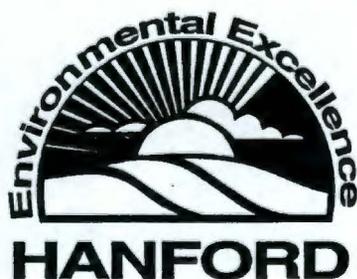


BHI-00146
Rev. 00

100-IU-6 Operable Unit Technical Baseline Report

Author
D. H. DeFord

Date Published
January 1995



Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management

Bechtel Hanford, Inc.
Richland, Washington



Approved for Public Release

LEGAL DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

This report has been reproduced from the best available copy.

Printed in the United States of America

DISCLM-2.CHP (1-91)

CONTENTS

1.0 INTRODUCTION	1
2.0 BACKGROUND	1
2.1 GENERAL DESCRIPTION OF HANFORD TOWNSITE AND SURROUNDING AREA	1
3.0 100-IU-6 OPERABLE UNIT	3
3.1 213-J AND 213-K PLUTONIUM STORAGE VAULTS	4
3.2 213-J AND 213-K CRIB SITES	6
3.3 600-3 EXCESS MATERIAL STORAGE YARD (PAINT PIT AND DUMPING AREA)	7
3.4 600-24 H-21 ANTI-AIRCRAFT ARTILLERY COMPOUND AND DUMP SITE ...	8
3.5 600-27 WELL AND VOLATILE ORGANICS SITE	9
3.6 HANFORD TOWNSITE LANDFILL	10
3.7 HANFORD TRAILER CAMP LANDFILL	11
3.8 600-20 -- TANK CLEANING SITE	12
3.9 600-26 -- HANFORD TOWNSITE BURN PILE	12
3.10 P-11 SITE -- CRITICAL MASS LABORATORY SITE AND CRIB	13
3.11 UPR-600-16 -- P-11 FIRE AND CONTAMINATION SPREAD	13
3.12 UPR-600-18 -- GASOLINE SPILL NEAR 100-F	14
3.13 UPR-600-19 -- LIME SULFUR SPILL	14
4.0 SUSPECT WASTE SITES	15
4.1 SUSPECT WASTE SITE -- 213-J AND 213-K GUARD HOUSE TOILET PIT ...	15
4.2 SUSPECT WASTE SITE -- BURN AND BURIAL TRENCH	16
4.3 SUSPECT WASTE SITE -- 101 BUILDING GRAPHITE DUMP SITE	16
4.4 SUSPECT WASTE SITES -- SEPTIC TANKS AND SEWAGE TREATMENT PLANTS	16
4.5 SUSPECT WASTE SITE -- FUMIGATION CHAMBER	17
4.6 SUSPECT WASTE SITE -- POWER HOUSE ASH PILE	18
4.7 SUSPECT WASTE SITE -- CONSTRUCTION CAMP BOILER HOUSE PONDS .	19
4.8 SUSPECT WASTE SITE -- HANFORD TOWNSITE DOMESTIC LANDFILL 2 ..	20
4.9 SUSPECT WASTE SITES -- SERVICE STATIONS AND POTENTIAL UNDERGROUND TANKS	20
4.10 SUSPECT WASTE SITE -- HONEY DUMP STATIONS	20
4.11 SUSPECT WASTE SITE -- THREE TRENCHES	21
4.12 SUSPECT WASTE SITE -- SMALL ARMS RANGE	21
4.13 SUSPECT WASTE SITES -- FOUR BURN AND BURIAL PITS	21
4.14 SUSPECT WASTE SITE -- SEPTIC TANKS AND DRAIN FIELD, P-11 SITE ...	21
5.0 REFERENCES	22

CONTENTS (Continued)

FIGURES:

1. Hanford Construction Camp, 1944 2
2. 100-IU-6 Operable Unit 3
3. 213-J and 213-K Plutonium Storage Vaults 4
4. Interior of 213-K Storage Vault, Vault Section 6
5. 600-3 Dump Site Map 7
6. Hanford Construction Camp 9
7. 600-27 Test Well Site 10
8. Hanford Townsite Landfill - Horseshoe Bend of Canal 11
9. 213-J and 213-K Guard Tower Base and Toilet Pit 15
10. Suspect Waste Site -- Sewage Treatment Plant Trench 17
11. Site of Suspect Waste Site -- Fumigation Chamber 18
12. Suspect Waste Site -- Power House Ash Pile 19

ACRONYMS

BHI	Bechtel Hanford, Inc.
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
MED	Manhattan Engineering District, U.S. Army Corps of Engineers
NEPA	<i>National Environmental Policy Act</i>
PNL	Pacific Northwest Laboratory
RL	U.S. Department of Energy, Richland Operations Office
WIDS	Waste Information Data System

1.0 INTRODUCTION

This document was prepared in support of 100 Area environmental restoration at the U.S. Department of Energy (DOE), Richland Operations Office (RL) Hanford Site near Richland, Washington. It provides a historical baseline of waste sites located near the Hanford, Washington townsite and includes all waste sites associated with the 100-IU-6 Operable Unit (formerly the 200-IU-4 Operable Unit). It results from an environmental investigation undertaken by the CH₂M Hill Facility and Waste Site Research Office in support of the Bechtel Hanford, Inc. (BHI) 100 Area Project Office. It is based on 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. Units of measure that derive from historical documents are shown as they appear in those documents.

The 100-IU-6 Operable Unit includes ten known liquid or solid waste sites plus three unplanned release sites. These include burial grounds, landfills, cribs, storage facilities, dumping areas, and storage tanks. Several additional previously undocumented waste sites, or suspect waste sites, are also included. Each waste site is described separately. Photographs are provided where available and useful.

A comprehensive environmental summary is not provided here but may be found in the Hanford Site *National Environmental Policy Act* (NEPA) Characterization, which describes the geology and soils, meteorology, hydrology, land use, population, and air quality (Cushing 1988).

