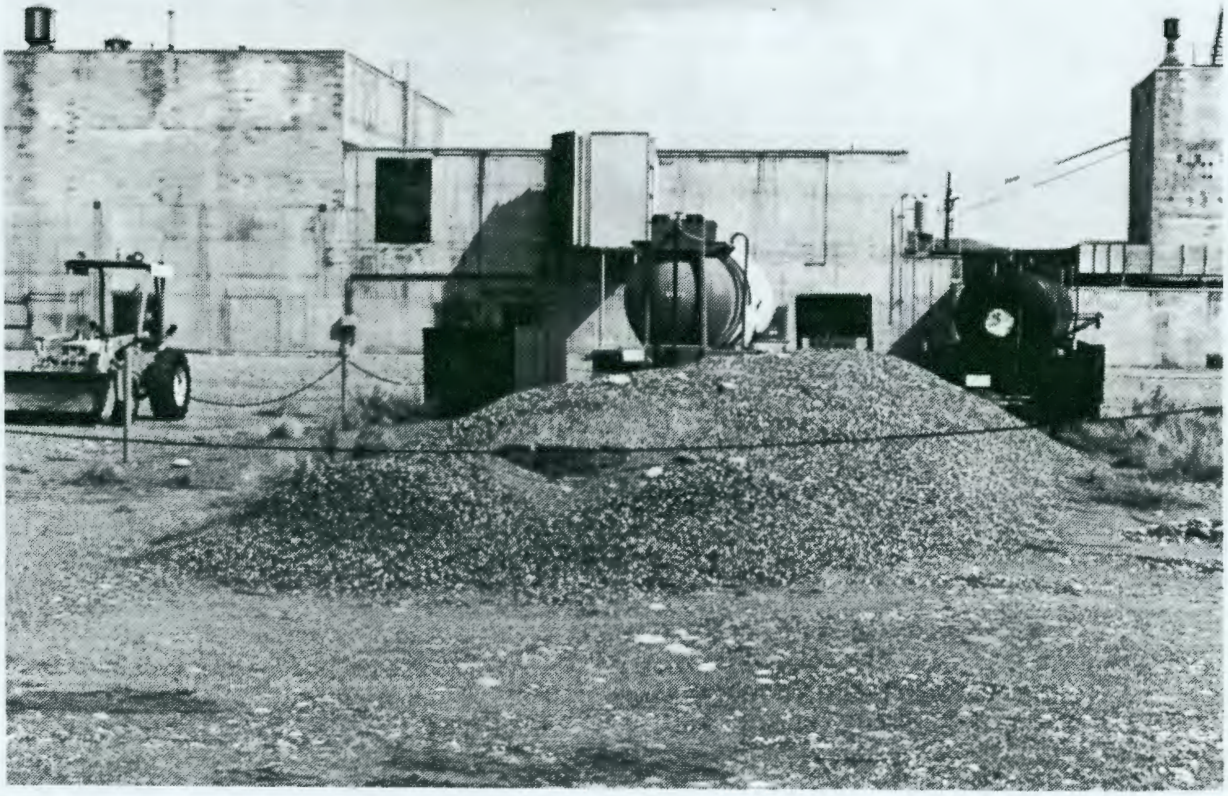
100-H-1 is an inactive, low-level solid waste site (Homan 1994a) that is located within the radiation zone established around the 118-H-5 Thimble Pit. The site is at approximate Washington State plane coordinates E152437 N577746, approximately 75 ft southwest of the southwest corner of the 105-H Reactor Building. The site consists of a rod cave that was used for the temporary storage of irradiated 105-H HCRs and VSRs, as well as tools used in their removal and/or installation.

The rod cave is about 40 ft long, 7 ft wide, and 4.5 ft high. It has a north/south orientation.

Homan (1994a) states that the 105-H Rod Cave is an underground, concrete structure with gravel mounded over the top of the aboveground portion, and reports that the cave is 40 ft long and 25 ft wide. Because these measurements were obtained by assuming that the 105-H Rod Cave is identical to the 105-C Horizontal Control Rod Cave, they are believed to be less accurate than the measurements obtained by visiting the site.

This author visited the site and noted that the cave appears to have been constructed of materials at hand; it is of primitive construction when compared with the concrete rod caves at other reactor areas. Lead bricks, visible at the cave's south end, appear to have been stacked to form the end wall. The roof of the cave is not visible because it is covered with gravel. A counter-balance-type steel door, which swings upward to provide access, is located in the north end of the cave. The door is closed and the interior of the cave is not visible (see Figure 5-8).

Figure 5-8. Suspect Waste Site, Rod Cave.



Because the HCRs, VSRs, and hardware stored in the rod cave were usually contaminated, the potential for contamination exists within the cave. No information could be found by this author to identify cave contents, if any. Homan (1994a) states that, based on historical descriptions of the 105-C Horizontal Control Rod Cave, the 105-H Rod Cave is suspected to contain contaminated HCRs and, perhaps, other miscellaneous reactor facility components.

The cave appears in aerial photographs as early as September 1950.

5.15 SUSPECT WASTE SITE: TYPE UNKNOWN

A suspect waste site exists at a point about 100 ft east of the 118-H-2 Burial Ground at approximate Hanford coordinates N95200 W40800. Aerial photographs taken in 1950 and 1952 show the site, but it is no longer evident in photographs taken in 1956.

The site appears in photographs as a 150-ft by 30-ft area that is enclosed by a white rail fence. A small structure appears immediately east of the fence. A line of disturbed soil runs eastward (toward the reactor building) from the east end of the fenced area to a point near the southeast corner of the 151-H electrical substation, and for approximately another 100 ft east. The soil disturbance line appears to terminate at a 5-ft by 5-ft area protected by a wooden fence. A site visit by this

author disclosed the 5-ft by 5-ft area to be a manhole adjacent to, and identical to, the manhole associated with the 1607-H1 Septic Tank.

In general appearance, the waste site looks much like a septic tank and drain field, but none are known to have been located at this site. The 1607-H1 Septic Tank and Associated Drain Field is located a few hundred feet south of the suspect site, and it seems unlikely that two such facilities would have been needed in such close proximity.

Isaacson (1990) notes that personnel decontamination was frequently accomplished in change room sinks and showers that drained to sanitary sewage systems, not to process sewers. Thus, the lines from change room sinks and showers to the sanitary sewage systems should be suspected of containing low-level contaminants.

The site may be best seen in Hanford photographs 106 and 682 (see Figure 5-9, Hanford photograph 106).

No evidence of the site is visible today, but a surveyor's benchmark is located at the approximate site.

5.16 SUSPECT WASTE SITE: POWER HOUSE BRINE PIT AND FRENCH DRAIN

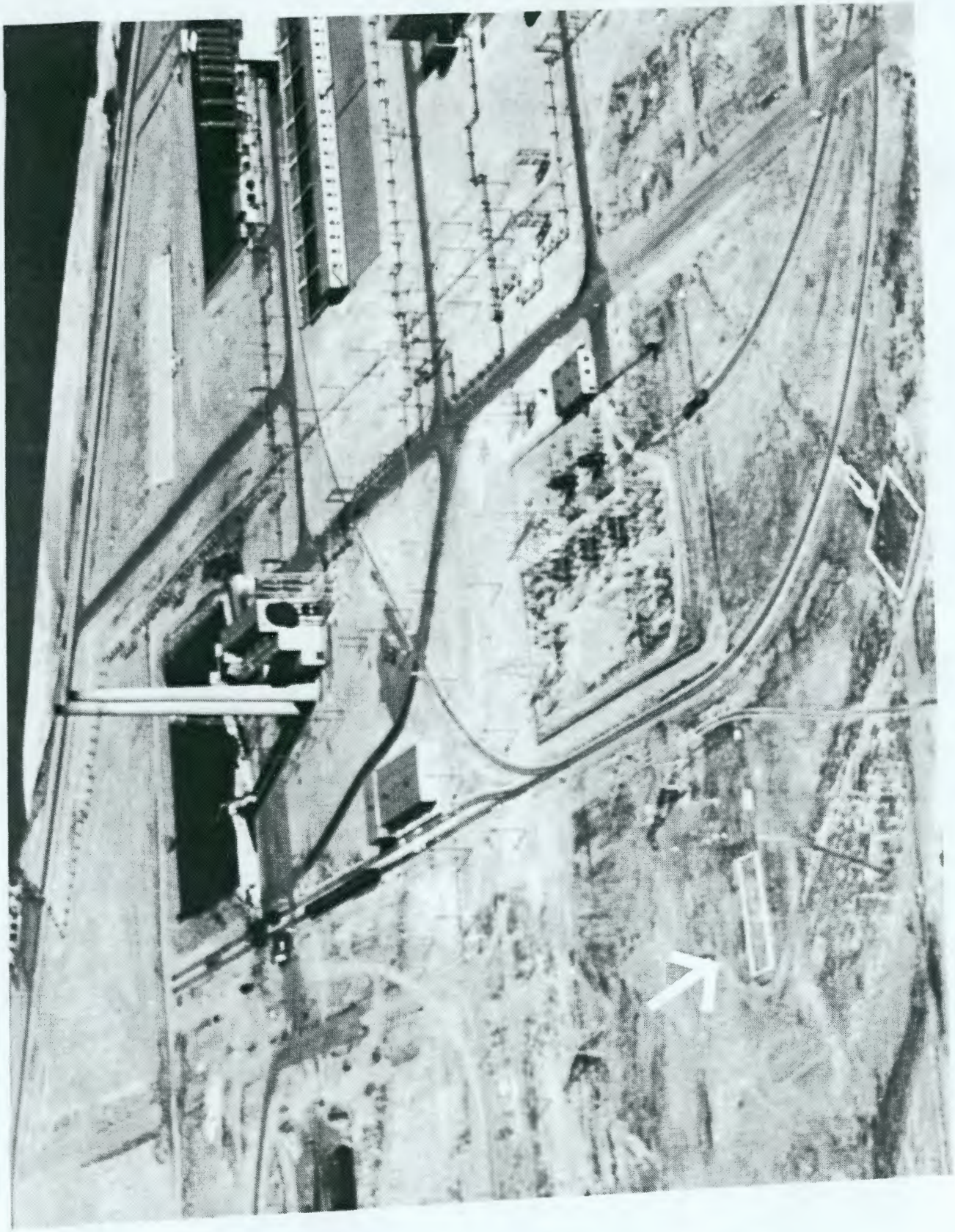
Hanford Site Drawing P-1216 shows the existence of a brine pit and french drain, located adjacent to the railroad tracks west of the 184-H Power House, at approximate Hanford coordinates N96400 W40660.

No additional data on this waste site could be located, but brine pits are common to power houses, and the french drain was probably associated with the brine pit.

Brine pits were used at other Hanford reactor sites for mixing salt and water to produce brine, which was used in regenerating power house water softeners. At other reactor sites, the brine pits were concrete structures that were approximately 20 ft long, 15 ft wide, and 10 ft deep. They were divided by interior walls into multiple chambers. Each chamber had a wooden or metal hatch through which salt was unloaded from rail cars parked on the adjacent railroad track.

No evidence of these waste facilities can be seen today.

Figure 5-9. Suspect Waste Site, Probable Septic Tank.



6.0 DIRECTORY OF 100-H AREA BUILDINGS AND FACILITIES

During the years in which the 100-H Reactor was operating, the 100-H Area contained several major buildings and facilities.

Table 6-1 provides a list of the buildings, mobile offices, facilities, and structures that have been located in the 100-H Area. Many of the original reactor support facilities have been decommissioned and/or demolished. Several inactive buildings and facilities, including the 105-H Reactor Building, remain in place. These buildings and facilities may or may not be important from a waste standpoint.

Table 6-2 provides a list of the buildings, mobile offices, facilities, and structures that remained in the 100-H Area in December 1994.

According to a Hanford FacilitiesCORE list of occupied buildings, Mobile Office MO-348 was the only 100-H Area building with permanently assigned personnel in December 1994 (see Appendix D).

Table 6-1. Buildings, Mobile Offices, Facilities, and Structures That Were Located in the 100-H Area. (5 Sheets)

Building or Facility Number	Comments
MO316	Mobile Office at 105-H. 10 ft wide, 30 ft long.
MO338	Change Room Trailer. 10 ft wide, 30 ft long.
MO348	Mobile Office. 24 ft wide, 54 ft long.
MO668	Mobile Office. 10 ft wide, 52 ft long.
105-H	105-H Reactor Building (also known as the 100-H Reactor and as the H Reactor). The reactor building measured approximately 363 ft by 298 ft and had 840 ft^2 of shop space, 2,200 ft^2 of office space, 46,920 ft^2 of work areas, 3,560 ft^2 of storage space, 3,980 ft^2 of laboratory space, and 17,140 ft^2 of "common" space. The building is "Similar to 105-B except for minor variations in layout and detail" (AEC-GE 1964). It is now abandoned.
106-H	Storage Building. This was a galvanized iron Quonset hutment with plywood flooring. The hutment was 50 ft long, 25 ft wide, and 12 ft high, and provided 1,250 ft^2 of storage space for contaminated equipment. It had no services except electricity for lights and receptacles (AEC-GE 1964).
107-H	Effluent Water Retention Basin. The retention basin was 620 ft long and 280 ft wide, and had the capacity to hold 18 million gallons of water. Its gate house was 22 ft long, 12 ft wide, and 9 ft tall. A small pump house and crib, for the disposal of effluent water to the ground, were associated with the basin (AEC-GE 1964). According to AEC-GE (1964), the retention basin was "Similar to [the] 107-B facility." That document describes the 107-B retention basin as "a reinforced concrete structure divided into two sections with a central flume running the length of the basin. Sluice gates [permitted] the use of each section alternately. Small wood frame structures at the inlet and outlet house instruments and controls for gates, valves, etc."
117-H	Exhaust Air Filter Building. AEC-GE (1964) states that this building was "Identical with 117-B." The reinforced concrete 117-B Exhaust Air Filter Building is described as being 59 ft long, 39 ft wide, and 35 ft in height, and is "almost completely below grade." It "consists of two identical filter cells (capable of individual operation) with [an] operating gallery [in] between. Each filter cell contains two filter banks in series: the first, of the "absolute" type capable of removing 99.95% of 0.3 μ particles; the second, of activated charcoal" (AEC-GE 1964).
181-H	River Pump House. This 125-ft by 54-ft building provided 260 ft^2 of office space, an 8,140-ft^2 work area, and 170 ft^2 of "common" space. It was "Similar to 181-B" and pumped raw river water "to water treatment plants or area reservoir" (AEC-GE 1964). AEC-GE (1964) describes the 181-B River Pump House as being 245 ft long, 50 ft wide, and 20 ft tall. The 181-B Building was of reinforced concrete and concrete block construction with a slab roof that had a built-up felt, tar, and gravel surface. The building contained "a number of electrically-driven 10,000 gal/min, vertical, deep well water pumps," some of which were equipped with steam turbine drives for emergency use. Barometric condensers were mounted on steel frames over the roof (AEC-GE 1964).