2.0 BACKGROUND

2.1 GENERAL DESCRIPTION OF HANFORD TOWNSITE AND SURROUNDING AREA

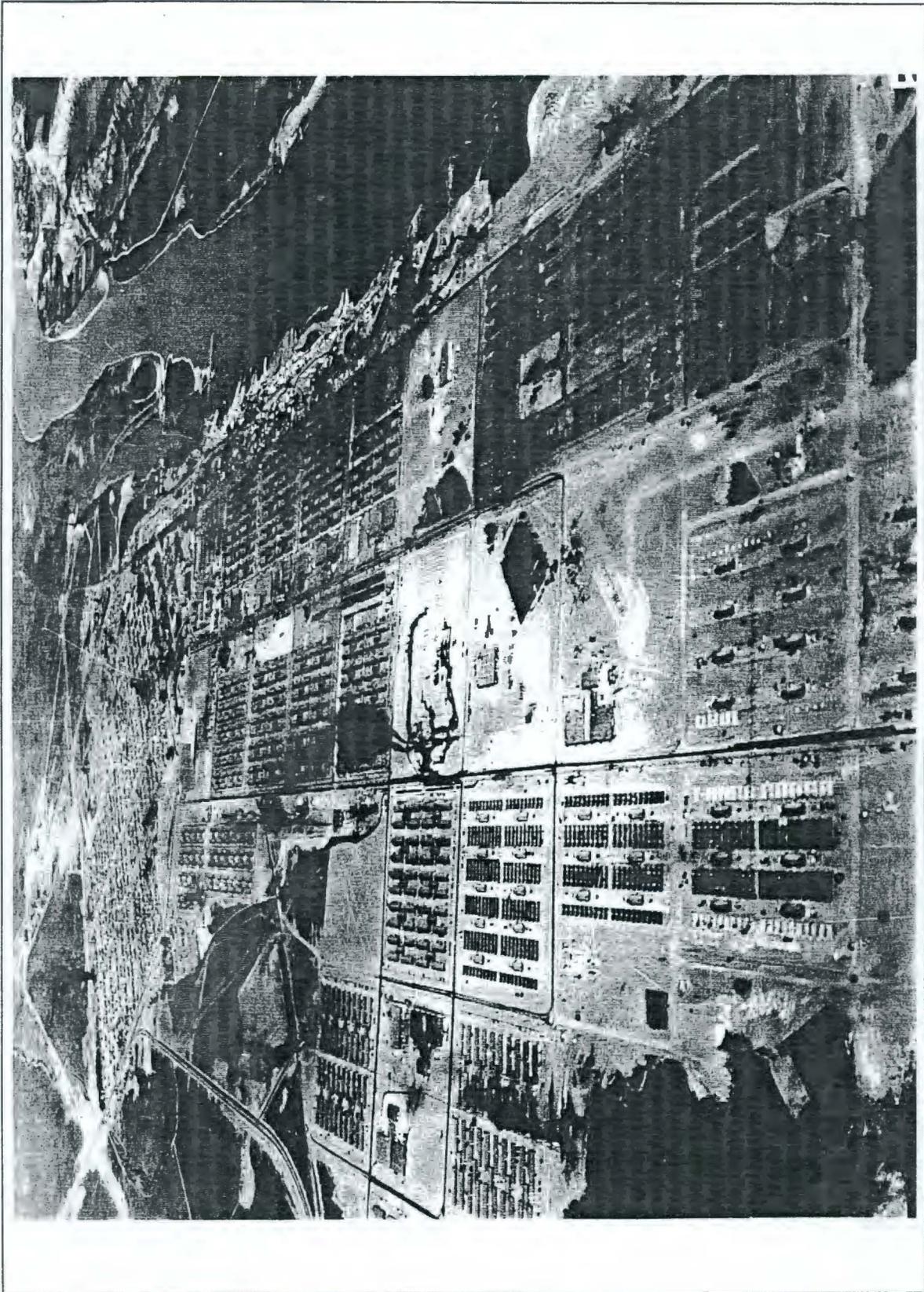
The town of Hanford was a small agricultural community. Although ranching began in the area in the mid 1800's, the community was not promoted as a farming area until the 1880's and 1890's.

By 1942, Hanford had grown to a few hundred farm families. The combined population for Hanford, White Bluffs, and Richland was only 1,500 when the Manhattan Engineering District (MED) of the U.S. Army Corps of Engineers selected the area for plutonium production in December 1942.

The Hanford townsite was selected for the site of a temporary construction worker housing camp that housed more than 45,000 construction workers during Hanford's original construction period. The camp comprised 1,176 buildings and 9 service facilities capable of housing more than 39,000 persons. Additional employees lived in trailers located in the large Hanford Camp Trailer Park. Figure 1 shows the Hanford Construction Camp during operation in 1945.

Most of the waste sites described in this document are related to this early construction period and resulted from construction activities, not from plant operations.

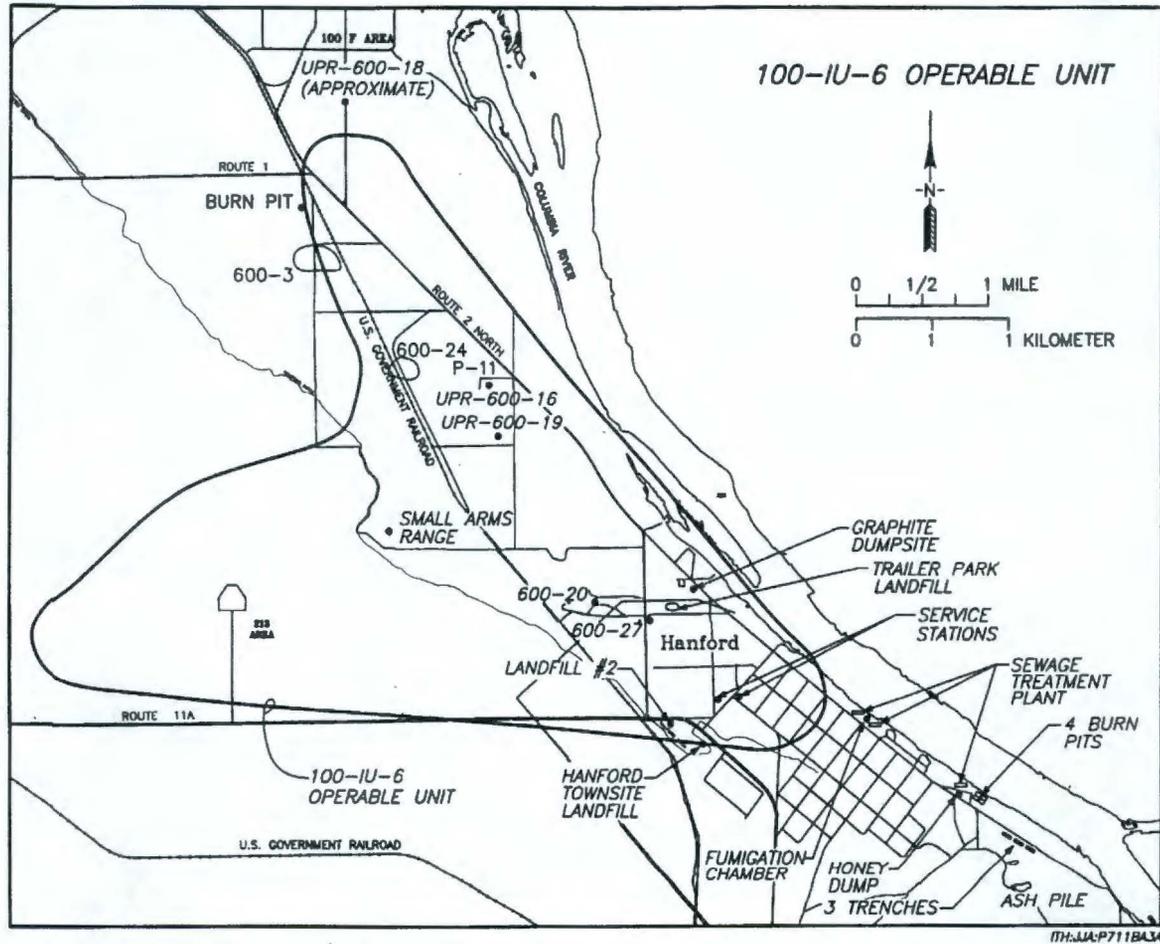
Figure 1. Hanford Construction Camp, 1944.



3.0 100-IU-6 OPERABLE UNIT

This section describes the thirteen waste sites included in the 100-IU-6 Operable Unit. Figure 2 shows the location of these waste sites in relation to other known points.

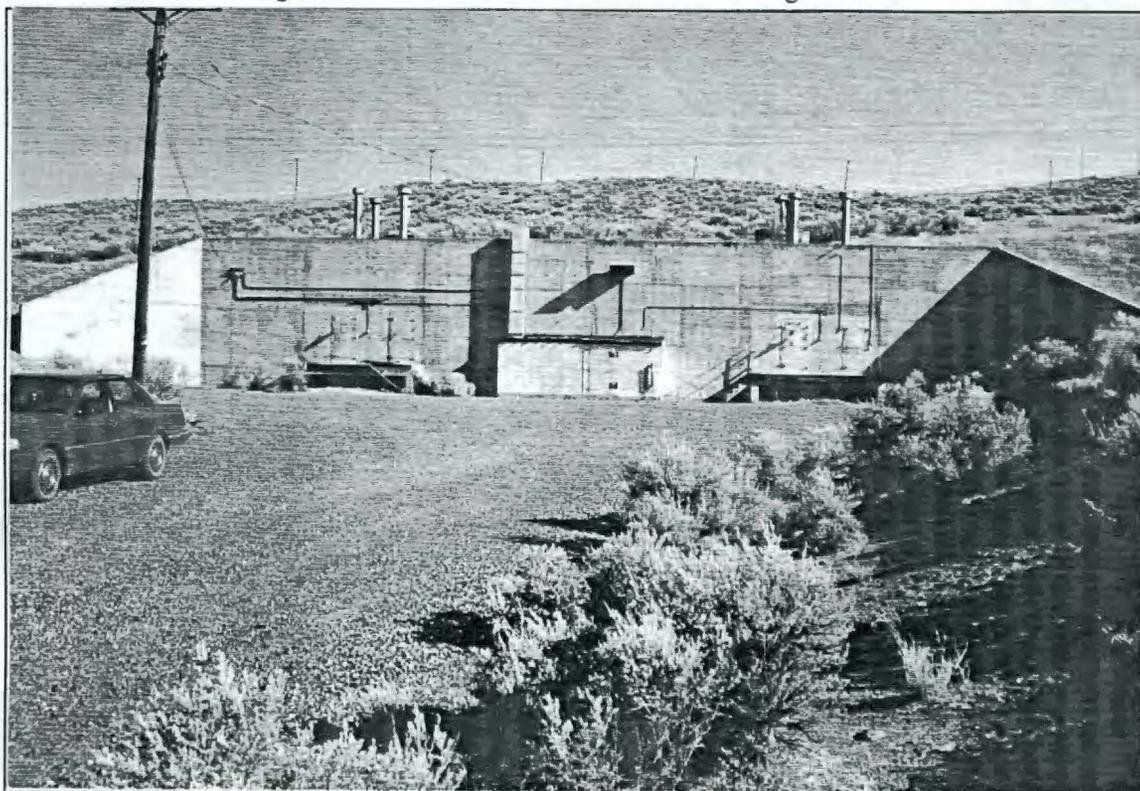
Figure 2. 100-IU-6 Operable Unit.



3.1 213-J AND 213-K PLUTONIUM STORAGE VAULTS

The 213-J and 213-K Plutonium Storage Vaults are identical underground storage vaults located side by side on the south slope of Gable Mountain, about 3 mi northeast of the 200 East Area and 4 mi west of the Hanford townsite at approximate Hanford coordinates N55000 W35000 (Figure 3).

Figure 3. 213-J and 213-K Plutonium Storage Vaults.



Each vault is 12 ft wide, extends 40 ft horizontally into the mountain, and has an 8-ft ceiling. Each has a concrete loading dock and a steel outer door opening from the dock to a small inner vestibule. A steel Mosler vault door separates the small chamber from a larger store room beyond. A ventilation and air conditioning building is located between the loading docks on the front face of the vault. Four ventilation ducts are visible on the surface above each vault. A second steel door opens from each loading dock to a 5-ft 6-in. x 9-ft instrument room that housed instrumentation related to the original plutonium storage mission.

Also known as the 213-J and 213-K Magazines, the 213-J and 213-K Waste Storage Caverns, and the 213-J and 213-K Storage Facilities, the vaults were constructed in 1944 for the storage of plutonium. They were originally defended by barbed-wire fences and a guard tower but became undefended as their storage mission changed later in the 1940's.

A more detailed description of the structure is provided in DuPont (1945) that describes it as "a reinforced concrete, earth-covered, magazine building containing two parallel vaults. The south end of each vault forms a continuous reinforced concrete wing-shaped retaining wall that has an attached

reinforced concrete loading platform for each vault section. The structure is oriented north and south, having its center line identical with the center line of its access road. Distance between vault sections is 44 ft 6 in. face-to-face. Each section contains three rooms, namely magazine, vestibule, and instrument. The latter two have outside, steel-hinged doors opening out onto the loading platform."

The type of foundations used are as follows:

- Vault Section: Reinforced concrete slab 1 ft thick with 4-ft spread footing; loading platform -12 in. square reinforced concrete piers with 9-in. spread footings.
- Retaining Wall: 10-ft 6-in. reinforced concrete spread footing, 1 ft 6 in. thick. Side walls, end walls, and roof slabs are reinforced concrete 1 ft thick with the bulkhead wall between the vestibule room and magazine room being 2 ft thick. An 8-ft ceiling is maintained in all rooms. The retaining wall is reinforced concrete extending 2 ft above backfill and tapers from 1 ft 8 in. to 1 ft at the top. Roofs have membrane waterproofing, 2-ply, with 1 in. Celotex protective covering. Exterior surface of the rear and side walls is treated with "Carbozite" waterproofing.