Table 6-1. Buildings, Mobile Offices, Facilities, and Structures That Were Located in the 100-H Area. (5 Sheets)

Building or Facility Number	Comments
182-H	Reservoir and Pump House. The pump house was 373 ft long, 49 ft wide, and 22.5 ft high; the reservoir was 438 ft long, 245 ft wide, and 15 ft deep. The reservoir and pump house had the capacity to hold 10 Mgal of water (AEC-GE 1964). AEC-GE (1964) states that it was "Similar to 182-B." That document describes the 182-B Pump House as a reinforced concrete and concrete block structure below ground level that contained "a number of turbine and motor driven pumps used for raw water, condenser water, and filter supply systems." The pumps at 182-B had capacities of up to 6,000 gal/min. The 182-B Reservoir was constructed of reinforced concrete (AEC-GE 1964).
183-H	Filter Plant. AEC-GE (1964) states that the Head House was 134 ft by 63 ft and covered an area of 8,510 ft^2, the Filter Building was 858 ft by 40 ft and covered an area of 34,100 ft^2, and the Pump Room was 134 ft by 37 ft and covered an area of 4,960 ft^2. The Filter Plant provided 420 ft^2 of office space, 4,290 ft^2 of storage space, 54,800 ft^2 of work area, 2,750 ft^2 of "common" space, and 500 ft^2 of laboratory space. According to AEC-GE (1964), the facility was "Similar to 183-B."
184-H	Power House. This building was 200 ft long, 60 ft wide, and 80 ft high. It provided 170 ft^2 of office space, 150 ft^2 of storage space, 54,000 ft^2 of work area, and 1,320 ft^2 of "common" space. AEC-GE (1964) states that it was "A 1,250 ft^2 building housing pumps for lifting waste water to the river" and was "Similar to 184-B." AEC-GE (1964) describes 184-B as a steel frame and concrete block building that provided "steam and emergency electric power." 184-B had four coal-fired boilers, each "rated at 100,000 lb of steam per hour at 225 psig and 460°F," and discharged furnace gas through two 300-ft stacks (AEC-RL 1964).
190-H	Main Pump House. AEC-GE (1964) states that this structure was "Similar to 190-B except in size and pumping system."
1501-H	Fence and Road Lighting.
1503-H	Outside Lines. Electrical.
1506-H	General Communications, including fire alarms.
1603-H	Roads, Walks, Bridges, Culverts, and Parking Areas.
1605-H	Guard Towers and Fences.
1607-H	Sewage Treatment Septic Tanks.
1607-H1	Septic Tank.
1607-H2	Septic Tank.
1607-H3	Septic Tank.
1607-H4	Septic Tank.
1608-H	Waste Water Pump House, Lift Station. AEC-GE (1964) states that this facility was "Similar to 1608-D except for size, 1,150 ft^2." The 1608-D Waste Water Pump House is described as a concrete structure with a subsurface concrete floor and foundation, a concrete roof with a built-up tar and gravel surface, and automatic pumping equipment to remove sump drainage. The 1608-H facility has been abandoned.

Table 6-1. Buildings, Mobile Offices, Facilities, and Structures That Were Located in the 100-H Area. (5 Sheets)

Building or Facility Number	Comments
1701-H	Gate House. AEC-GE (1964) states that it is "Similar to 1701-B except larger, 1,450 ft^2." AEC-GE (1964) describes the 1701-B Gate House as a two-story frame structure with a concrete foundation, a concrete first-floor, a wood second floor, shake siding, and a flat tar- and gravel-surfaced roof. Access to the second floor was by an enclosed stairway. The 1701-H Gate House "served as area badge house and patrol headquarters" (AEC-GE 1964).
1702-H	105 Area Badge House. AEC-GE (1964) states that it is "Similar to 1702-B except for size, 225 ft^2." 1702-B, which is also known as the 105 Area Badge House, was a single-story wooden frame structure with a concrete floor and foundation, asbestos shake siding, and a gable wooden roof covered with "roll-roofing." This badgehouse functioned to provide entrance to the exclusion area.
1703-H	Office Building. This single-story frame structure building with asbestos siding was 106 ft long, 36.5 ft wide, and 26 ft high. It provided 1,740 ft^2 of office space for area administrative and technical personnel and 2,130 ft^2 of "common" space. The building had a concrete block foundation, wood flooring, and a gabled roof with composition shingles (AEC-GE 1964).
1704-H	Office Building. AEC-GE (1964) states that this single-story, "T"-shaped wood frame structure building had asbestos shake siding, a concrete block foundation, wood flooring, a gable, and a "hipped roof" with composition shingles. That document provides two sets of dimensions for the building: 154 ft long, 37 ft wide, and 20 ft high; and 90.5 ft long, 37 ft wide, and 20 ft high. The building provided office facilities for area administrative and technical personnel, providing 5,220 ft^2 of office space, 100 ft^2 of storage space, and 3,730 ft^2 of "common" space. A former Hanford Site employee states that this was the main administration building for all of the reactor areas in the early 1960's.
1709-H	Office Building. AEC-GE (1964) states that this single-story frame structure building had asbestos shake siding, a concrete floor and foundation, and a gabled roof with composition shingles. It was 112 ft long, 58 ft wide, and 12 ft high. The building provided office space for area personnel and had 1,260 ft^2 of office space, 2,480 ft^2 of storage space, 360 ft^2 of work area space, 1,020 ft^2 of "common" space, and 250 ft^2 of space for shops.
1713-H	Warehouse. AEC-GE (1964) states that this material storage and spare parts warehouse was an "L"-shaped, single-story, steel frame structure with corrugated transite siding and a concrete foundation and floor. The roof was built-up tar and gravel surfacing over flat prefabricated concrete tile. AEC-GE (1964) provides two sets of measurements for the building: 156 by 62 ft, and 72 by 60 ft. The building provides 145 ft^2 of office space and 13,650 ft^2 of storage space. A railroad spur with an adjacent 4-ft-high concrete unloading platform is associated with this building (AEC-GE 1964).
1715-H	Oil and Paint Storage. AEC-GE (1964) states that this oil and paint storage facility consists of a wood frame structure with asbestos shake siding, a concrete floor, and a gable roof with composition shingles. The building was 32 ft long, 23 ft wide, and 20 ft high (AEC-GE 1964).

Table 6-1. Buildings, Mobile Offices, Facilities, and Structures That Were Located in the 100-H Area. (5 Sheets)

Building or Facility Number	Comments
1716-H	Office and Garage. AEC-GE (1964) describes this facility as a steel frame structure with corrugated transite siding, a concrete floor and foundation, and a flat wooden roof with a built-up tar and gravel surface. The building was equipped to function as a light maintenance and repair service station. At the time that AEC-GE (1964) was written, "Approximately one-half of the building [had] been converted to shops for the maintenance, calibration, and repair of electrical and electronic instruments." The building was 93 ft long, 76.5 ft wide, and 20 ft high. It provided 480 ft^2 of office space, 4,630 ft^2 of work area space, 600 ft^2 of storage space, and 1,490 ft^2 of "common" space (AEC-GE 1964).
1717-H	Central Maintenance Shops. AEC-GE (1964) states that this facility was a concrete and steel structure with corrugated transite walls, a concrete foundation and floor, and a flat, prefabricated concrete tile roof with a built-up tar and gravel surface. It is 248 ft long, 82 ft wide, and 20 ft high, and provided 1,110 ft^2 of office space, 13,025 ft^2 of space for shops, 4,650 ft^2 of storage space, and 1,550 ft^2 of "common" space. The building was "completely renovated" in 1964; a sprinkler-type fire control system was installed and lighting was upgraded. At that time, the building housed a machine shop; a fabrication shop, which was "outfitted for fabrication and repair of reactor system components, particularly those associated with water treatment and pumping systems"; a sheet metal shop; and a carpenter shop. These shops provided centralized maintenance services "for all of the 100 Area operations" (AEC-GE 1964).
1719-H	First Aid. This single-story, "T"-shaped wood frame structure had asbestos shake siding, a concrete foundation and floor, and a wood gable roof with composition shingles. AEC-GE (1964) provides two sets of dimensions for the building: 55 ft long, 17.5 ft wide, and 18 ft high and 43.5 ft long, 29.5 ft wide, and 18 ft high. The building provided 460 ft^2 of office space, 100 ft^2 of storage space, 945 ft^2 of work area space, 460 ft^2 of "common" space, and 315 ft^2 of laboratory space. It contained a first aid room, an examination room, a laboratory, a ward, and office and sanitary facilities (AEC-GE 1964).
1720-H	Patrol Headquarters. This single-story wood frame structure had a concrete foundation and floor, asbestos shake siding, and a gable roof with composition shingles. It provided offices and associated facilities (including locker, assembly, supply rooms, wash/shower rooms, and radio rooms) for area security patrol personnel. It was 90.5 ft long, 32 ft wide, and 15 ft high, and provided 520 ft^2 of office space, 1,150 ft^2 of work area space, and 1,300 ft^2 of "common" space. An emergency lighting generator building, of frame construction, is associated with the Patrol Headquarters Building (AEC-GE 1964).
1720-HA	Storage Arsenal. Abandoned.
1722-H	Paint Shop. This single-story frame structure had a concrete foundation and floor, asbestos shake siding, a gable roof with composition shingle surfacing, and a 6-ft-wide concrete unloading dock along one end. It covered a total area of 1,500 ft^2, with 620 ft^2 allotted to work area space, 810 ft^2 allotted to storage space, and 70 ft^2 allotted to "common" space. The building contained typical painting equipment, as well as equipment for metal spraying and sign painting facilities (AEC-GE 1964).
1760-H	Office Building AEC-GE (1964) states that this building is "Similar to 1760-D." However, neither that document nor Carpenter (1993) provides information about the 1760-D Building.
1761-H	Office Building. AEC-GE (1964) states that this building is "Identical to [the] 1760-H Building except for slight differences in layout."

Table 6-1. Buildings, Mobile Offices, Facilities, and Structures That Were Located in the 100-H Area. (5 Sheets)

Building or Facility Number	Comments
1901-H	Water Lines. General.
1902-H	Fire Lines. General.
1905-H	Underground Drainage, Sewers.

(Hanford FacilitiesCORE, 12/09/94, Appendix D; AEC-GE 1964)

Table 6-2. Buildings, Mobile Offices, Facilities, and Structures Located in the 100-H Area as of October 1994.

Building or Facility Number	Comments
MO316	Mobile Office at 105-H. 10 ft wide, 30 ft long.
MO338	Change Room Trailer. 10 ft wide, 30 ft long.
MO348	Mobile Office. 24 ft wide, 54 ft long.
MO668	Mobile Office. 10 ft wide, 52 ft long.
105-H	105-H Reactor Building (also known as the 100-H Reactor and as the H Reactor). Abandoned.
1501-H	Fence and Road Lighting.
1503-H	Outside Lines. Electrical.
1506-H	General Communications, including fire alarms.
1603-H	Roads, Walks, Bridges, Culverts, and Parking Areas.
1605-H	Guard Towers and Fences.
1607-H	Sewage Treatment Septic Tanks.
1607-H1	Septic Tank.
1607-H2	Septic Tank.
1607-H3	Septic Tank.
1607-H4	Septic Tank.
1608-H	Waste Water Pump House, Lift Station. Abandoned.
1713-H	Warehouse.
1720-HA	Storage Arsenal. Abandoned.
1901-H	Water Lines: General.
1902-H	Fire Lines: General.
1905-H	Underground Drainage, Sewers.

(Hanford FacilitiesCORE, 12/09/94, Appendix D)

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8.0 HANFORD SITE DRAWINGS REFERENCED IN TEXT

Drawing Number	Description
H-1-4047	Unknown
H-1-13484	Burial Ground, 100-H Area
H-1-14732	Permanent Burial Grounds, Plan and Details, 100-H Area
H-1-15245	Permanent Markers, Burial Waste, Terminated 100-H Site
H-1-15397	Vicinity Map, 100-H Terminated Burial Sites
H-1-15859	H-538 Permanent Markers, Burial Waste, 100-H Site
H-1-19824	Civil Plot Plan, 117-H Crib Area
H-1-19825	Civil Crib Plan and Details, 117-H
M-1904-H, Shts 3, 4, and 6	Outside Lines--Sewers, 100-H Area
P-1041	100-H Area Layout
P-1216	Underground Services, Sewer and Water Sect., 100-H Area
P-1220	Underground Services, Sewer and Water 100-H
P-1221	Underground Service, Sewer and Water, 100-H Area
P-1230	Underground Services, Sewer and Water Sect., 100-H Area
P-1247	Overhead Steam Distribution Sheet #3, 100-H Area
P-1269	Septic Tank and Tile Field Details, 100-H Area
P-1756	Process Area Plan Below Elevation 0' 0", 105-H
P-1758	Key Plan Area High Roof Steel Framing, 105-H
P-1759	Ground Floor Plan, 105-H
P-1897	Elevations, Roof Plan, Sections and Details, 1716-H
P-3132	Prestone Tank, 150 Gal. Capacity, 100-H Area
P-3475	Burial Trench, Cross Section, 100-H Area
P-4273	Foundation Plan and Details, 1716-H
P-9343	Rearrangement of 1717-H Shop, Piping Modifications
SK-1-7325	Floor Plan, Existing Building, 1717-H
SK-1-7328	Plans and Sections, Proposed Building Addition, 1717-H
SP-4850	100-H Water Flow Diagram

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DRAWINGS:

H-1-1298	Waste Disposal Crib, 100-H Area
H-1-13254	Plot Plan, Chemical Addition Storage Tanks
H-1-14601	Fire and Sanitary Water Modifications, 100-H Area
M-1600-H	Topographic Map, 100-H Area
M-1901-H, Shts 1 through 6	Outside Lines--Underground Water, 100-H Area
M-2954, Shts 2 and 3	Topographic Map
P-1005	100-H Area Soil Test Locations
P-1009, Shts 1 through 18	100-H Area Plot Plan, Area West of Main Entrance
P-1021	100-H Area Topography
P-1022	100-H Area Topography
P-1023	100-H Area Topography
P-1024	100-H Area Topography
P-1026	100-H Area Topography
P-1028	100-H Area Topography
P-1029	100-H Area Topography
P-1032	100-H Area Topography
P-1201	General Plan, 100-H Area
P-1211	Underground Service, Sewer and Water, 100-H Area
P-1220	Underground Service, Sewer and Water, 100-H Area
P-1225	Underground Service, Sewer and Water, 100-H Area
P-1270	Arrangement of Gas Piping Handling Area, 100-H Area
P-1326	General Plan, 100-H Area
P-1337	Hot Well Discharge and Fish Flume, 100-H Area
P-1341	Pump House and Reservoir General Arrangement, 100-H Area
P-1410	Chemical Feed Piping, 100-H Area
P-1413	Drains and Sewers, 100-H Area
P-1419	Brine Pit and Piping, 100-H Area
P-1437	Drains and Service Lines, 100-H Area
P-1679	Aerial Distribution, Section #1, 100-H Area
P-1706	Lighting and Power Plan, 1716-H
P-1941	Ground Floor Plan and Schedules, 1717-H
P-2092	Expansion Boxes for 60' Process Sewers, 100-H Area
P-3133	Prestone Tank Support Details, 100-H Area
P-3485	1716-H Building Gas Pump Concrete Slab
P-4268	Foundation Plan and Details, 1717-H
P-4316	Underground Services, Sewers Details, 100-H Area
P-4335	Underground Services, Process Sewer--Manhole, 100-H Area
P-4336	Underground Services, Process Sewer--Manhole, 100-H Area