Ventilation is provided by four 12-in.-diameter ventilators in each unit, equipped with dampers and bird screens. These extend approximately 4 ft above the backfill that averages 6 to 10 ft above the roof slab. Six-hour fire resistive steel doors are installed in the bulkhead wall. Reinforced concrete shelving with concrete brick partitions line each side of each magazine section. The floor is built up an additional 6 in. under the shelving portion (DuPont 1945, Gerber 1993).

An examination by this author revealed that each vault section has three chambers, entered though one of two outside doors. The large chambers, made up of vestibule and magazine and separated by a vault door, are to the west and are as described above. The smaller chambers, or instrument rooms, are located to the east and are entered through the doors to the right of the vault door. These are about 8 x 4.5 x 8 ft high (inside dimension) with a concrete shelf on the rear wall (Figure 4).

The vaults have been used for various purposes during their history. Constructed for storage of Hanford plutonium, they were used only briefly, if at all, for that purpose. They have since been used for storage of explosives and for hardware contaminated with radioactive sodium. Dose rates up to 5 mR/hr were measured in 213-K during the sodium storage period. At present, 213-K is empty and being used for seismic testing, while 213-J is used by Pacific Northwest Laboratory (PNL) to store soil samples from various Hanford locations. Sodium metal storage signs and a sodium metal Material Safety Data Sheet were located in a litter pile inside 213-K. The remnants of a radioactive symbol (trifol) are visible on one storage vault wall.

The 213-J and 213-K loading docks have floor drains that may have drained to the cribs described in Section 3.2. No floor drains are apparent in the magazine or vestibule areas. An undocumented waste site exists a few hundred feet south of the vault at the site of the guard house and tower (see Section 3.3). Hanford Drawings W-74519 and H-6-502 provide limited detail on the facility.

Figure 4. Interior of 213-K Storage Vault, Vault Section.



3.2 213-J AND 213-K CRIB SITES

The 213-J and 213-K Crib Sites are inactive, decommissioned liquid waste sites that have been removed from radiation zone status.

Located at Hanford coordinates N54675 W34855 and N54675 W34745, one on each side of the 213-J and 213-K Storage Vault front entrance, the cribs were gravel filled and measured 15 x 8 x 5 ft deep. Each was covered with a 2-in.-thick concrete cover. Although no floor drains are apparent in the 213-J or 213-K vestibules or magazines, both vault loading docks have floor drains that feed into 8-in. steel pipes that run downward to a point below grade. These may have fed the cribs. Figure 3 shows the vault and parking lot. Although not visible in the photograph, the crib sites are to the extreme left and right of the photo, at the extreme east and west limits of the parking lot.

Both cribs received unspecified liquid wastes from 213-J and 213-K Vaults through 2-in. steel or iron pipes. No quantitative or qualitative data could be located to characterize any drainage that may have occurred. A 1974 survey detected no radioactive contaminants above world fallout levels, and both cribs were excavated and removed (Stenner et al. 1988).

No visual sign of the cribs remains today. The crib sites are gravel covered, and no distinction can be made between the crib sites and the vault parking area.

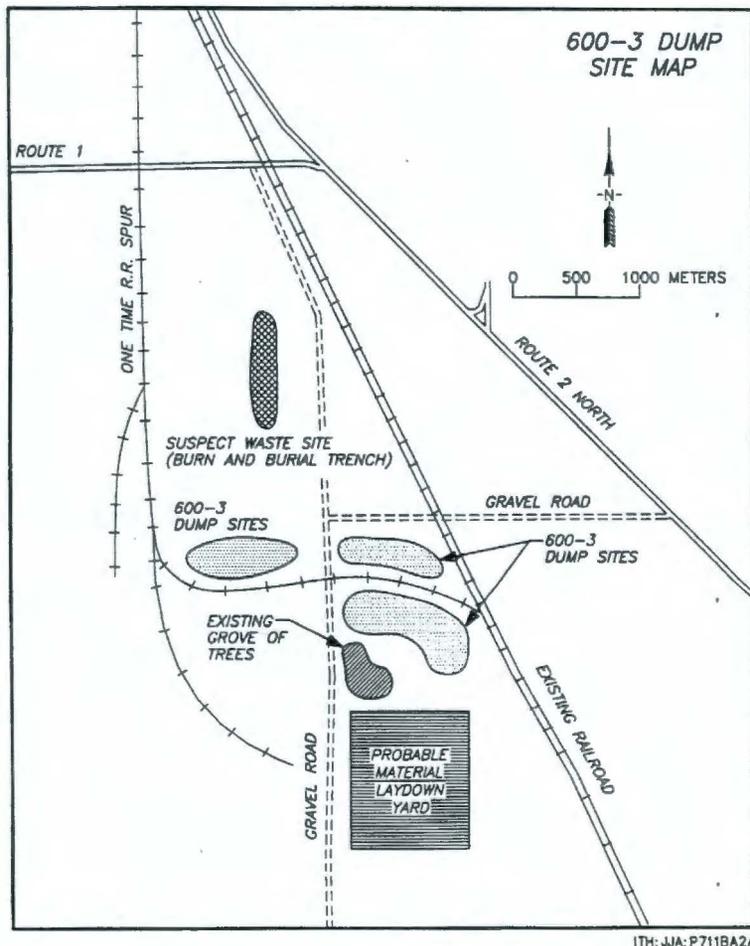
Hanford Drawing W-74519 provides detail on the vault facility but does not show floor drains, feed lines, or cribs. No drawing could be located that provides this information.

3.3 600-3 EXCESS MATERIAL STORAGE YARD (PAINT PIT AND DUMPING AREA)

The 600-3 Paint Pit and Dumping Area is a large area of intermixed and overlapping dump and burial sites located in the area of a one-time railroad spur called "Leizure Spur" on old drawings. The site is also known as the Excess Material Storage Yard (DuPont 1945) and the U.S.E.D. Salvage Yard (Drawing C-3316). These could have been separate facilities located about 1/2 mi apart, or they could have been the same facility with missions and names that changed over time.

Located west of Route 2 North, south of Route 1, and west of the existing railroad line at approximate Hanford coordinates N68000 W33000 (center), the site covers approximately 34 acres and includes multiple dump sites that received various classes of refuse (see Figure 2 for location and Figure 5 for detail).

Figure 5. 600-3 Dump Site Map.



DuPont (1945) interviews with plant employees identify the site as the Excess Material Storage Yard. Several small buildings located there were used for salvage sorting and disposal. All buildings have since been removed.

A site inspection disclosed metal scrap including machine lathe turnings and filings, most of it stainless steel or aluminum; paint contaminants, paint cans, cans and bottles; electrical insulators; small arms ammunition casings; electrical batteries; transite; and other debris. Multiple areas, including a 30-ft radius near the northeast corner of the site, appear to be contaminated with materials that have stained the soil brown and precluded vegetation growth. This 30-ft radius is covered with machining scrap. Bulldozer marks and the manner in which scrap debris protrudes from the surface suggest that the multiple dump sites have been partially covered with soil and that additional scrap exists below grade.

An overview of the area suggests that some of the scrap is located along the shoulders of the one-time railroad spur, suggesting the possibility that the area was used for railroad dumping. Other scrap material, however, does not seem related to railroad activities.

A 1948 aerial photo of the area confirms the existence of multiple railroad spurs into the dumping area and that dumping occurred near and along the rail lines at multiple sites. Numerous vehicle tracks suggest that dumping was also accomplished from motor vehicles and that it was ongoing and intensive. The area has the appearance of a rail-side material storage area and may have been developed for that purpose during the initial Hanford construction period (1944 to 1945) and converted to a dumping area at a later time. The site is visible on Hanford photo 12:46 of the U.S. Geological Survey (USGS 1948) aerial photo series and was in active use at that date.

A radiation survey of the area was conducted in March 1992, and no instances of radiological contamination were detected (Survey Number 102947).

3.4 600-24 H-21 ANTI-AIRCRAFT ARTILLERY COMPOUND AND DUMP SITE

The 600-24 Dump Site is part of the H-21 Anti-Aircraft Artillery Compound. It is an inactive hazardous waste dumping area located about 1/2 mi northwest of the P-11 Site at the end of a narrow paved road. This is about 100 m east of the north/south running railroad track at approximate Hanford coordinates N63670 W27550 (see Figure 2).

The site is typical of Hanford military facilities of the early 1950's with several building (probably quonset hutment) foundation pads and remnants located along both sides of a roadway. Building sites are delineated by rock lined gravel pathways or by small rock walls. All structures have been removed, but concrete entry pads or foundation pads remain and show locations and arrangement of the structures.

A well house is located on the east side of the roadway at the north end of the compound. A 20- x 36-ft concrete pad exists with concrete cradles for a large (approximately 30- x 8-ft radius) water tank. A well head exists in the foundation pad, and a water distribution system appears to have distributed water to the other buildings at the compound. Metal water pipe is visible at most building sites. Test well 64-27, A-5295 BNW, is located at the well house.

Multiple small dumping sites are evident northwest and northeast of the compound, but none could be located that exhibit more than a small scattering of debris. Lesser amounts of debris are located at a site 100 yd southeast of the end of the paved road. An ammunition case is also located here. A coal

pile site exists on the east shoulder of the railroad tracks northwest of the compound, and a large pile of military barbed-wire fence posts (screw type) is located west of the tracks.

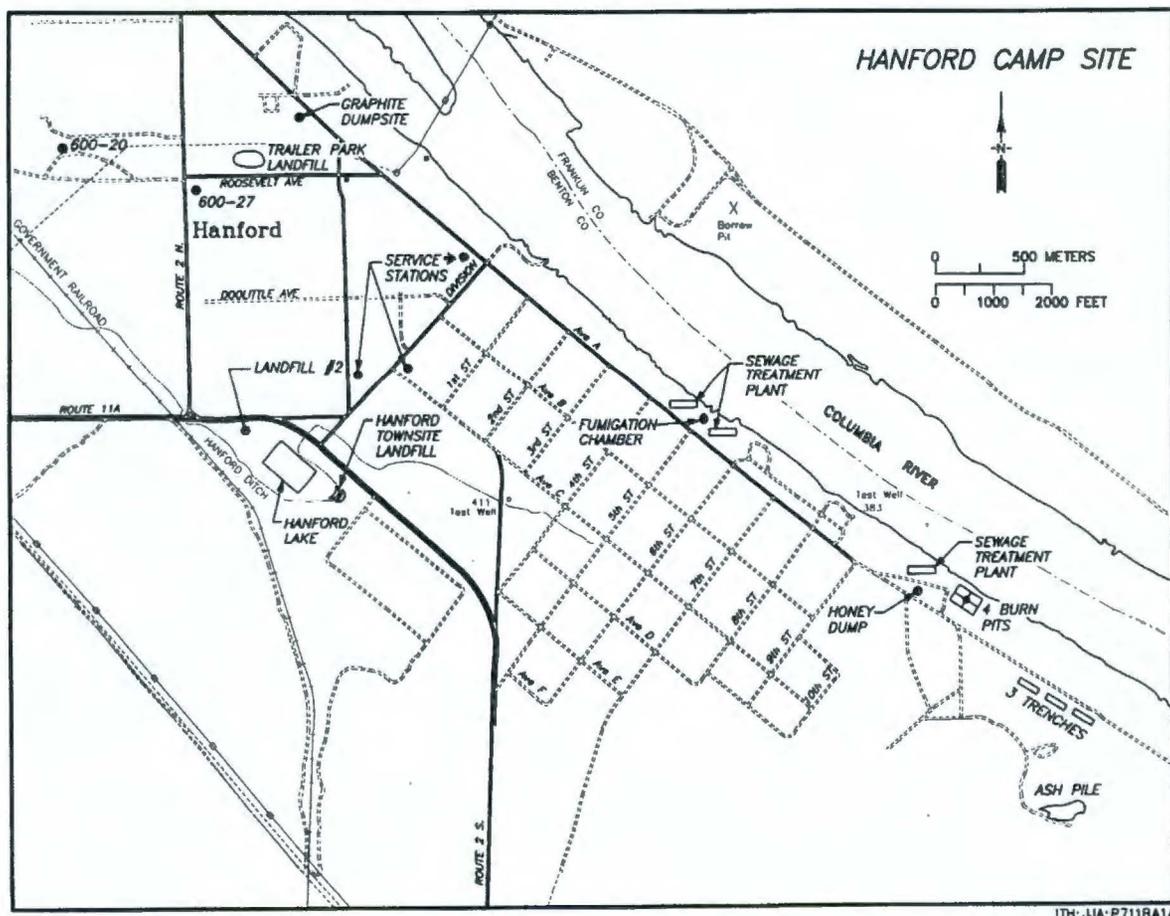
An unexploded mortar round was located in 1990 at a site 200 yd northeast of the compound in an area that appeared to have been used for dumping, although little waste or debris is evident today. The mortar round was detonated by explosives experts, and some level of decontamination and decommissioning (D&D) has been accomplished at the dump sites (Roos 1988). Occasional bulldozer marks suggest that any existing burial sites may have been covered over.