DRAWINGS (Continued):

P-4337	Underground Services, Process Sewer--Manhole, 100-H Area
P-4338	Underground Services, Miscellaneous Details, 100-H Area
P-4411	Underground Services, Miscellaneous Details, 100-H Area
SK-1-3227	Area Maintenance Shop, 100-H Area
SK-1-3856	Effluent Line Gravity Flow, 100-H Area
SK-1-5556	Facility Location, 100-H Area
SK-1-7102	Site Plan, 100-H Area
SK-1-7326	Floor Plan, Proposed Building Addition, Scheme I, 1717-H
SK-1-7327	Floor Plan, Proposed Building Addition, Scheme II, 1717-H
SP-2329	100-H Area Flow Diagram
SP-4031	100-H Water Flow Diagram
SP-4850	100-H Water Flow Diagram
SP-10711	Wier Box Detail, 100-H Area

APPENDIX A

SYNOPTIC CHRONOLOGY OF SIGNIFICANT 100-H REACTOR EVENTS

APPENDIX A

SYNOPTIC CHRONOLOGY OF SIGNIFICANT 100-H REACTOR EVENTS

Date	Event
October 29, 1949	The initial startup of the 100-H Reactor took place. The reactor operated at 400 MW.
June 1950	The irradiation of lithium-aluminum target elements for the production of tritium was begun.
March 1951	The discharge exposure of natural uranium was raised from 40 MWd/ton to 600 MWd/ton.
November 1952	Twenty process tubes were charged with enriched uranium alloy to augment reactivity and flattening.
January 1953	Further enrichening took place. Forty-eight tubes (30 pieces/tube) were enriched with 4.125% ^{235}U.
April 1953	The Ball 3X System was installed.
July 1953	The Ball 3X System was connected to the auto-scram circuit.
January 1954	Helium replaced carbon dioxide as the startup gas.
January 1954	The number of fuel pieces per storage bucket was raised to 280.
March 1954	The irradiation of thorium to produce ^{233}U was begun.
April 1955	The irradiated metal cooling time was increased from 90 to 105 days, because of a problem with iodine emissions.
July 1955	Horizontal control rods, panellit gages, and the beta monitoring system were replaced, and the orifice pattern was revised to provide 3,000 gal/min of additional cooling water flow.
December 1955	The process of replacing aluminum process tubes was begun.
January 1957	Separan feed facilities were installed. Separan is a coagulant aid used to filter cooling water.
July 1957	Project CG-558 (which increased the coolant water flow, allowing higher operating levels) was completed.
January 1958	The operating power level reached 1,440 MW.
July 1958	The use of internally-cooled fuel elements was begun.
January 1959	1,300 rear pigtails were replaced with the o-ring type.
April 1959	The KAPL-120 test loop was installed.
January 1961	The absolute filtering of reactor air was begun.

Date	Event
January 1961	The operating power level reached 2,090 MW.
May 1961	The use of "E-N" (lithium-alloy and enrichment) fuel elements was begun. 850 tubes were charged.
April 1962	A Bonneville Power Administration (BPA) power failure caused the reactor to scram.
July 1962	A BPA power failure caused the reactor to scram.
July 1963	The 100-H Reactor set a Hanford Site record with 60.6 days of continuous operation.
December 1963	The reactor's operating power level reached 1,955 MW.
December 1963	The reactor's cooling water flow was increased to 93,200 gal/min.
February 1964	The reactor's operating power level reached 2.090 MW and its outlet water temperature reached 93.5 °C.
September 1964	The 100-H Reactor set a Hanford Site record with 68.7 days of continuous operation.
April 21, 1965	The 100-H Reactor was deactivated.
May 1965	The final fuel discharge was completed at 100-H Reactor.

DeNeal, D. L., 1970, *Historical Events - Single Pass Reactors and Fuels Fabrication*, DUN-6888, Douglas United Nuclear, Richland, Washington.

APPENDIX B

DORIAN AND RICHARDS (1978) SOIL SAMPLING RESULTS

TABLE 2.6-1

Radioactive Concentrations (pCi/g) In and Near the Retention Basins

	Beta-Gamma		Pu-238		Pu-239/240	
	Ave.	Max.	Ave.	Max.	Ave.	Max.
Sludge						
107-B	6.1×10^{4}	1.8×10^{5}	1.9×10^{0}	8.7×10^{0}	5.8×10^{1}	3.4×10^{2}
107-C	1.8×10^{4}	5.5×10^{4}	2.4×10^{0}	9.0×10^{0}	6.5×10^{1}	2.3×10^{2}
107-D	6.2×10^{4}	1.4×10^{5}	2.2×10^{0}	4.7×10^{0}	1.1×10^{2}	2.9×10^{2}
107-DR	2.8×10^{4}	7.1×10^{4}	7.1×10^{-1}	2.3×10^{0}	3.0×10^{1}	8.2×10^{1}
107-F	2.5×10^{4}	4.7×10^{4}	3.1×10^{-1}	1.1×10^{0}	1.1×10^{1}	4.5×10^{1}
107-H	3.1×10^{4}	1.0×10^{5}	2.1×10^{0}	7.7×10^{0}	5.7×10^{1}	2.0×10^{2}
107-KE	1.2×10^{3}	3.4×10^{3}	1.0×10^{-1}	6.2×10^{-1}	1.2×10^{0}	4.6×10^{0}
107-KW	2.6×10^{3}	3.2×10^{3}	*	*	2.0×10^{0}	8.3×10^{0}
Fill Less Sludge						
107-B	5.9×10^{2}	9.5×10^{3}	3.9×10^{-3}	3.9×10^{-2}	7.1×10^{-1}	1.0×10^{1}
107-C	2.7×10^{2}	1.2×10^{3}	5.4×10^{-2}	4.9×10^{-1}	7.8×10^{-1}	1.6×10^{1}
107-D	2.3×10^{2}	7.6×10^{2}	1.2×10^{-3}	7.2×10^{-3}	4.2×10^{-1}	1.6×10^{0}
107-DR	2.4×10^{2}	6.6×10^{3}	1.6×10^{-2}	1.1×10^{-1}	6.2×10^{-1}	4.0×10^{0}
107-F	9.8×10^{1}	4.5×10^{2}	*	*	7.5×10^{-2}	3.7×10^{-1}
107-H	4.0×10^{2}	7.2×10^{3}	*	1.0×10^{0}	1.5×10^{0}	2.2×10^{1}
107-KE	7.3×10^{0}	1.9×10^{1}	*	*	*	*
107-KW	2.4×10^{1}	4.8×10^{1}	*	*	*	*
Underneath						
107-B 0-20'	1.8×10^{3}	5.4×10^{3}	1.0×10^{-1}	5.8×10^{-1}	5.0×10^{0}	1.8×10^{1}
107-C 0-8'	1.5×10^{3}	4.3×10^{3}	*	*	2.0×10^{0}	5.4×10^{0}
107-C 8-20'	2.5×10^{2}	1.1×10^{3}	*	*	4.7×10^{-1}	1.9×10^{0}
107-D 0-6'	1.3×10^{2}	1.9×10^{2}	*	*	3.8×10^{-1}	6.0×10^{-1}
107-D 6-10'	2.8×10^{1}	3.2×10^{1}	*	*	*	*
107-DR 0-3'	3.7×10^{2}	1.3×10^{3}	*	*	3.1×10^{-1}	1.0×10^{0}
107-DR 3-10'	2.0×10^{1}	4.1×10^{1}	*	*	3.4×10^{-1}	2.4×10^{0}
107-F 0-5'	5.4×10^{2}	1.3×10^{3}	*	*	1.1×10^{0}	3.0×10^{0}
107-F 5-10'	4.3×10^{1}	8.8×10^{1}	*	*	*	*
107-H 0-3'	2.0×10^{2}	3.6×10^{2}	*	*	*	*
107-H 3-10'	3.1×10^{1}	4.8×10^{1}	*	*	9.0×10^{-2}	1.8×10^{-1}
Adjacent						
107-B surface	2.9×10^{3}	2.9×10^{3}	*	*	5.0×10^{-1}	5.0×10^{-1}
107-B underground	7.4×10^{-1}	5.6×10^{2}	*	*	2.2×10^{-1}	3.3×10^{0}
107-C surface	9.8×10^{1}	2.2×10^{2}	*	*	5.1×10^{-1}	7.3×10^{-1}
107-C underground	1.2×10^{1}	2.2×10^{1}	*	*	1.4×10^{-2}	4.1×10^{-2}
107-D underground	2.7×10^{2}	2.1×10^{3}	1.1×10^{-2}	4.8×10^{-1}	5.3×10^{-1}	1.3×10^{1}
107-DR underground	5.3×10^{1}	1.3×10^{3}	*	*	6.9×10^{-2}	1.5×10^{0}
107-F underground	2.2×10^{2}	2.0×10^{3}	*	5.2×10^{-3}	2.4×10^{-1}	2.1×10^{0}
107-H underground	1.2×10^{2}	8.8×10^{2}	1.2×10^{-2}	3.0×10^{-1}	3.5×10^{-1}	3.2×10^{0}
107-KE surface	4.8×10^{1}	1.7×10^{2}	*	*	3.0×10^{-2}	2.1×10^{-1}
107-KE underground	1.4×10^{1}	4.8×10^{1}	*	*	*	*
107-KW surface	2.8×10^{2}	1.6×10^{3}	*	*	3.2×10^{-1}	3.2×10^{0}
107-KW underground	2.8×10^{0}	5.9×10^{0}	*	*	*	*
Concrete						
Ave of all basins	1.4×10^{3}		3.1×10^{-2}		1.8×10^{0}	

TABLE 2.6-2

Beta-Gamma Inventories In and Near the Retention Basins

107 Basin Beta-Gamma Inventories

Basin	Sludge	Fill Less Sludge	Concrete	Underneath	Adjacent	Total Curies
107-B	92	16	8	280	24	420
107-C	9	4		170	4	187
107-D	75	4.1	8	6.6	27	121
107-DR	54	7.3	13	15	3.5	93
107-F	45	2.9	8	22	15	93
107-H	60	18	13	9.6	17	118
107-KE	0.35	0.15			6.2	6.7
107-KW	0.51	0.48			3.9	4.9

Percentage of Total Basin Inventory

Basin	Sludge	Fill Less Sludge	Concrete	Underneath	Adjacent	Inside	Outside
107-B	22	4	2	66	6	28	72
107-C	5	2		91	2	7	93
107-D	62	3	7	6	22	72	28
107-DR	58	8	14	10	4	80	20
107-F	48	3	9	24	16	60	40
107-H	51	15	11	8	15	77	23
107-KE	5	2			93	7	93
107-KW	10	10			80	20	80
					Average	44	56

TABLE 2.6-3

Pu-238, Pu-239/240 Inventories In and Near the Retention Basins

107 Basin Pu-238, Pu-239/240 Inventories

Basin	Sludge	Fill Less Sludge	Concrete	Underneath	Adjacent	Total Curies
107-B	9.0×10^{-2}	1.8×10^{-2}	1.0×10^{-2}	7.7×10^{-1}	6.0×10^{-2}	9.5×10^{-1}
107-C	3.3×10^{-2}	1.3×10^{-2}	--	2.5×10^{-1}	8.0×10^{-3}	3.0×10^{-1}
107-D	1.4×10^{-1}	7.6×10^{-3}	1.0×10^{-2}	1.7×10^{-2}	5.4×10^{-2}	2.3×10^{-1}
107-DR	5.8×10^{-2}	2.5×10^{-2}	1.6×10^{-2}	3.9×10^{-2}	4.5×10^{-3}	1.4×10^{-1}
107-F	2.0×10^{-2}	2.2×10^{-3}	1.0×10^{-2}	4.1×10^{-2}	1.6×10^{-2}	8.9×10^{-2}
107-H	1.1×10^{-1}	6.8×10^{-2}	1.6×10^{-2}	7.4×10^{-3}	5.0×10^{-2}	2.5×10^{-1}
107-KE	2.6×10^{-4}	0.0	--	--	3.0×10^{-4}	5.6×10^{-4}
107-KW	4.2×10^{-4}	0.0	--	--	3.2×10^{-3}	3.6×10^{-3}

Percentage of Pu Inventory

Basin	Sludge	Fill Less Sludge	Concrete	Underneath	Adjacent	Inside	Outside
107-B	10	2	1	81	6	13	87
107-C	11	4	--	82	3	15	85
107-D	61	3	5	7	24	69	31
107-DR	40	18	11	28	3	69	31
107-F	23	2	11	46	18	36	64
107-H	44	27	6	3	20	77	23
107-KE	46	0.0	--		54	46	54
107-KW	11	0.0	--		89	11	89
					Average	42	58

TABLE 2.6-4

Relative Percentages of Various Basin Materials
Compared to Sludge Concentrations

Percentage of Basin Sludge Beta-Gamma Concentrations

Basin	Fill Less Sludge	Concrete	Underneath <10'	Underneath >10'	Adjacent Surface	Adjacent Underground
107-B	1	2	3	3	5	0.001
107-C	1	--	8	1	0.5	0.07
107-D	0.4	2	0.2	0.05	--	0.4
107-DR	0.9	5	1	0.07	--	0.2
107-F	0.4	6	2	0.2	--	0.9
107-H	1	5	0.7	0.1	--	0.4
107-KE	0.6	--	--	--	4	1
107-KW	0.9	--	--	--	11	0.1
Average	0.8	4	2	0.7	3	0.4

Percentage of Basin Sludge Pu-238, Pu-239/240 Concentrations

Basin	Fill Less Sludge	Concrete	Underneath <10'	Underneath >10'	Adjacent Surface	Adjacent Underground
107-B	1	3	8	8	0.8	0.4
107-C	1	--	3	0.7	0.8	0.02
107-D	0.4	2	0.4	0.0	--	0.5
107-DR	2	6	1	1	--	0.2
107-F	0.7	16	10	0.0	--	2
107-H	2	3	0.0	0.1	--	0.6
107-KE	0.0	--	--	--	2	0.0
107-KW	0.0	--	--	--	16	0.0
Average	0.9	6	4	2	2	0.5