The site appears today as rolling, open, sage-covered fields. Sagebrush is fairly mature which suggests several decades of undisturbed growth. Building scrap and debris may be found scattered throughout the area, especially northeast of the military compound.

3.5 600-27 WELL AND VOLATILE ORGANICS SITE

An inactive hazardous wastesite exists about 1 mi west of the old Hanford High School and 50 m east of Route 2 North on the south side of Roosevelt Avenue at approximate Hanford coordinates N53880 W17760. This is in the northwest corner of Hanford Construction Camp trailer park that operated from 1944 to 1945 (Figure 6, shows the location).

Figure 6. Hanford Construction Camp.

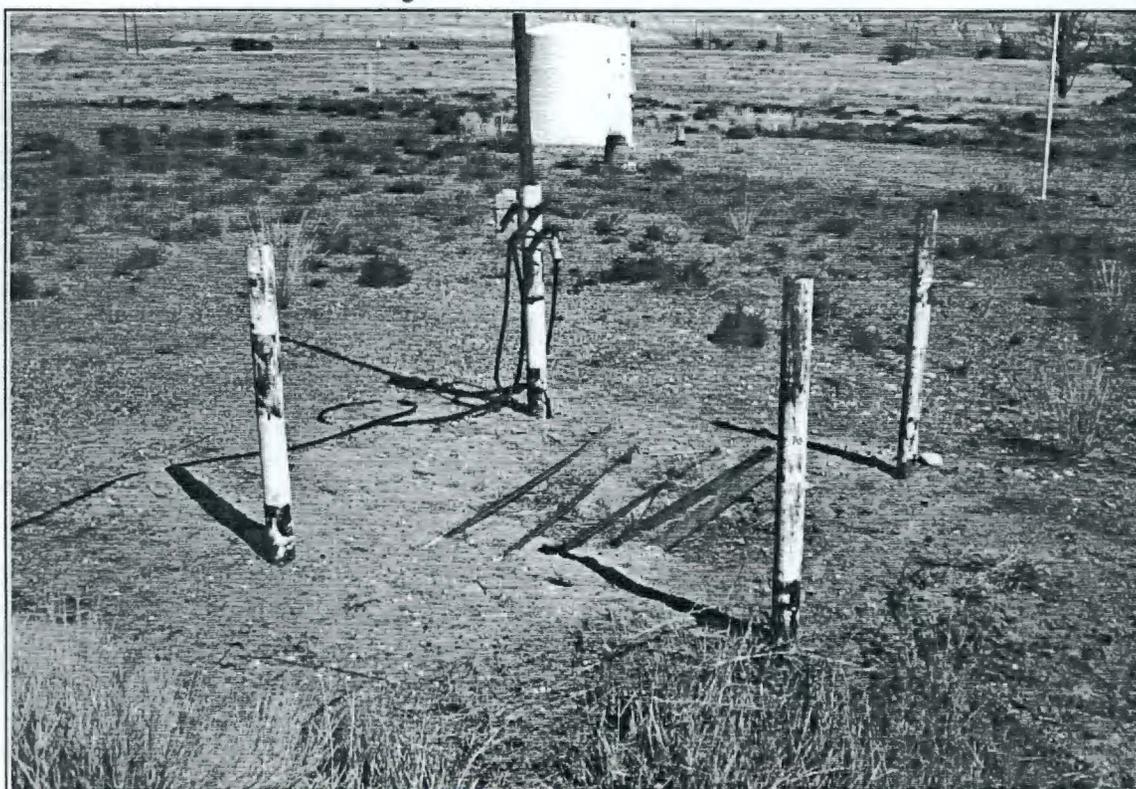


The site is an abandoned groundwater monitoring well in which volatile organics were detected. Maintenance waste and herbicides were possibly disposed of in this area (Roos 1988).

Several test wells currently exist at this site, including 54-18A (A8855), 6-54-18B (A8856), 6-54-18C (A8857), 6-54-18D (A8858), and others. Two unnumbered and abandoned wells are also located at this site, and it is from one of these that the organic-contaminated groundwater was detected. Both abandoned wells are protected by steel posts (Figure 7).

Small amounts of asbestos transite and other debris are also visible in the general area of the well site.

Figure 7. 600-27 Test Well Site.



3.6 HANFORD TOWNSITE LANDFILL

The Hanford Townsite Landfill is an inactive and stabilized solid waste burial ground located west of the original Hanford townsite. It operated from about 1850 until 1943 when it was backfilled with clean soil during the construction of the Hanford Construction Camp.

The site measured about 200- x 200- x 20-ft deep. It received normal solid industrial and domestic wastes common to the period and has a hazard ranking score of 7.73 (Stenner et al. 1988). The site is located west of the Hanford Construction Camp between Route 2 South and Lake Hanford, within the horseshoe bend formed by the irrigation canal (see Figure 6). No photographs of the landfill could be located that show it during operation to verify its exact location, but aerial

photo 4-13 of USGS (1948) shows the horseshoe bend of the irrigation canal and surrounding area. Early topographic maps indicate a natural depression at the landfill site, but a site survey by the author finds the site essentially level, probably because of backfilling with clean soil.

Miscellaneous metal and glass waste of a type common to community land fills may be found scattered about and protruding from the surface. The surface has been bulldozed. Past employees verify this location, as does Denton and Buslach (1987).

Additional debris may be found immediately south and southeast of the accepted location of the landfill along the outer radius of the horseshoe bend of the canal. This area also appears to have been bulldozed to cover debris, and it is likely that preproject Hanford residents dumped domestic waste along both banks of the canal in the area of the horseshoe bend.

This waste site should therefore be considered to extend to both sides of the canal in the areas described. Figure 8 shows the horseshoe bend of the canal and the landfill to the left and right of the canal.

Figure 8. Hanford Townsite Landfill - Horseshoe Bend of Canal.



3.7 HANFORD TRAILER CAMP LANDFILL

The Hanford Trailer Camp Landfill is an inactive, stabilized solid waste burial ground located at the Hanford Construction Camp. It was a 100- x 100- x 10- to 20-ft-deep excavation that supported solid

waste disposal requirements for the Hanford Construction Camp Trailer Park and is believed to have received typical domestic wastes common to the period.

Existing records are contradictory with respect to its exact location. Some literature, such as Stenner et al. (1988), provides a location that duplicates that of the Hanford Townsite Landfill (see Section 3.6) when it says: "200 ft south of the Hanford Construction Camp between Route 2 North and the old Swimming Pond."

Site personnel recall the burial site as being northeast of the trailer park between the 101 Building and Roosevelt Avenue. A photograph located in the Waste Information Data System (WIDS) hard files tends to confirm the Roosevelt Avenue location, as does a site inspection. Denton and Buslach (1987) also confirms the Roosevelt Avenue location and should be considered to be highly reliable.