TABLE 2.6-5

107 Liquid Waste Trenches

Trench	Total Curies	Concentrations (pCi/g) Beta-Gamma Ave.	Beta-Gamma Max.	Pu-238 Ave.	Pu-238 Max.	Pu-239/240 Ave.	Pu-239/240 Max.
116-B-1	3.1	6.4×10^{1}	3.6×10^{2}	2.1×10^{-3}	1.7×10^{-2}	1.7×10^{-1}	9.9×10^{-1}
116-C-1	79	4.4×10^{2}	3.2×10^{3}	*	*	7.4×10^{-1}	5.3×10^{0}
116-K-1	46	3.8×10^{2}	1.7×10^{3}	1.2×10^{-1}	4.8×10^{-1}	1.2×10^{0}	4.4×10^{0}
116-K-2	2100	3.6×10^{3}	7.0×10^{4}	3.3×10^{-1}	4.0×10^{0}	8.5×10^{0}	1.3×10^{2}
116-DR-1&2	31	2.5×10^{2}	1.7×10^{3}	*	*	2.9×10^{-1}	3.2×10^{0}
116-F-2	15	1.8×10^{2}	8.2×10^{2}	*	*	8.6×10^{-2}	3.6×10^{-1}
116-H-1	33	5.3×10^{2}	5.3×10^{3}	5.4×10^{-2}	3.5×10^{-1}	1.1×10^{0}	1.1×10^{1}

TABLE 2.7-74

107-H RETENTION BASIN

SAMPLE HOLES DRILLED OUTSIDE OF BASIN

Concentration (pCi/g)

Sample No.	Pu-238	Pu-239/240	Sr-90	H-3	P-11/Scaler c/m	Eu-152	Co-60	Eu-154	Cs-134	Cs-137	Eu-155	U	C-14
A 20	*	$2.3x10^{-1}$	$9.8x10^{-1}$		<200	$1.6x10^{-1}$	*	*	*	*	*		
B 15					<200	$8.6x10^{0}$	$7.1x10^{0}$	$3.2x10^{0}$	$1.4x10^{-1}$	$2.2x10^{0}$	$1.3x10^{0}$		
16	$3.0x10^{-1}$	$3.2x10^{0}$	$9.5x10^{0}$		1000	$2.3x10^{2}$	$1.9x10^{2}$	$6.8x10^{1}$	*	$8.2x10^{1}$	$1.3x10^{1}$	$4.0x10^{-1}$	*
20	*	$1.2x10^{0}$	$4.7x10^{0}$		600	$1.6x10^{2}$	$1.2x10^{2}$	$4.7x10^{1}$	*	$1.8x10^{1}$	$7.3x10^{0}$		
25	*	*	$6.8x10^{-1}$		<200	$1.6x10^{0}$	$9.0x10^{-1}$	$3.4x10^{-1}$	*	$3.8x10^{0}$	$1.8x10^{0}$		
C 15	*	*	$3.8x10^{-1}$		<200	*	*	$2.1x10^{-1}$	*	*	$1.4x10^{-1}$		*
D 10					<200	$3.8x10^{-1}$	$7.2x10^{-2}$	*	$8.0x10^{-2}$	$1.2x10^{0}$	$2.2x10^{-1}$		
20	*	*	$1.4x10^{0}$		<200	$3.6x10^{-1}$	$3.8x10^{-2}$	*	*	$3.1x10^{-2}$	$3.7x10^{-2}$	$2.8x10^{-1}$	*
H 5					<200	*	*	*	*	*	$1.5x10^{-1}$		
15	*	*	$2.0x10^{-1}$		<200	$1.6x10^{-1}$	*	*	*	$3.4x10^{-2}$	$1.9x10^{-1}$		*
19-1/2	*	$1.5x10^{0}$	$1.0x10^{0}$		1000	$4.7x10^{2}$	$2.4x10^{2}$	$1.3x10^{2}$	*	$1.5x10^{1}$	$2.4x10^{1}$		*
25	*	*	$5.9x10^{-1}$		200	$3.5x10^{1}$	$2.6x10^{1}$	$1.1x10^{1}$	*	$7.5x10^{0}$	$2.3x10^{0}$	$5.1x10^{-1}$	*
30	*	*	$5.0x10^{-1}$		<200	$3.5x10^{0}$	$2.3x10^{0}$	$1.2x10^{0}$	*	$2.7x10^{0}$	$5.9x10^{-1}$		
I 10					<200	*	*	*	*	*	$2.5x10^{-1}$		
20	*	*	$5.1x10^{-1}$		<200	$1.2x10^{0}$	$8.7x10^{0}$	$5.8x10^{-1}$	*	$2.9x10^{0}$	$2.1x10^{-1}$		
25	*	$5.0x10^{-1}$	$8.7x10^{-1}$		1000	$3.2x10^{2}$	$3.0x10^{2}$	$1.1x10^{2}$	*	$1.4x10^{1}$	$1.9x10^{1}$	$4.1x10^{-1}$	*
30	*	*	$4.9x10^{-1}$		<200	*	$1.5x10^{-1}$	*	*	$5.2x10^{0}$	$1.6x10^{-1}$		
J 15					<200	*	*	*	*	*	$1.8x10^{-1}$		
25	*	*	$6.3x10^{-1}$		<200	$4.7x10^{-1}$	$3.0x10^{0}$	$3.2x10^{-1}$	*	$1.8x10^{0}$	$1.2x10^{-1}$		
35	*	*	$1.1x10^{0}$		<200	$1.6x10^{-1}$	*	*	*	$5.1x10^{-1}$	*		
K 10	*	$1.9x10^{-1}$	$3.3x10^{-1}$		<200	$7.1x10^{-1}$	$5.3x10^{-1}$	*	*	*	$1.0x10^{-1}$		
15	*	$1.6x10^{-1}$	$4.1x10^{0}$		500	$4.2x10^{1}$	$1.0x10^{2}$	$1.6x10^{1}$	*	$4.1x10^{1}$	$3.5x10^{0}$	$4.1x10^{-1}$	*
20	*	*	$2.5x10^{0}$		300	$4.9x10^{1}$	$3.1x10^{1}$	$1.4x10^{1}$	*	$1.2x10^{1}$	$2.7x10^{0}$		
30	*	*	$2.0x10^{0}$		<200	$1.6x10^{1}$	$2.3x10^{1}$	$4.4x10^{0}$	*	$2.6x10^{1}$	$1.2x10^{0}$		
L 5	*	*	$5.8x10^{-2}$		<200	$2.9x10^{-1}$	$8.9x10^{-2}$	*	*	$6.8x10^{-2}$	$8.3x10^{-2}$		
10	*	$1.2x10^{0}$	$6.9x10^{-1}$		600	$1.6x10^{2}$	$1.3x10^{2}$	$5.3x10^{1}$	*	$6.7x10^{1}$	$7.6x10^{0}$		
15	*	$1.9x10^{0}$	$1.8x10^{1}$		400	$9.8x10^{1}$	$7.2x10^{1}$	$3.3x10^{1}$	*	$6.2x10^{1}$	$5.4x10^{0}$	$3.5x10^{-1}$	*
20	*	*	$8.9x10^{-1}$		<200	$1.0x10^{0}$	$3.8x10^{-1}$	$3.0x10^{-1}$	*	$3.1x10^{1}$	$2.3x10^{-1}$		
25	*	*	$1.2x10^{0}$		<200	$1.7x10^{0}$	$9.2x10^{-1}$	$8.8x10^{-1}$	*	$2.2x10^{1}$	$5.6x10^{-2}$		
M 10					<200	$2.0x10^{-1}$	*	*	*	*	$2.4x10^{-1}$		
15	*	*	$8.7x10^{-2}$	$4.4x10^{-1}$	<200	$1.0x10^{-1}$	$1.5x10^{-1}$	*	*	$9.9x10^{-2}$	$6.7x10^{-2}$	$2.0x10^{-1}$	*

TABLE 2.7-74 (Cont'd)

107-H RETENTION BASIN (Cont'd)

SAMPLE HOLES DRILLED OUTSIDE OF BASIN

Concentration (pCi/g)

Sample No.	Pu-238	Pu-239/240	Sr-90	H-3	P-11/Scaler c/m	Eu-152	Co-60	Eu-154	Cs-134	Cs-137	Eu-155	U	C-14
N 10	*	*	6.0×10^{-1}		<200	*	*	*	*	*	9.5×10^{-2}		
18	*	*	1.1×10^{-1}		<200	*	6.0×10^{-2}	*	*	4.5×10^{-2}	1.1×10^{-1}	1.9×10^{-1}	*
O 5	*	*	2.0×10^{-1}		<200	1.9×10^{-1}	7.2×10^{-2}	*	*	3.4×10^{-2}	3.0×10^{-1}		
10	*	5.2×10^{-1}	1.0×10^{0}		500	1.1×10^{2}	6.0×10^{1}	4.1×10^{1}	*	3.3×10^{1}	7.4×10^{0}		
15	7.9×10^{-2}	5.9×10^{-1}	3.1×10^{0}		450	1.8×10^{2}	8.0×10^{1}	5.7×10^{1}	*	3.9×10^{1}	1.1×10^{1}		
P 10	*	*	*		<200	*	*	*	*	*	*		
20	*	*	3.3×10^{0}	5.3×10^{-1}	<200	1.9×10^{-1}	2.7×10^{-1}	*	*	*	5.1×10^{-2}	3.8×10^{-1}	*
30	*	*	3.1×10^{-2}		<200	*	6.1×10^{-2}	*	*	4.2×10^{-2}	1.0×10^{-1}		
Q 10	2.7×10^{-2}	1.4×10^{-1}	1.3×10^{-1}		<200	*	*	2.8×10^{-1}	*	3.0×10^{-2}	6.0×10^{-2}		
20	*	1.3×10^{-2}	2.6×10^{-2}	7.4×10^{-1}	<200	*	*	*	*	*	8.6×10^{-2}	2.9×10^{-1}	
25					<200	*	*	*	*	*	2.4×10^{-1}		
30	*	*	3.4×10^{-2}		<200	1.9×10^{-1}	*	*	*	*	8.8×10^{-2}		
W 10					<200	*	*	*	*	4.9×10^{-2}	3.6×10^{-1}		
15	*	*	2.3×10^{-2}		<200	*	*	*	*	3.6×10^{-2}	*		
20	*	*	1.7×10^{2}	4.3×10^{1}	<200	2.5×10^{-1}	3.1×10^{-1}	*	*	4.7×10^{-2}	*	3.0×10^{-1}	
30	*	*	*		<200	*	5.0×10^{-2}	*	*	*	1.0×10^{-1}		
River Beach Sample	*	1.3×10^{-1}	8.7×10^{-1}	1.4×10^{0}	<200	*	1.0×10^{-1}	3.6×10^{-1}	*	2.5×10^{-1}	8.5×10^{-2}	4.5×10^{-1}	

TABLE 2.7-75

107-H RETENTION BASIN

SAMPLE HOLES DRILLED INSIDE OF BASIN

Concentration (pCi/g)

Sample No.	Pu-238	Pu-239/240	Sr-90	H-3	P-11/Scaler c/m	Eu-152	Co-60	Eu-154	Cs-134	Cs-137	Eu-155	U	Ni-63	C-14
X 1	*	*	$1.3x10^{0}$		<200	$1.6x10^{-1}$	*	*	*	$4.7x10^{-2}$	*			
2	*	*	$9.8x10^{-1}$		<200	$3.8x10^{-1}$	*	*	*	$5.2x10^{-2}$	$7.8x10^{-2}$			
2-1/2	*	$4.7x10^{-1}$	$3.0x10^{0}$		200	$7.8x10^{1}$	$1.9x10^{1}$	$2.6x10^{1}$	*	$2.0x10^{0}$	$2.3x10^{0}$			
3	$5.1x10^{-1}$	$1.4x10^{1}$	$1.4x10^{2}$	$1.9x10^{1}$	10,000	$8.1x10^{2}$	$2.1x10^{2}$	$2.7x10^{2}$	$1.2x10^{3}$	$3.0x10^{1}$	$1.3x10^{1}$	$8.3x10^{-1}$	$1.2x10^{3}$	*
3C	$1.5x10^{-1}$	$3.9x10^{0}$	$4.4x10^{1}$		3,000	$3.6x10^{1}$	$9.1x10^{1}$	$1.4x10^{2}$	$5.2x10^{2}$	$6.2x10^{1}$	$8.3x10^{1}$		$5.2x10^{2}$	
5-1/2	*	*	$1.8x10^{-1}$	$3.7x10^{0}$	200	$8.7x10^{1}$	$8.5x10^{1}$	$2.9x10^{1}$	*	$1.5x10^{2}$	$1.6x10^{0}$	$4.4x10^{-1}$		*
7-1/2	*	*	$8.9x10^{-1}$		<200	$5.0x10^{-1}$	$3.2x10^{-1}$	*	*	$1.4x10^{0}$	$9.7x10^{-2}$			
12-1/2	*	*	$6.7x10^{0}$		<200/20	$2.2x10^{-1}$	$7.1x10^{-2}$	*	*	$3.6x10^{0}$	$1.1x10^{-1}$			
Y 1	*	*	$2.5x10^{-2}$		<200	$1.7x10^{-1}$	*	*	*	$8.6x10^{-2}$	$1.3x10^{-1}$			
2	*	$8.0x10^{-1}$	$1.1x10^{-1}$		<200	*	$5.5x10^{-2}$	*	*	$3.1x10^{-2}$	*			
3	*	$5.5x10^{-1}$	$4.7x10^{0}$		<200	$7.5x10^{1}$	$2.5x10^{1}$	$2.4x10^{1}$	*	$3.6x10^{0}$	$3.7x10^{0}$			
4	*	*	$5.6x10^{-1}$		<200	$3.1x10^{-1}$	$1.6x10^{-1}$	*	*	$1.1x10^{-1}$	$1.7x10^{-1}$			
4-1/2	$1.0x10^{0}$	$2.2x10^{1}$	$2.5x10^{0}$		3,000	$3.8x10^{3}$	$1.3x10^{3}$	$1.7x10^{3}$	*	$2.9x10^{2}$	$6.6x10^{1}$			
5	$1.4x10^{0}$	$3.2x10^{1}$	$2.4x10^{1}$	$5.5x10^{1}$	40,000	$3.9x10^{4}$	$1.8x10^{4}$	$2.0x10^{4}$	$8.9x10^{1}$	$2.9x10^{3}$	$9.9x10^{2}$	$4.7x10^{0}$	$2.0x10^{4}$	*
5-1/2	*	$9.8x10^{0}$	$3.7x10^{1}$		3,000	$1.0x10^{3}$	$4.8x10^{2}$	$4.8x10^{2}$	*	$2.2x10^{2}$	$4.9x10^{1}$			
7-1/2	*	*	$2.8x10^{0}$	$1.7x10^{1}$	200	$5.5x10^{-1}$	$5.8x10^{-1}$	$8.3x10^{-1}$	*	$2.1x10^{1}$	$2.5x10^{-1}$	$1.6x10^{-1}$		*
10	*	$1.8x10^{-1}$	$1.5x10^{0}$		<200/30	$7.4x10^{0}$	$8.5x10^{0}$	$2.5x10^{0}$	*	$1.7x10^{1}$	*			
12	*	$1.8x10^{-1}$	$6.6x10^{-1}$		<200/30	$5.0x10^{0}$	$1.3x10^{1}$	$1.8x10^{0}$	*	$8.7x10^{0}$	$1.1x10^{-1}$			