The Roosevelt Avenue site is a large excavation. Surface markings suggest that materials have been covered by bulldozing over with excavation spoils. Debris includes metal and glass fragments, fabric, rubber, and other materials suggestive of domestic refuse. Some heavier, nondomestic materials can also be seen, such as heavy metal scrap, rebar, concrete block, and concrete scrap. A large pile of washed river rock is also located in the upper part of the excavation.

No evidence exists of chemical or radiological contamination.

3.8 600-20 -- TANK CLEANING SITE

The 600-20 Tank Cleaning Site is a nonhazardous and nonradioactive tank site located west of the Hanford townsite at approximate Hanford coordinates N53880 W21430. The site is adjacent to the railroad tracks at a point approximately 300 m west of Route 2 North.

The site consists of two abandoned 3,000-gal asphalt tanks mounted on concrete cradles. A small amount of industrial hardware, apparently related to asphalt transfer between the tanks and asphalt trucks, may be found in the general area of the tanks.

The site has been cleaned by Hanford D&D personnel, and no significant waste or refuse is evident in the immediate area of the tanks.

A 3- x 3- x 1-m-deep pit is located 200 ft south of the tanks. Waste asphalt appears to have been dumped into this pit. Several pails and a 55-gal drum are in the pit bottom, and the floor of the pit is coated with asphalt.

3.9 600-26 -- HANFORD TOWNSITE BURN PILE

The Hanford Townsite Burn Pile is a nonhazardous and nonradioactive dumping area located west of the Hanford townsite, 200 yd west of Route 2 North, south of an access road, and east of a soil mound in the vicinity of test wells 54-18, 54-19, and 55-21. This is near the tank site mentioned in Section 3.8.

The pit consists of an 8-ft excavation containing a construction refuse burn pile and contains construction debris and possibly asbestos and barrels. This author was unable to locate this site, and no further description could be located.

3.10 P-11 SITE -- CRITICAL MASS LABORATORY SITE AND CRIB

The P-11 Site is the location of Hanford's first critical mass laboratory and its liquid waste crib. Located about 3 mi south of the 100-F Reactor Site and west of Highway 2 North at Hanford coordinates N63343 W25821 (building center), the site consisted of a preMED era farm house that was converted to laboratory use (see Figure 2 for location). A crib was located nearby that received low-level plutonium-contaminated liquid waste.

The laboratory (120 Building) consisted of a critical assembly room, chemistry lab, storage and tank room, and change room and operated from 1951 to 1974. A criticality event and fire in 1951 damaged the building and spread plutonium contamination to the extent that the building was demolished and removed from the site (Raile 1974).

An 8- x 8- x 5-ft-deep wooden crib with concrete outside walls and cover was located 160 ft east of the building at Hanford coordinates N63343 W25820. It was fed by a 4-in. stainless steel pipe (Hanford Drawing H-7-617). The crib and soils were exhumed in 1974, and the site was released from radiation zone status.

The bulk of plutonium was found in the top 1/2 in. of soil on the bottom of the crib. The surface resembled a dry mud bed and could be removed as a separate layer. The top layer of soil had up to 30,000 dpm surface reading. No contamination was detectable below the sandy 3-in. layer (Harmon and King 1975).

A former employee noted in a 1990 interview that "many poorly documented cribs are in the area" [of the P-11 Site]. This former employee was not available during the time period of this study but will be available in the near future, and additional study seems warranted to determine if additional contaminants may be found in area soils.

The exact location of the P-11 Laboratory is fixed by a permanent concrete benchmark at the site. The general area appears today as a flat, featureless field that has been sown with rye grass. Sage and cheatgrass are absent from the site. Test well 63-25 is located a few yards north of the laboratory site. The site is approximately 35 ft above groundwater (Stenner et al. 1988).

A hazard ranking system migration score of 16.25 has been assigned to the unplanned release UPR-600-16 site that necessarily includes this site (see Section 3.11).

3.11 UPR-600-16 -- P-11 FIRE AND CONTAMINATION SPREAD

A 1951 fire at the P-11 Critical Mass Laboratory spread plutonium contamination through the lab building and to a 180- x 100-ft area around the building (see Section 3.10 for description of the P-11 lab).

The area was stabilized with 2 to 2.5 ft of clean soil and gravel and enclosed in a wire fence with radiation warning signs. The entire area of contamination was exhumed in 1974, and contaminated soils were removed. The site was subsequently removed from radiation zone status (Stenner et al. 1988).

Contamination spread and cleanup activities are documented in Raile (1974). A hazard ranking system score of 16.25 has been assigned to this site.

3.12 UPR-600-18 -- GASOLINE SPILL NEAR 100-F

In a 1987 traffic accident a fuel tanker truck left the road 1/2 mi south of the 100-F Reactor Site and overturned. Approximately 7 gal of #2 diesel oil, 112 gal of unleaded gasoline, 10 gal of ethylene glycol, and 226 gal of leaded gasoline were spilled onto the ground from service hatches on the top of the fuel tanks. A total of 1,344 L of contaminants are estimated to have been lost to soil.

The location of the accident is reported as "1/2 mi south of 100-F Area on the 100-F access road." No obvious indicators exist, and this author was unable to identify the exact site of this spill.

As of 1987, a site cleanup was planned, but this author was unable to determine if it was completed (DOE 1987). The cleanup plan was to excavate 20 yd³ of soil and dispose of the soil as determined using soil analysis and characterization.

3.13 UPR-600-19 -- LIME SULFUR SPILL

A barrel of lime sulfur insecticide was abandoned at the DeWitt Buckholdt Ranch in 1943 when the Buckholdt property was taken over by the U.S. Army Corps of Engineers. The wooden barrel has long since collapsed, and the contents, perhaps 100 lb of lime sulfur, remain on the ground.

The Buckholdt Ranch, sometimes referred to as the Herriford Ranch, is located on a gravel road approximately 1/4 mi west of Route 2 North, between the Hanford townsite and 100-F Area (see Figure 2). The lime sulfur may be found about 1 yd off the access road, approximately in front of the house foundation and southeast of the well house foundation.

The ranch may be found by leaving Highway 2 North onto a gravel road that runs southwest from a point 3 mi north of the Hanford townsite. The road to the P-11 Site also departs the highway at this point, running to the northwest. The general area of the ranch is marked by several acres of orchard tree stumps visible from the highway.

Several hazardous conditions exist in the area of the Buckholdt and neighboring ranches. Pre-World War II wells remain partially open, and soil has collapsed around some of them. Toilet pits also remain open and present a falling and soil collapse hazard. Numerous small holes and pits abound in the area because of collapsing underground irrigation pipe. The Buckholdt house cellar remains open and presents a falling hazard.