TABLE 2.7-76

116-H-1

107-H LIQUID WASTE DISPOSAL TRENCH

Concentration (pCi/g)

Sample No.		Pu-238	Pu-239/240	Sr-90	H-3	P-11/Scaler c/m	Eu-152	Co-60	Eu-154	Cs-134	Cs-137	Eu-155	U	C-14
E	15	*	*	$1.4x10^{-1}$		<200	*	*	*	*	*	*		*
F	2	$3.2x10^{-1}$	$6.6x10^{0}$	$5.2x10^{1}$		3000	$1.2x10^{3}$	$2.8x10^{2}$	$3.1x10^{2}$	*	$5.8x10^{2}$	$4.2x10^{1}$		
G	15	*	*	$5.5x10^{-2}$		<200	$5.5x10^{-1}$	*	$2.9x10^{-1}$	*	*	$3.0x10^{-1}$		*
	20	*	*	*		<200	*	*	*	*	$4.6x10^{-2}$	$1.0x10^{-1}$		*
R	5					<200	$2.9x10^{0}$	$6.8x10^{-1}$	$5.0x10^{-1}$	$3.8x10^{-2}$	$1.3x10^{0}$	$4.7x10^{-1}$		
	15	*	*	$4.8x10^{-1}$	$9.7x10^{-1}$	<200	$5.1x10^{0}$	$1.0x10^{0}$	$1.7x10^{0}$	*	$2.8x10^{0}$	$6.7x10^{-1}$	$3.1x10^{-1}$	*
	18	$3.5x10^{-1}$	$1.3x10^{-1}$	$8.2x10^{1}$		3000	$1.8x10^{3}$	$4.4x10^{2}$	$5.9x10^{2}$	*	$5.2x10^{2}$	$9.3x10^{1}$		*
	20	*	*	$3.6x10^{0}$		<200	$5.4x10^{1}$	$1.4x10^{1}$	$1.4x10^{1}$	*	$6.5x10^{1}$	$1.8x10^{0}$		
	25	*	*	$1.3x10^{1}$		<200	$3.1x10^{0}$	$3.7x10^{-1}$	$3.2x10^{-1}$	*	$9.5x10^{-1}$	$4.2x10^{-2}$		
S	15	*	*	$5.4x10^{-1}$		<200	$3.7x10^{0}$	$9.8x10^{-1}$	$1.2x10^{0}$	*	$1.9x10^{0}$	$3.8x10^{-1}$		
	18	*	$2.4x10^{-1}$	$1.9x10^{0}$		200	$5.3x10^{1}$	$1.2x10^{1}$	$1.2x10^{1}$	*	$2.7x10^{1}$	$1.4x10^{0}$		
	23	*	$1.8x10^{0}$	$1.6x10^{1}$		600	$2.5x10^{2}$	$6.1x10^{1}$	$6.5x10^{1}$	*	$5.6x10^{1}$	$8.0x10^{0}$		
	25	*	*	$2.6x10^{0}$		<200	$1.5x10^{0}$	$5.5x10^{-2}$	$6.2x10^{-1}$	$4.0x10^{-2}$	$7.5x10^{-2}$	$1.0x10^{-1}$		
T	10					<200	$4.0x10^{-1}$	*	*	*	$1.6x10^{-1}$	$2.2x10^{-1}$		
	20	*	*	$2.4x10^{0}$	$6.3x10^{-1}$	<200	$4.3x10^{0}$	$4.2x10^{-1}$	$6.8x10^{-1}$	*	$3.6x10^{0}$	$3.3x10^{-1}$	$1.6x10^{-1}$	*
	25					<200	$4.4x10^{0}$	$5.3x10^{-1}$	$1.0x10^{0}$	*	$4.1x10^{0}$	$3.0x10^{-1}$		
U	10					<200	$4.6x10^{0}$	$8.4x10^{-1}$	$9.9x10^{-1}$	*	$1.8x10^{0}$	*		
	15	*	$2.0x10^{-1}$	$1.8x10^{0}$		<200	$6.3x10^{0}$	$1.2x10^{0}$	$1.1x10^{0}$	*	$2.2x10^{0}$	$3.3x10^{-1}$		
	17-1/2	$3.1x10^{-1}$	$1.1x10^{1}$	$8.2x10^{1}$		2000	$2.1x10^{3}$	$1.8x10^{2}$	$2.5x10^{3}$	*	$4.0x10^{2}$	$3.0x10^{1}$		
	20	*	$2.4x10^{-1}$	$1.7x10^{0}$		200	$3.3x10^{1}$	$4.6x10^{1}$	$8.4x10^{0}$	*	$1.2x10^{2}$	$1.8x10^{0}$	$3.0x10^{-1}$	
	25	*	*	$1.3x10^{0}$		<200	$1.1x10^{0}$	$1.5x10^{-1}$	$4.8x10^{-1}$	*	$3.6x10^{-1}$	*		
V	10					<200	$4.1x10^{0}$	$7.9x10^{0}$	$1.7x10^{0}$	*	$3.2x10^{1}$	$1.5x10^{-1}$		
	15					<200	$1.2x10^{0}$	*	$2.0x10^{-1}$	$3.4x10^{-2}$	$5.3x10^{-1}$	$3.4x10^{-1}$		
	20	*	*	$2.5x10^{0}$		<200	$9.1x10^{-1}$	$7.2x10^{-2}$	$2.8x10^{-1}$	*	$1.0x10^{-1}$	*		

TABLE 2.7-77

107-H RETENTION BASIN

SAMPLING OF BASIN FILL

Concentration (pCi/g)

Sample No.		Pu-238	Pu-239/240	Sr-90	H-3	P-11/Scaler c/m	Eu-152	Co-60	Eu-154	Cs-134	Cs-137	Eu-155	U	Ni-63
AS	3-1/2	*	*	8.5×10^{-1}		<200/40	8.5×10^{0}	6.5×10^{0}	4.5×10^{0}	9.9×10^{-2}	2.7×10^{0}	7.4×10^{-1}		
	4	*	4.4×10^{0}	2.6×10^{1}	3.0×10^{0}	1,500	5.6×10^{2}	2.8×10^{2}	2.2×10^{2}	*	2.9×10^{1}	7.6×10^{0}	4.0×10^{-1}	
DS	0	*	2.5×10^{0}	8.5×10^{-2}		/350	2.4×10^{2}	4.4×10^{1}	7.1×10^{1}	1.6×10^{-1}	6.2×10^{0}	8.4×10^{0}		
	2	*	1.3×10^{-1}	2.4×10^{-1}		<200/40	1.7×10^{4}	4.0×10^{3}	4.3×10^{3}	*	3.0×10^{-1}	5.0×10^{-1}		
	4-1/2	1.7×10^{0}	5.6×10^{1}	8.2×10^{1}	4.1×10^{0}	15,000	1.4×10^{4}	2.8×10^{3}	3.9×10^{3}	1.8×10^{1}	5.2×10^{2}	2.9×10^{2}	9.2×10^{-1}	
AN	3	*	*	4.1×10^{-2}		<200/20	8.2×10^{-1}	1.9×10^{-1}	*	5.0×10^{-2}	2.9×10^{-1}	6.3×10^{-2}		
	4	*	1.5×10^{-1}	6.8×10^{1}		<200/120	8.5×10^{1}	1.2×10^{1}	2.5×10^{0}	9.0×10^{-2}	1.2×10^{2}	6.3×10^{-1}		
	4-1/2	*	9.0×10^{-1}	1.4×10^{1}	3.9×10^{0}	500	9.2×10^{1}	8.4×10^{1}	4.8×10^{1}	*	1.8×10^{2}	1.2×10^{1}	2.2×10^{-1}	
BN	3-1/2	*	*	3.1×10^{-1}		<200/30	5.1×10^{0}	1.4×10^{0}	1.0×10^{0}	4.3×10^{-2}	1.9×10^{0}	1.4×10^{-1}		
	4	1.5×10^{0}	3.9×10^{1}	7.4×10^{1}	3.7×10^{2}	10,000	7.3×10^{3}	3.1×10^{3}	2.5×10^{3}	2.9×10^{1}	1.9×10^{2}	6.2×10^{3}	5.2×10^{-1}	
CN	3-1/2	*	5.8×10^{-1}	1.1×10^{1}		500	8.3×10^{1}	1.9×10^{1}	2.8×10^{1}	5.7×10^{-1}	6.8×10^{0}	8.3×10^{0}		
	4	7.7×10^{0}	2.0×10^{2}	3.5×10^{2}	2.2×10^{2}	20,000	2.0×10^{4}	5.0×10^{3}	6.5×10^{3}	2.9×10^{1}	1.2×10^{3}	1.7×10^{2}	3.4×10^{0}	4.7×10^{3}
DN	1	*	1.3×10^{0}	5.9×10^{0}		300	1.1×10^{2}	2.8×10^{1}	3.4×10^{1}	9.4×10^{-2}	4.6×10^{0}	4.4×10^{-1}		
	3	*	9.3×10^{0}	5.5×10^{1}		3,000	1.1×10^{3}	2.8×10^{2}	3.3×10^{2}	*	5.8×10^{1}	4.3×10^{0}		
	4	4.0×10^{0}	1.1×10^{2}	1.2×10^{2}	2.4×10^{2}	15,000	1.2×10^{4}	3.1×10^{3}	3.7×10^{3}	*	5.7×10^{2}	1.7×10^{2}	1.2×10^{0}	
107-H INLET DISTRIBUTION BOX														
Z	1	4.3×10^{0}	1.1×10^{2}	5.4×10^{1}		10 mR/hr	2.1×10^{4}	8.2×10^{4}	8.4×10^{3}	*	9.7×10^{2}	5.5×10^{2}		
	2	1.1×10^{1}	2.3×10^{1}	1.4×10^{1}	1.6×10^{3}	3 mR/hr	5.9×10^{3}	9.3×10^{2}	1.1×10^{2}	1.9×10^{1}	4.2×10^{1}	6.9×10^{1}	3.3×10^{0}	
	3	1.0×10^{0}	1.4×10^{0}	2.1×10^{1}	1.3×10^{1}	6,000	2.8×10^{3}	2.3×10^{3}	9.7×10^{3}	2.4×10^{0}	2.1×10^{1}	4.2×10^{2}	1.3×10^{0}	1.4×10^{3}
	4	*	5.4×10^{0}	2.0×10^{1}		7,000	3.8×10^{3}	4.2×10^{3}	1.2×10^{2}	1.9×10^{1}	8.0×10^{2}	2.4×10^{1}		
	5	*	4.9×10^{0}	3.5×10^{1}	3.5×10^{1}	1,000	1.1×10^{3}	1.1×10^{3}	3.4×10^{2}	*	1.5×10^{2}	4.6×10^{1}		

TABLE 2.7-78

107-H RETENTION BASIN FILL

BASIN SLUDGE

Ave. Depth = 2" Mass = 1.9×10^9g

Concentrations (pCi/g)

Sample No.	Pu-238	Pu-239/240	Sr-90	H-3	Eu-152	Co-60	Eu-154	Cs-134	Cs-137	Eu-155	U	Ni-63	C-14
AS 4	*	4.4×10^{0}	2.6×10^{1}	3.0×10^{0}	5.6×10^{2}	2.8×10^{2}	2.2×10^{2}	*	2.9×10^{1}	7.6×10^{0}	4.0×10^{-1}		
DS 4-1/2	1.7×10^{0}	5.6×10^{1}	8.2×10^{1}	4.1×10^{0}	1.4×10^{4}	2.8×10^{3}	3.9×10^{3}	1.8×10^{1}	5.2×10^{2}	2.9×10^{2}	9.2×10^{-1}		
AN 4-1/2	*	9.0×10^{-1}	1.4×10^{1}	3.9×10^{0}	9.2×10^{1}	8.4×10^{1}	4.8×10^{1}	*	1.8×10^{2}	1.2×10^{1}	2.2×10^{-1}		
BN 4	1.5×10^{0}	3.9×10^{1}	7.4×10^{1}	3.7×10^{2}	7.3×10^{3}	3.1×10^{3}	2.5×10^{3}	2.9×10^{1}	1.9×10^{2}	6.2×10^{3}	5.2×10^{-1}		
CN 4	7.7×10^{0}	2.0×10^{2}	3.5×10^{2}	2.2×10^{2}	2.0×10^{4}	5.0×10^{3}	6.5×10^{3}	2.9×10^{1}	1.2×10^{3}	1.7×10^{2}	3.4×10^{0}	4.7×10^{3}	
DN 4	4.0×10^{0}	1.1×10^{2}	1.2×10^{2}	2.4×10^{2}	1.2×10^{4}	3.1×10^{3}	3.7×10^{3}	*	5.7×10^{2}	1.7×10^{2}	1.2×10^{0}		
X 3	5.1×10^{-1}	1.4×10^{1}	1.4×10^{2}	1.9×10^{1}	8.1×10^{2}	2.1×10^{2}	2.7×10^{2}	1.2×10^{3}	3.0×10^{1}	*	8.3×10^{-1}	1.2×10^{3}	*
Y 5	1.4×10^{0}	3.2×10^{1}	2.4×10^{1}	5.5×10^{1}	3.9×10^{4}	1.8×10^{4}	2.0×10^{4}	8.9×10^{1}	2.9×10^{3}	9.9×10^{2}	4.7×10^{0}	2.0×10^{4}	*
Ave. pCi/g	2.1	5.7×10^{1}	1.0×10^{2}	1.3×10^{2}	1.2×10^{4}	4.1×10^{3}	4.6×10^{3}	5.4×10^{1}	7.0×10^{2}	1.1×10^{3}	1.5	8.6×10^{3}	0.0
Curies	4.0×10^{-3}	1.1×10^{-1}	1.9×10^{-1}	2.5×10^{-1}	23	7.8	8.7	1.0×10^{-1}	1.3	2.1	2.9×10^{-3}	16	0.0

Total Curies in Sludge = 60

TABLE 2.7-79

107-H RETENTION BASIN FILL
BASIN FILL (EXCLUDING SLUDGE)
Ave. Depth = 4' Mass = 4.5×10^{10}g
Ave. Concentrations (pCi/g)

Sample Hole	Pu-238	Pu-239/240	Sr-90	H-3	Eu-152	Co-60	Eu-154	Cs-134	Cs-137	Eu-155	U	Ni-63	C-14
AS	*	*	8.5×10^{-1}		8.5×10^{0}	6.5×10^{0}	4.5×10^{0}	9.9×10^{-2}	2.7×10^{0}	7.4×10^{-1}			
DS	*	1.3×10^{0}	1.6×10^{-1}		1.3×10^{2}	2.4×10^{1}	3.8×10^{1}	1.6×10^{-1}	3.3×10^{0}	4.5×10^{0}			
AN	*	1.5×10^{-1}	3.4×10^{0}		4.7×10^{0}	6.1×10^{0}	2.5×10^{0}	7.0×10^{-2}	6.0×10^{1}	3.5×10^{-1}			
BN	*	*	3.1×10^{-1}		5.1×10^{0}	1.4×10^{0}	1.0×10^{0}	4.3×10^{-2}	1.9×10^{0}	1.4×10^{-1}			
CN	*	5.8×10^{-1}	1.1×10^{1}		8.3×10^{1}	1.9×10^{1}	2.8×10^{1}	5.7×10^{-1}	6.8×10^{0}	8.3×10^{0}			
DN	*	5.3×10^{0}	3.1×10^{1}		6.1×10^{2}	1.5×10^{2}	1.8×10^{2}	9.4×10^{-2}	3.1×10^{1}	2.4×10^{0}			
X	*	1.6×10^{-1}	1.8×10^{0}		2.6×10^{1}	6.3×10^{0}	1.3×10^{1}	*	7.0×10^{-1}	7.9×10^{-1}			
Y	*	4.6×10^{0}	1.6×10^{0}		7.8×10^{2}	3.3×10^{2}	4.3×10^{2}	*	5.9×10^{1}	1.4×10^{1}			
Ave. pCi/g		1.5×10^{0}	6.3×10^{0}		2.1×10^{2}	6.8×10^{1}	8.7×10^{1}	1.7×10^{-1}	2.1×10^{1}	6.6×10^{0}			
Curies		6.8×10^{-2}	2.8×10^{-1}		9.5	3.1	3.9	7.7×10^{-3}	9.4×10^{-1}	2.9×10^{-1}			

Total Curies in Fill Less Sludge	=	18
Sludge	=	60
Total Curies in Basin Fill	=	78

TABLE 2.7-80

CONTAMINATED SOIL COLUMN ADJACENT TO 107-H RETENTION BASIN

Description - Includes area 100' from east wall and 25' from north, south, and west basin walls x 20' ave. depth.

9.9×10^4 ft^2 x 20' = 2.0×10^6 ft^3
Mass = 1.4×10^{11} g

Radionuclides	Ave. pCi/g	Curies
Pu-238	1.2×10^{-2}	1.6×10^{-3}
Pu-239/240	3.5×10^{-1}	4.8×10^{-2}
Sr-90	1.9×10^{0}	2.6×10^{-1}
H-3	5.7×10^{-1}	7.8×10^{-2}
Eu-152	5.0×10^{1}	6.8
Co-60	3.7×10^{1}	5.0
Eu-154	1.6×10^{1}	2.2
Cs-134	5.8×10^{-3}	7.9×10^{-4}
Cs-137	1.3×10^{1}	1.8
Eu-155	2.9×10^{0}	3.9×10^{-1}
U	3.5×10^{-1}	4.8×10^{-2}
C-14	4.1×10^{-1}	5.6×10^{-2}
	Total Curies =	17

TABLE 2.7-81

CONTAMINATED SOIL COLUMN UNDERNEATH 107-H RETENTION BASIN

0-3' Below Basin 1.7×10^5 ft^2 x 3' = 5.2×10^5 ft^3

Mass = 3.5×10^{10}g

3'-10' Below Basin 1.7×10^5 ft^2 x 7 ft = 1.2×10^6 ft^3

Mass = 8.2×10^{10}g

Radionuclide	0-3' Ave pCi/g	3'-10' Ave pCi/g	Curies
Pu-238	*	*	0.0
Pu-239/240	*	9.0×10^{-2}	7.4×10^{-3}
Sr-90	1.5×10^{0}	2.4×10^{0}	2.5×10^{-1}
H-3	1.0×10^{1}	NA[1]	1.2
Eu-152	4.4×10^{1}	3.3×10^{0}	1.8
Co-60	4.3×10^{1}	5.5×10^{0}	2.0
Eu-154	1.5×10^{1}	1.1×10^{0}	6.2×10^{-1}
Cs-134	*	*	0.0
Cs-137	1.8×10^{2}	7.7×10^{0}	6.9
Eu-155	9.3×10^{-1}	7.9×10^{-2}	3.9×10^{-2}
U	3.0×10^{-1}	NA[1]	3.5×10^{-2}
C-14	7.2×10^{-1}	NA[1]	8.4×10^{-2}

Total Curies = 13

[1]Concentration conservatively assumed to be the same as 0-3' interval for total Curies calculation.

TABLE 2.7-82

116-H-1

107-H LIQUID WASTE DISPOSAL TRENCH

Potentially Contaminated Soil Column

Volume = 300' x 150' x 20' = 9.0×10^5 ft^3

Mass = 6.1×10^{10}g

Radionuclide	Ave. pCi/g	Curies
Pu-238	5.4×10^{-2}	3.3×10^{-3}
Pu-239/240	1.1×10^{0}	6.7×10^{-2}
Sr-90	1.5×10^{1}	9.2×10^{-1}
H-3	8.0×10^{-1}	4.9×10^{-2}
Eu-152	2.3×10^{2}	14
Co-60	4.4×10^{1}	2.7
Eu-154	1.6×10^{2}	9.8
Cs-134	1.1×10^{-2}	6.7×10^{-4}
Cs-137	7.6×10^{1}	4.6
Eu-155	7.6×10^{0}	4.6×10^{-1}
U	2.6×10^{-1}	1.6×10^{-1}
C-14	*	0.0
	Total Curies =	33

TABLE 2.7-83

107-H Inlet Distribution Chamber Sludge

Volume = 150'x20'x1" = 2.5×10^2 ft^3

Mass = 1.1×10^7 g

Radionuclide	Concentration (pCi/g)	Curies
Pu-238	1.1×10^1	1.2×10^{-4}
Pu-239/240	2.3×10^2	2.5×10^{-3}
Sr-90	1.4×10^3	1.5×10^{-2}
H-3	1.6×10^3	1.8×10^{-2}
Eu-152	5.9×10^4	6.5×10^{-1}
Co-60	9.3×10^4	1.0×10^0
Eu-154	1.1×10^4	1.2×10^{-1}
Cs-134	1.9×10^1	2.1×10^{-4}
Cs-137	4.2×10^3	4.6×10^{-2}
Eu-155	6.9×10^2	7.6×10^{-3}
U	3.3×10^0	3.6×10^{-5}
Ni-63[1]	2.0×10^5	2.2×10^0
	Total Curies	4.1

[1]Ni-63 concentration estimated by multiplying the Co-60 concentration in the inlet distribution chamber sludge by the Ni-63/Co-60 ratio of the sludge along the 107-H basin floor.

TABLE 2.7-84

SOIL COLUMN

ALONG EFFLUENT LINES TO 107-H BASIN

Description - Location is between two expansion boxes in the effluent lines running to the 107-H basins, approximately 200' from southwest corner of basins.

Radionuclide	Ave. pCi/g	Max. pCi/g
Pu-238	*	*
Pu-239/240	*	*
Sr-90	1.3×10^{-2}	2.3×10^{-2}
H-3	4.3×10^{1}	4.3×10^{1}
Eu-152	6.3×10^{-2}	2.5×10^{-1}
Co-60	9.0×10^{-2}	3.1×10^{-1}
Eu-154	*	*
Cs-134	*	*
Cs-137	3.3×10^{-2}	4.9×10^{-2}
Eu-155	1.2×10^{-1}	3.6×10^{-1}
U	3.0×10^{-1}	3.0×10^{-1}

TABLE 2.7-85

SOIL COLUMN

ALONG EFFLUENT LINES FROM 107-H BASIN TO OUTFALL STRUCTURE

Radionuclide	Ave. pCi/g	Max. pCi/g
Pu-238	9.0×10^{-3}	2.7×10^{-2}
Pu-239/240	5.1×10^{-2}	1.4×10^{-1}
Sr-90	6.3×10^{-2}	1.3×10^{-1}
H-3	7.4×10^{-1}	7.4×10^{-1}
Eu-152	4.8×10^{-2}	1.9×10^{-1}
Co-60	*	*
Eu-154	7.0×10^{-2}	2.8×10^{-1}
Cs-134	*	*
Cs-137	7.5×10^{-3}	3.0×10^{-2}
Eu-155	1.2×10^{-1}	2.4×10^{-1}
U	2.9×10^{-1}	2.9×10^{-1}
C-14	*	*

TABLE 2.7-86 (Cont'd)

107-RETENTION BASIN CONCRETE SAMPLES

Retention Basin	Sample No.	Concentration (pCi/g) Pu-238	Pu-239	Sr-90	H-3	Eu-152	Co-60	Eu-154	Cs-134	Cs-137	Eu-155	U	Ni-63
107-H	X3C	1.5×10^{-1}	3.9×10^{0}	4.4×10^{1}		3.6×10^{1}	9.1×10^{1}	1.4×10^{2}	5.2×10^{2}	6.2×10^{1}	8.3×10^{1}		5.2×10^{2}
Ave. pCi/g for all basins		3.1×10^{-2}	1.8×10^{0}	1.2×10^{1}	3.5×10^{0}	3.1×10^{2}	3.2×10^{2}	1.4×10^{2}	1.8×10^{1}	9.2×10^{1}	1.9×10^{1}	4.9×10^{-1}	5.2×10^{2}
Contaminated concrete mass/basin for B, D, F - 5.5×10^{9}g													
Curies in concrete/basin for B, D, F		1.7×10^{-4}	9.9×10^{-3}	6.6×10^{-2}	1.9×10^{-2}	1.7	1.8	7.7×10^{-1}	9.9×10^{-2}	5.0×10^{-1}	1.0×10^{-1}	2.7×10^{-3}	2.9
											TOTAL CURIES/B, D, F BASIN = 8		
Contaminated concrete mass/basin for DR, H - 9.0×10^{9}g													
Curies in concrete/basin for DR, H		2.8×10^{-4}	1.6×10^{-2}	1.0×10^{-1}	3.1×10^{-2}	2.8	2.9	1.3	1.6×10^{-1}	8.3×10^{-1}	1.7×10^{-1}	4.4×10^{-3}	4.7
											TOTAL CURIES/DR, H BASIN = 13		
OTHER CONCRETE SAMPLES pCi/g													
107-B	Wall #1	6.4×10^{-1}	1.6×10^{1}	8.9×10^{0}		1.5×10^{4}	1.3×10^{4}	4.8×10^{3}	5.8×10^{1}	4.6×10^{2}	2.8×10^{2}		
	Wall #2					9.4×10^{2}	1.2×10^{3}	3.5×10^{2}	*	1.0×10^{2}	5.1×10^{1}		
	Cement flakes	*	8.5×10^{0}	1.3×10^{-1}		1.3×10^{3}	6.1×10^{3}	4.3×10^{2}	*	4.7×10^{2}	7.6×10^{2}		
	BS core[1]	*	8.7×10^{0}	1.7×10^{1}		2.0×10^{2}	1.3×10^{2}	7.5×10^{1}	7.9×10^{1}	1.5×10^{2}	1.6×10^{2}		
Ave. pCi/g		2.1×10^{-1}	1.1×10^{1}	8.7×10^{0}		4.4×10^{3}	5.1×10^{3}	1.6×10^{3}	3.4×10^{1}	3.0×10^{2}	3.1×10^{2}		

[1]Loose contamination scraped and brushed from concrete core sample taken from sample hole BS.

Table 3.4-27

116-H MISC. CRIBS & TRENCHES

Sample No.	Pu-238	Pu-239/240	Sr-90	H-3	P-11/Scaler c/m	Eu-152	Co-60	Eu-154	Cs-134	Cs-137	Eu-155	U
					Concentration (pCi/g)							
116-H-2 1608-H TRENCH												
A 1	*	$1.3x10^{-1}$	$7.3x10^{1}$	$1.9x10^{0}$	400	$2.7x10^{1}$	$6.4x10^{0}$	$6.2x10^{0}$	$8.2x10^{-2}$	$2.8x10^{-1}$	$2.5x10^{0}$	$4.5x10^{-1}$
5	*	*	$3.3x10^{1}$	$6.8x10^{0}$	<200/100	$3.8x10^{-1}$	$2.6x10^{-1}$	$2.2x10^{-1}$	$3.3x10^{-2}$	$1.4x10^{1}$	$3.5x10^{-1}$	$2.0x10^{-1}$
10			$1.9x10^{-1}$		<200/20	*	*	*	*	*	*	
B 2-1/2	*	*	$5.4x10^{1}$	$1.1x10^{0}$	<200/100	$4.3x10^{-1}$	$2.7x10^{-1}$	*	*	$1.4x10^{1}$	$5.6x10^{-1}$	$1.5x10^{-1}$
5	*	*	$1.2x10^{-1}$		<200/10	*	*	*	*	$3.5x10^{-2}$	*	
C 5	*	*	$5.0x10^{1}$	$1.1x10^{1}$	<200/150	$2.6x10^{0}$	$3.6x10^{0}$	$1.0x10^{0}$	*	$7.7x10^{1}$	$9.5x10^{-1}$	$1.7x10^{-1}$
10			$1.0x10^{0}$		<200/20	*	$4.1x10^{-2}$	*	*	$1.1x10^{0}$	$5.4x10^{-2}$	
D 10	*	*	$1.3x10^{1}$	$4.5x10^{1}$	<200/80	$7.0x10^{-1}$	$6.6x10^{-1}$	*	*	$1.4x10^{1}$	$2.1x10^{-1}$	$1.8x10^{-1}$
E 15	*	*	$1.1x10^{-1}$		<200/35	*	*	*	$3.1x10^{-2}$	$1.1x10^{-1}$	$7.0x10^{-2}$	
F 10	*	*	$1.8x10^{-1}$		<200/40	*	*	$1.3x10^{-1}$	*	$6.5x10^{-2}$	$8.3x10^{-2}$	
116-H-3 105-H DUMMY DECONTAMINATION DRAIN												
A 15	*	$2.7x10^{-1}$	$5.6x10^{-1}$	$4.4x10^{0}$	<200/60	$2.0x10^{0}$	$1.6x10^{0}$	$1.1x10^{0}$	*	$1.1x10^{2}$	$2.2x10^{0}$	
C 4						$7.2x10^{1}$	$3.0x10^{1}$	$1.7x10^{1}$	*	$5.7x10^{1}$	$9.0x10^{-1}$	
D 4						$2.4x10^{1}$	$1.1x10^{2}$	$8.0x10^{0}$	*	$2.1x10^{2}$	$4.0x10^{-1}$	

A-1 -- Surface sample from south end of trench.

Samples C-4 & D-4 were some preliminary characterization samples taken in 1961. The results were decay corrected to 12/30/75. C-4 & D-4 were taken 4 feet and 2-1/2 feet away, respectively, from the trench drain.

Table 3.4-28

116-H-2

1608-H TRENCH

Potentially Contaminated Soil Column

Volume = 250' x 75' x 20' = 3.8×10^5 ft^3

Mass = 2.6×10^{10}g

Radionuclide	Ave. pCi/g	Curies
Pu-238	*	0.0
Pu-239/240	1.6×10^{-2}	4.2×10^{-4}
Sr-90	2.3×10^{1}	6.0×10^{-1}
H-3	1.3×10^{1}	3.4×10^{-1}
Eu-152	3.1×10^{0}	8.1×10^{-2}
Co-60	1.1×10^{0}	2.9×10^{-2}
Eu-154	7.6×10^{-1}	2.0×10^{-2}
Cs-134	1.5×10^{-2}	4.2×10^{-4}
Cs-137	1.2×10^{1}	3.1×10^{-1}
Eu-155	4.8×10^{-1}	1.3×10^{-2}
U	2.3×10^{-1}	6.0×10^{-3}
	Total Curies =	1.4

Table 3.4-29

116-H-3

105-H DUMMY DECONTAMINATION DRAIN

Potentially Contaminated Soil Column

Volume = 15' x 15' x 20' = 4.5×10^3

Mass = 3.1×10^8 g

Radionuclide	Ave. pCi/g	Curies
Pu-238	*	0.0
Pu-239/240	2.7×10^{-1}	8.4×10^{-5}
Sr-90	5.6×10^{-1}	1.7×10^{-4}
H-3	4.4×10^{0}	1.4×10^{-3}
Eu-152	3.3×10^{1}	1.0×10^{-2}
Co-60	4.7×10^{1}	1.5×10^{-2}
Eu-154	8.7×10^{0}	2.7×10^{-3}
Cs-134	*	0.0
Cs-137	1.3×10^{2}	4.0×10^{-2}
Eu-155	1.2×10^{0}	3.7×10^{-4}

Total Curies = 7.0×10^{-2}

APPENDIX C

OTHER SOURCES OF INFORMATION

MEMO TO FILE

JUNE 1, 1994

RE: JUNE 1, 1993 TELEPHONE CONVERSATION WITH MR. RALPH WAHLEN, ALOHA OREGON, CONCERNING THE CORRECT LOCATION OF THE 118-H-5 BURIAL GROUND.

AUTHOR: DH DEFORD, WHC HISTORY OFFICE DH DeFord

RK (Ralph) Wahlen published a document entitled "100-H Contaminated Waste Disposal Sites", date and document number unknown, which was located and collected in a source data collection effort by Advanced Sciences, Inc. for WHC ER. The page addressing the 118-H-5 burial ground is in my possession but the balance of the document has been misplaced and some difficulty is being experienced in relocating it. Luke Galinis is attempting to locate it at this writing.

The document notes the following concerning the 118-H-5 waste site:

118-H-5 Rod and Thimble Pit

- This pit is marked by a square concrete marker.
- Location is in the south end of the 1608 crib overflow area.

Thimble Burial Pit

- This pit has not been assigned a number.
- It is partially within a barricaded area that surrounds the rod cave.
- A square concrete marker locates the north and south ends.
- Located on the south side of the 105 Building within the exclusion area fence.

Having read Wahlen's comments in the document, I telephoned him to further document the most probable location of the burial site.

In response to my question "What is the correct location of the 118-H-5 Thimble Pit?", he said that it was located at the approximate south end of an area bounded on the east and west sides by converging rail road tracks. He said this was the area impacted by overflow of the 1608 Crib and is also contaminated by that event. He recalls that the burial site was once marked with square concrete markers.

Mr. Wahlen noted that there has long been a confusion about the location of this burial site. He said that the site currently thought to be the correct site, i.e., Hanford coordinates N95000 W39750, about 200 ft. south of the south wall of the 105-H Reactor Building, is not the location of the original contaminated thimble burial. He further notes that, although this is not the correct site of the thimble burial, it is the site of the burial of

other contaminated reactor hardware (possibly including thimbles) and of excavated Pluto Crib soils.

The location referred to by Mr. Wahlen as the correct site would be between approximate Hanford coordinates N94500 W39700 and N94400 W39700. An unmarked concrete monument exists at this location.

9513339.0896

APPENDIX D

HANFORD FACILITIESCORE INFORMATION ABOUT 100-H AREA BUILDINGS

HPCR206R

HANFORD PEOPLECORE
HANFORD MOBILE OFFICE REPORT

DATE: 12/09/94
PAGE: 3

FACILITY OFFCL NUM	AREA	CONTR	FACILITY NAME	*******FACILITY******** WIDTH	LENGTH	SIZE	LEASED /OWNED	GPF
M0258	300	WHC	MOBILE OFFICE @ FMIT	28	66	1848	G	Y
M0259	300	WHC	MOBILE OFFICE @ FMIT	28	66	1848	G	Y
M0260	300	WHC	MOBILE OFFICE @ FMIT	28	66	1848	G	Y
M0261	300	WHC	MOBILE OFFICE @ FMIT	28	66	1848	G	Y
M0262	300	WHC	MOBILE OFFICE @ FMIT	28	66	1848	G	Y
M0263	300	WHC	MOBILE OFFICE @ FMIT	28	66	1848	G	Y
M0264	300	WHC	MOBILE OFFICE @ FMIT	28	66	1848	G	Y
M0265	300	WHC	MOBILE OFFICE @ FMIT	28	66	1848	G	Y
M0266	200E	WHC	MOBILE OFFICE @ 272AW TANK FARMS	28	66	1848	G	Y
M0267	200E	WHC	MOBILE OFFICE @ 272AW TANK FARMS	28	66	1848	G	Y
M0268	200E	WHC	MOBILE OFFICE @ 272AW TANK FARMS	28	66	1848	G	Y
M0269	200E	WHC	CHANGE TRAILER E/O SUB BURIAL GROUND	28	66	1848	G	Y
M0270	300	PNL	MOBILE OFFICE 3764 T. 1	28	66	1848	G	N
M0271	300	PNL	MOBILE OFFICE 3764 T.2	28	66	1848	G	N
M0272	200E	WHC	MOBILE CRAFT LUNCHROOM E/O 241A ON BALTIMORE	28	60	1680	L	N
M0273	200E	WHC	MOBILE OFFICE @ PUREX (OUTSIDE FENCE)	140	66	9240	G	Y
M0274	300	PNL	MOBILE OFFICE @ 324 T.1	28	66	1848	L	N
M0275	300	PNL	MOBILE OFFICE @ 324	28	66	1848	L	N
M0276	200E	WHC	MOBILE OFFICE @ 2753E	112	132	14784	G	Y
M0277	200E	WHC	MOBILE OFFICE @ 2753E	112	132	14784	G	Y
M0278	200W	WHC	MOBILE OFFICE W/O 275W	66	140	9240	L	Y
M0279	200W	WHC	MOBILE OFFICE W/O 275W	66	140	9240	L	Y
M0280	600	WHC	MOBILE OFFICE @ WSCF SITE	66	140	9240	L	Y
M0281	200W	WHC	MOBILE OFFICE @ 272WA	66	224	14784	L	Y
M0282	200E	WHC	MOBILE OFFICE @ GROUT	28	66	1848	L	Y
M0283	200E	WHC	MOBILE OFFICE @ GROUT	28	66	1848	L	Y
M0284	200E	WHC	MOBILE OFFICE @ GROUT	28	66	1848	L	Y
M0285	200E	WHC	MOBILE OFFICE @ 2753E	66	168	11088	G	Y
M0286	200E	WHC	MOBILE OFFICE @ 2727E	66	168	11088	G	Y
M0287	200W	WHC	MOBILE OFFICE @ 275W	66	168	11088	G	Y
M0288	200W	WHC	MOBILE CHANGE FACILITY @ CTRL WASTE COMPLEX	12	32	384	G	N
M0289	200W	WHC	MOBILE CHANGE FACILITY @ 224T	12	32	384	G	N
M0290	200W	WHC	MOBILE COMPUTER HUB @ 19TH/CAMDEN (PFP)	28	66	1848	G	Y
M0291	200W	WHC	MOBILE OFFICE NEAR 2704S	66	140	9240	L	N
M0292	600	WHC	MOBILE OFFICE @ WSCF (E/O 6270)	66	140	9240	L	Y
M0293	100K	WHC	MOBILE OFFICE @ 1725K (SPENT FUEL)	66	140	9240	L	N
M0301	100K	WHC	MOBILE OFFICE @ 1733K (FKA 1133N)	24	54	1296	G	N
M0302	600	WHC	ARMORER SHOP (MOBILE OFFICE) @ PTA	24	50	1200	G	Y
M0303	1100	WHC	MOBILE OFFICE W. OF 1167A	24	50	1200	G	N
M0304	600	WHC	MOBILE OFFICE @ HTS PIPEYARD	24	54	1296	G	Y
M0305	300	PNL	MOBILE OFFICE 325 T.1	12	56	672	G	N
M0306	200W	WHC	MOBILE OFFICE @ 222T	12	56	672	G	Y
M0307	300	PNL	MOBILE OFFICE 320 T.2	12	56	672	G	N
M0312	200E	WHC	LAUNDRY STORAGE @ 225B	8	32	256	G	Y
M0314	100N	WHC	PAINT STORAGE TRAILER	10	30	300	G	N
M0315	600	WHC	STORAGE TRAILER @ 622G	10	56	560	G	Y
→ M0316	100H	WHC	MOBILE OFFICE @ 105H	10	30	300	G	N
M0317	200W	WHC	MOBILE OFFICE @ 277W	10	30	300	G	Y
M0319	200E	WHC	CHANGE TRAILER (TANK FARMS) 241BX	10	30	300	G	N
M0320	200W	WHC	WOMENS CHANGE ROOM TRAILER @ 242S	10	30	300	G	Y

HPCR206R

HANFORD PEOPLECORE
HANFORD MOBILE OFFICE REPORT

DATE: 12/09/94
PAGE: 4

FACILITY OFFCL NUM	AREA	CONTR	FACILITY NAME	*******FACILITY******** WIDTH	LENGTH	SIZE	LEASED /OWNED	GPF
M0321	200W	WHC	SWP CHANGEROOM TRAILER @ 211U	10	30	300	G	Y
M0322	200E	WHC	SWP CHANGE TRAILER @ 207B	10	30	300	G	Y
M0323	200E	WHC	MOBILE OFFICE @ 202A	12	50	600	G	Y
M0324	200E	WHC	CHANGE ROOM TRAILER @ 284E	10	30	300	G	Y
M0325	200E	WHC	CHANGE TRAILER @ PUREX	10	30	300	G	N
M0326	200W	WHC	DECON TRAILER @ 242S	10	30	300	G	Y
M0327	200E	WHC	MOBILE OFFICE @ 218E	10	30	300	G	Y
M0332	200E	WHC	SWP CHANGE TRAILER @ PUREX	10	30	300	G	N
M0333	200W	WHC	STORAGE TRAILER @ 2W TANK FARMS	10	30	300	G	N
M0337	200E	WHC	CHANGE ROOM TRAILER @ 2704C	10	30	300	G	Y
→M0338	100H	WHC	CHANGE ROOM TRAILER @ 105H	10	30	300	G	N
M0341	OS	PNL	MOBILE LAB @ HOLTVILLE, CA	8	28	224	G	N
M0346	200W	WHC	MOBILE OFFICE @ 222S	24	50	1200	G	Y
M0347	200E	WHC	MOBILE OFFICE @ 202A (ATT'D TO M0948)	24	54	1296	G	Y
→ M0348	100H	WHC	MOBILE OFFICE (FKA: 1131N)	24	54	1296	G	N
M0351	200W	WHC	MOBILE OFFICE @ 224U	14	56	784	G	Y
M0352	100N	WHC	MOBILE OFFICE (AKA 1135N)	24	54	1296	G	N
M0353	400	WHC	MOBILE OFFICE W. OF 4706	24	50	1200	G	Y
M0354	200E	WHC	MOBILE OFFICE @ 2400E	24	54	1296	G	Y
M0355	200E	WHC	MOBILE OFFICE @ 202A (ATT'D TO M0542)	24	54	1296	G	Y
M0356	100N	WHC	QA MOBILE OFFICE (AKA 1135NA)	24	50	1200	G	N
M0358	100N	WHC	TRAINING SIMULATOR (AKA 1116N)	110	52	5720	G	N
M0359	300	PNL	MOBILE OFFICE @ 331	8	40	320	G	N
M0363	200W	WHC	MOBILE OFFICE @ 241SX TANK FARM	8	24	192	G	Y
M0366	OS	PNL	MOBILE LAB @ HOLTVILLE, CA	8	9	72	G	N
M0367	100N	WHC	MOBILE OFFICE (AKA:1127N)	24	54	1296	G	N
M0368	600	WHC	PATROL TRAINING (MOBILE OFFICE) @ PTA	24	50	1200	G	Y
M0369	3000	WHC	MOBILE OFFICE NEAR 1262 BUILDING	28	66	1848	G	Y
M0370	RCHN	PNL	MOBILE OFFICE @ 2400 STEVENS	8	14	112	G	N
M0371	200W	WHC	D&D FEMALE CHANGE TRAILER @ 271T	10	50	500	G	Y
M0374	200W	PNL	MOBILE OFFICE W/O T PLANT	8	24	192	G	N
M0375	100N	WHC	STORAGE MOBILE (AKA 1157NA)	8	30	240	G	N
M0376	600	WHC	FIELD TRAILER @ KEH SLAB YARD	8	30	240	G	N
M0377	200W	WHC	MOBILE OFFICE @ 275W	10	50	500	G	Y
M0378	400	WHC	MOBILE OFFICE (TRL 100) W. OF 4706	28	66	1848	G	Y
M0379	400	WHC	MOBILE OFFICE (TRL 102) W. OF 4706	28	66	1848	G	Y
M0381	100N	WHC	MOBILE OFFICE (AKA 1147N)	28	60	1680	G	N
M0382	100K	WHC	MOBILE OFFICE AKA: 1721K	28	60	1680	G	N
M0383	100N	WHC	MOBILE OFFICE	14	60	840	G	N
M0384	200E	WHC	MOBILE OFFICE @ 2703E	28	66	1848	G	Y
M0386	200E	WHC	MOBILE OFFICE @ DMRHF (2400E)	28	66	1848	G	Y
M0387	200E	WHC	CONTROL ROOM TRAILER @ 2703E	8	16	128	G	Y
M0388	200E	WHC	MOBILE OFFICE @ 2721EA	28	52	1456	G	Y
M0389	100N	WHC	MOBILE OFFICE @ 1143N	24	50	1200	G	N
M0390	200W	WHC	FIELD TRAILER X FM 271U (200UP2)	10	32	320	G	N
M0391	600	WHC	FIELD TRAILER @ EFS PIPEYARD	8	32	256	G	N
M0392	200E	WHC	MOBILE OFFICE @ 243G (GROUT)	28	66	1848	G	Y
M0393	200E	WHC	MOBILE OFFICE @ 272AW TANK FARMS	24	50	1200	G	Y
M0394	300	WHC	MOBILE OFFICE (FMIT TRL 3)	24	50	1200	G	Y
M0395	300	WHC	MOBILE OFFICE (FMIT TRL 5)	28	60	1680	G	Y

HPCR206R

HANFORD PEOPLECORE
HANFORD MOBILE OFFICE REPORT

DATE: 12/09/94
PAGE: 6

FACILITY OFFCL NUM	AREA	CONTR	FACILITY NAME	*******FACILITY******** WIDTH	LENGTH	SIZE	LEASED /OWNED	GPF
M0542	200E	WHC	MOBILE OFFICE @ 202A (ATT'D/ID'D M0355)	24	54	1296	G	Y
M0543	300	WHC	MOBILE CHANGEROOM	24	54	1296	G	N
M0544	200W	WHC	FIELD TRAILER @ CARBON TET SITE	8	32	256	G	N
M0545	200W	WHC	FIELD TRAILER @ CARBON TET SITE	8	32	256	G	N
M0546	200W	WHC	FIELD TRAILER @ CARBON TET SITE	8	32	256	G	N
M0548	200W	WHC	MOBILE FIELD OFFICE E/O 222T	8	16	128	G	N
M0549	100N	WHC	LUNCH ROOM - AKA TRL. 1 (ATT'D M0550)	28	64	1792	G	N
M0550	100N	WHC	MOBILE OFFICE - AKA TRLR 2 (ATT'D M0549)	28	60	1680	G	N
M0551	200E	WHC	MOBILE OFC @ BALTIMORE N/O 4TH	28	60	1680	G	N
M0552	200E	WHC	MOBILE OFFICE ON BALTIMORE N/O 4TH	28	60	1680	G	N
M0553	200E	WHC	MOBILE OFFICE ON BALTIMORE N/O 4TH	28	60	1680	G	N
M0555	600	WHC	ESCORT TRAILER @ GATE 814	12	60	720	G	N
M0556	200W	WHC	MOBILE OFFICE ON HILL E/O Z PLANT	24	54	1296	G	N
M0557	300	WHC	CF MOBILE OFFICE (FORMERLY TRLR A)	28	60	1680	G	N
M0558	300	WHC	CM MOBILE OFFICE (FORMERLY TRLR B)	28	60	1680	G	N
M0559	600	WHC	ESCORT TRAILER	10	56	560	G	N
M0560	200E	WHC	MOBILE OFFICE @ UNSECURED CORE AREA	28	60	1680	G	Y
M0561	3000	WHC	PREVIOUSLY CALLED TRL. 4 NEAR 1301	28	60	1680	G	Y
M0562	3000	WHC	MOBILE OFFICE ATT TO 1154 - FORMERLY TRLR 7	10	56	560	G	Y
M0569	200E	WHC	RESTROOM TRAILER @ 244CR	8	30	240	G	N
M0570	200E	WHC	MOBILE OFFICE @ 244CR	28	64	1792	G	N
M0571	200E	WHC	OFFICE/LUNCHROOM TRLR @ 244CR	12	60	720	G	N
M0572	200E	WHC	OFFICE/LUNCHROOM TRAILER @ 242A	10	58	580	G	N
M0573	200W	WHC	CHANGE/LUNCHROOM TRLR X FM 271U (200UP2)	8	24	192	G	N
M0574	200E	WHC	CHANGEROOM TRAILER @ 224B	8	30	240	G	N
M0587	600	PNL	FIELD LABORATORY @ 622R	8	16	128	G	N
M0656	300	PNL	MOBILE OFFICE	8	12	96	G	N
M0659	300	PNL	MOBILE OFFICE TO BE EXCESSED 7/94	10	52	520	G	N
M0660	600	WHC	STORAGE TRAILER @ PTA	10	52	520	G	Y
M0662	200E	WHC	FIELD MOBILE @ SLAB YARD	10	52	520	G	N
M0666	200E	WHC	MOBILE OFFICE @ 202A	10	52	520	G	Y
M0667	600	PNL	FIELD LABORATORY @ COLD TEST FACILITY	8	30	240	G	N
→ M0668	100H	WHC	MOBILE OFFICE @ 105H	10	52	520	G	N
M0674	200E	WHC	MOBILE OFFICE @ 243G (GROUT)	10	52	520	G	Y
M0702	600	WHC	MOBILE OFFICE @ EFS PIPEYARD	10	52	520	G	N
M0705	200E	WHC	JANITORIAL STORAGE @ 284E	10	52	520	G	Y
M0707	200E	WHC	PATROL TRAILER @ 202A	10	52	520	G	Y
M0708	200W	WHC	MOBILE OFFICE @ 201R	10	52	520	G	Y
M0709	300	WHC	MOBILE OFFICE ALSO KNOWN AS 377 TRL 2	10	42	420	G	N
M0710	200W	WHC	MOBILE OFFICE E/O 222T (3/94)	10	42	420	G	N
M0711	300	PNL	MOBILE OFFICE	10	42	420	G	N
M0712	600	WHC	MOBILE OFFICE S/O 622G	10	42	420	G	Y
M0713	600	WHC	PORTABLE GEN/WATER TANK @ CTRL LANDFILL	10	52	520	G	Y
M0714	100N	WHC	SERVICE BUILDING TRAILER @ 1143N (AKA 1130N)	10	52	520	G	N
M0716	200W	WHC	STORAGE TRAILER ON HILL E/O Z PLANT	12	60	720	G	N
M0717	200E	WHC	LUNCHROOM TRAILER @ SLAB YARD	8	14	112	G	N
M0718	200E	WHC	LUNCHROOM TRAILER @ SLAB YARD	8	14	112	G	N
M0719	200W	WHC	CALIBRATION LAB @ 272W	8	14	112	G	Y
M0720	200W	WHC	MOBILE OFFICE @ 272WA	66	224	14784	L	Y
M0721	200W	WHC	MOBILE CHANGE FACILITY @ 272WA	56	66	3696	L	Y

AREA	COMMON NAME	OFFICIAL NAME	COMPANY	COST CODE	NUMBER OF OCCUPANTS
RCHN	450HILLSB1		BHI	IB002	1
RCHS	1405CCB	1405COL-CEN	AWUNW		1
	1776FOWLER	1776FOWLER	TEN	10240	1
100	105N		BHI	BT001	1
100B	182B	182B	WHC	54610	3
				54620	2
	*				5
100D	183D	183D	WHC	54610	3
→ 100H	MO348	MO348	WHC	7C562	1
				85400	30
	*				31
100K	MO102	MO102	WHC	0HJ43	1
				2A410	9
	*				10
	MO382	MO382	WHC	0HJ43	1
				33910	5
	*				6
	MO401	MO401	CE&ES	2A100	1
			COMPA		1
			DOE	99L30	1
			MCE	52890	1
			PT&C	10220	3
			UE&C	7FA00	1
			WHC	2A000	3
				2A100	7
				2A200	6
				2A400	3
				2A420	7
				2A500	2
				2A600	1
				2A640	1
				31F00	6
				38400	3
				4B120	1
				50440	1
				58100	1
				71230	1
				74300	1

HPCR202R

HANFORD PEOPLECORE
FACILITIES BY OFFICIAL NAME

DATE: 12/09/94
PAGE: 17

AREA	OFFCL NAME	COMN NAME	HANFORD AUTHORIZED NAME	RESP. COMP	STAT CODE	BLDG TYPE	OWNER SHIP	LAST UPDATED	DEL FLG
100F	1902F	1902F	FIRE LINES - GENERAL		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
100F	1909F	1909F	EFFLUENT VALVE PIT, CONCRETE, UNDERGROUND		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
→ 100H	MO316	MO316	MOBILE OFFICE @ 105H	WHC	A	M	G	11/21/1994	
	SIZE: 300		DESCRIPTION: CRUSADER 1360						
→ 100H	MO338	MO338	CHANGE ROOM TRAILER @ 105H	WHC	A	M	G	11/21/1994	
	SIZE: 300		DESCRIPTION: CRUSADER 1377						
→ 100H	MO348	MO348	MOBILE OFFICE (FKA: 1131N)	WHC	A	M	G	10/27/1994	
	SIZE: 1296		DESCRIPTION: BENDIX 24BGDS0719U						
→ 100H	MO668	MO668	MOBILE OFFICE @ 105H	WHC	A	M	G	11/21/1994	
	SIZE: 520		DESCRIPTION: REX 9227						
→ 100H	100H	100H	MAPS, OUTSIDE AND UNDERGROUND FACILITIES		I		G	11/16/1994	
	SIZE:		DESCRIPTION:						
→ 100H	105H	105H	REACTOR FACILITY - ABANDONED	WHC	I	B	G	11/16/1994	
	SIZE: 74640		DESCRIPTION: (WATER TUNNELS - DEMO'D)						
→ 100H	1501H	1501H	FENCE AND ROAD LIGHTING		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
→ 100H	1503H	1503H	OUTSIDE LINES - ELECTRICAL		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
→ 100H	1506H	1506H	COMMUNICATIONS - GENERAL, INCLUDES FIRE ALARM		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
→ 100H	1603H	1603H	ROADS, WALKS, BRIDGES, CULVERTS, PARKING AREAS		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
→ 100H	1605H	1605H	FENCES, GUARD TOWERS		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
→ 100H	1607H	1607H	SEWAGE TREATMENT SEPTIC TANKS		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
→ 100H	1607H1	1607H1	SEPTIC TANK N95200, W40800	WHC	I	T	G	08/22/1994	
	SIZE:		DESCRIPTION: N95200.0, W40800.0; (SOUTH OF 1713H)	151H, 105H, ABANDONED P1226,P2090,M1904-					
→ 100H	1607H2	1607H2	SEPTIC TANK N98050, W39800	WHC	I	T	G	08/22/1994	
	SIZE:		DESCRIPTION: N98050.0, W39800.0; (NE OF 1720HA & NW	OF 182H) 182H,183H,190H ABANDONED 1965'S					
→ 100H	1607H3	1607H3	SEPTIC TANK N92974, W39634	WHC	I	T	G	08/22/1994	
	SIZE:		DESCRIPTION: N92974.0, W39634.0; (N.E. OF 1720HA	1701H,1720H ABAN 68 P1230,P2090,M1904-H					

HPCR202R

HANFORD PEOPLECORE
FACILITIES BY OFFICIAL NAME

DATE: 12/09/94
PAGE: 18

AREA	OFFCL NAME	COMN NAME	HANFORD AUTHORIZED NAME	RESP. COMP	STAT CODE	BLDG TYPE	OWNER SHIP	LAST UPDATED	DEL FLG
→ 100H	1607H4	1607H4	SEPTIC TANK N98260, W40348	WHC	I	T	G	08/22/1994	
	SIZE:		DESCRIPTION: N98260.0, W40348.0; (S.E. OF 181H), 181HP1211,P2090,M1904-H SH1 ABANDONED 65'S						
→ 100H	1608H	1608H	WASTE WATER PUMP HOUSE, LIFT STATION - ABANDONED		I		G	03/20/1990	
	SIZE:	1150	DESCRIPTION:						
→ 100H	1713H	1713H	WAREHOUSE	WHC	I	B	G	11/16/1994	
	SIZE:	13800	DESCRIPTION:						
→ 100H	1720HA	1720HA	STORAGE ARSENAL - ABANDONED	WHC	I	B	G	11/16/1994	
	SIZE:	64	DESCRIPTION:						
→ 100H	1901H	1901H	WATER LINES - GENERAL		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
→ 100H	1902H	1902H	FIRE LINES - GENERAL		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
→ 100H	1905H	1905H	UNDERGROUND DRAINAGE, SEWERS		I		G	03/20/1990	
	SIZE:		DESCRIPTION:						
100K	M0101	M0101	MOBILE OFFICE @ 1711K (FKA 1111N)	WHC	A	M	G	11/04/1994	
	SIZE:	1584	DESCRIPTION: TRANSWORLD 1998A-B						
100K	M0102	M0102	MOBILE OFFICE @ 1709K	WHC	A	M	G	11/04/1994	
	SIZE:	1584	DESCRIPTION: TRANSWORLD 1996A-B MOBILE OFFICE						
100K	M0205	M0205	MOBILE OFFICE @ 190KE	WHC	I	M	G	11/10/1994	
	SIZE:	300	DESCRIPTION: EVERGREEN 177-112						
100K	M0214	M0214	PATROL BADGEHOUSE (AKA:1701K)	WHC	A	M	G	11/10/1994	
	SIZE:	672	DESCRIPTION: EVERGREEN 377-112						
100K	M0229	M0229	MOBILE OFFICE @ 1734K (FKA 1134N)	WHC	A	M	G	11/21/1994	
	SIZE:	3696	DESCRIPTION: EVERGREEN 1083103A-D						
100K	M0293	M0293	MOBILE OFFICE @ 1725K (SPENT FUEL)	WHC	A	M	L	08/19/1994	
	SIZE:	9240	DESCRIPTION: MOBILE OFFICE (SPENT NUCLEAR FUEL)	EVERGREEN					
100K	M0301	M0301	MOBILE OFFICE @ 1733K (FKA 1133N)	WHC	A	M	G	11/21/1994	
	SIZE:	1296	DESCRIPTION: BENDIX 50925U-X						
100K	M0382	M0382	MOBILE OFFICE AKA: 1721K	WHC	A	M	G	11/10/1994	
	SIZE:	1680	DESCRIPTION: BENDIX SC1630AC-BC						
100K	M0401	M0401	MOBILE OFFICE @ 1719K (FKA: 1117N)	WHC	A	M	G	11/10/1994	
	SIZE:	10956	DESCRIPTION: CLIFF INDUSTRIES 22032214						
100K	M0402	M0402	MOBILE OFFICE AKA:1718K (FKA: 1118N)	WHC	A	M	G	10/27/1994	
	SIZE:	10956	DESCRIPTION: CLIFF INDUSTRIES 22202231						

APPENDIX E

TABLE OF PHOTOGRAPHS USED

APPENDIX E

TABLE OF PHOTOGRAPHS USED

Figure Number	Photograph Number	Title
2-1	1945 (47) 12-3-48	100-H Reactor Site During Construction, 1948
2-2	106 9-26-50	100-H Reactor Site, 1950
2-3	92071617-10CN	100-H Reactor Site As It Appears Today
4-2	122440-363CN	116-H-3 Dummy Decontamination French Drain
4-3	4045 6-54, Cropped	100-H Reactor Site, Showing the 116-H-4 Pluto Crib
4-4	1180 2-25-49	1904-H Outfall Under Construction, 1949
4-5	1185 4-6-49	1904-H Outfall, Newly Completed, 1949
4-7	1175 1-19-49	107-H Retention Basin (116-H-7) During Construction
4-9	122440-352CN, Cropped	116-H-9 Crib
4-10	4045 6-54	100-H Reactor Site, 1954
4-13	93041470-12CN	Surface Contamination Zone South of the 105-H Reactor Building, 1994
5-2	122440-350CN	118-H-2 Burial Ground No. 2
5-3	122440-364CN	118-H-4 Ball 3X Burial Ground
5-4	93041470-13CN	Suspect Waste Site, Thimble Guide Pipe Burial Pit, Surface Contamination Area, 1994
5-5	1237 (33) 8-26-49	184-H Power House with 128-H-1 Burn Pit in Background
5-6	83E700-6CN	Filter Building Before Decommissioning
5-7	83F462-10CN	Filter Building During Decommissioning
5-8	93041470-9CN	Suspect Waste Site, Rod Cave
5-9	106	Suspect Waste Site, Probable Septic Tank

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