4.0 SUSPECT WASTE SITES

Numerous suspect waste sites exist in the Hanford Construction Camp area. Some are documented in various Hanford documents; others are not, but none are documented in the WIDS (BHI 1994). Sufficient information is presented here to include them in WIDS.

4.1 SUSPECT WASTE SITE -- 213-J AND 213-K GUARD HOUSE TOILET PIT

The 213-J and 213-K Plutonium Storage Vaults were originally protected by a guard house and tower located at the front gate to the vault area, about 500 ft south of the vault parking lot.

A 14- x 16-ft concrete pad remains from the guard house. The pad includes a toilet pit opening that appears to open to a sanitary sewage pit located beneath the pad (Figure 9). No evidence of a sewage distribution system (septic tank) is apparent.

A second guard tower site is located at the northern limits of the security enclosure around the 213-J and 213-K Vault area, but no sewage pit is apparent at this site.

Figure 9. 213-J and 213-K Guard Tower Base and Toilet Pit.



4.2 SUSPECT WASTE SITE -- BURN AND BURIAL TRENCH

An undocumented burn (and possible burial) trench is located west of Route 2 North, south of Route 1, and west of the existing railroad line at approximate Hanford coordinates N70000 W34000 (center), 1/2 mi north of the dump site described in Section 3.4, and 100 m west of the north/south gravel road that runs through that waste site (see Figure 2 for location).

The trench is an inactive burn pit and possible solid waste burial site measuring approximately 150 x 20 x 4 m deep. It is oriented north to south. Miscellaneous debris is evident along the trench bottom, including metal and glass fragments, nails, fire scarred rock, cans, and bottles. The site is visible on Hanford Photo 12:46 of the USGS (1948) aerial photo series and appears to have been in active use at that date.

4.3 SUSPECT WASTE SITE -- 101 BUILDING GRAPHITE DUMP SITE

The 101 Building Graphite Dump is an inactive nonradioactive, nontoxic solid waste burial ground used for disposal of scrap graphite and building rubble (Denton and Buslach 1987).

The 101 Building was a graphite machine shop that manufactured reactor core graphite components. It was located at the Hanford Construction Camp, north of Roosevelt Avenue and North of the High School, west of Avenue A, in the "V" formed by Avenue A and the Power Lines (see Figure 6). The dump site appears to be along the southern edge of the 101 Building site, probably along the railroad right-of-way that serviced the building. A records review and site inspection reveal no evidence of radioactive or toxic dumping.

4.4 SUSPECT WASTE SITES -- SEPTIC TANKS AND SEWAGE TREATMENT PLANTS

The Hanford Construction Camp was supported by a system of underground sanitary waste treatment facilities sufficient to support the 45,000 employees who lived there. These facilities consisted of 80 septic tanks and 3 waste treatment plants, in addition to an unspecified number of septic tanks and drain fields that predate the construction camp but were used for camp purposes.

DuPont (1945) describes three sewage treatment plants for the camp. Each included a system of septic tanks and a waste treatment facility, connected by 4- to 30-in. vitrified clay or concrete pipe. Septic tanks were "standard design, three pass baffle, wooden box type" varying in size from 4 ft to 16 x 6 ft to 24 x 60 x 10 ft. Although these dimensions are confusing, it is clear that some tanks were quite large and that a significant potential for surface collapse may exist at these sites. The septic tanks were scattered throughout the Camp Area at required locations (DuPont 1945).

No map could be located that provides specific septic tank locations. However, several tanks were located on aerial photographs and were visited by this author. No visible sign of the septic tank could be found at one site, but shallow depressions were evident at three others. No additional effort was made to locate tanks, but further research would probably locate some. In the absence of maps or drawings, it is unlikely that all additional tanks can be located.

The sewage treatment plants operated from 1943 to 1945 to support the construction camp. These consisted of "baffled chlorine mixing chamber, chlorinator house, and a settling basin 80 x 230 x 4 ft deep and were located on the river side of A Avenue between 4th and 6th Streets and at 10th Street (DuPont 1945) (see Figures 6 and 10).

Figure 10. Suspect Waste Site -- Sewage Treatment Plant Trench.



The treatment plants appear today as rectangular excavations of somewhat larger dimensions than described above (i.e., 15 ft deep). The basins are unlined with soil bottoms and are grass covered. None are protected by barriers or warning signs and present a minor hazard to foot traffic and a more serious hazard to off-road vehicle traffic.

Concrete foundation remnants of the chlorinator buildings are evident at the north end of each treatment plant. Concrete and vitrified clay pipe and pipe rubble are evident in each area.

4.5 SUSPECT WASTE SITE -- FUMIGATION CHAMBER

A fumigation chamber (disinfestation building) existed at the Hanford Construction Camp. Located between Avenue A and the river, and midway between two sewage treatment basins, the chamber was a small wooden frame building. It was posted with "Poison Gas, Keep Out" signs and protected by an 8-ft barbed-wire security fence (see Figure 6 for exact location).

Each has the appearance of a standard modern 220-ft³ compressed gas bottle, but is wrapped in a burlap-like material and stands in running water.

A small building adjacent to the fumigation chamber is referred to as the "bedding storage" building, suggesting that the fumigation chamber was used to fumigate bedding. Fumigants commonly used for this purpose include methyl bromide and sulfuryl fluoride.

The site appears today as a grass covered field adjacent to a small grouping of trees. No remnant of the fumigation chamber is evident (Figure 11).

Figure 11. Site of Suspect Waste Site -- Fumigation Chamber.



4.6 SUSPECT WASTE SITE -- POWER HOUSE ASH PILE

A large ash pile exists at a site 1/2 mi south of the southern limits of the Hanford Construction Camp (see Figure 6). The pile is pear-shaped and oriented north to south with the wider portion to the south. It is about 250 x 60 x 10 ft deep. The ash appears characteristic of power house ash and probably came from coal fired power houses used at the Hanford Construction Camp (1943 to 1945). The dirt road leading to the site has been overlaid with ash (Figure 12).

A small ash pile may be found a few yards northwest of the large pile. No records could be located to characterize the site or verify its source.

Figure 12. Suspect Waste Site -- Power House Ash Pile.



4.7 SUSPECT WASTE SITE -- CONSTRUCTION CAMP BOILER HOUSE PONDS

Eighteen boiler houses, also called steam plants or power plants, were used at the Hanford Construction Camp to generate steam for building heat. These are described in DuPont (1945) as "100 boiler hp, hand-fired, horizontal return tubular boilers, [arranged] either singly or in batteries." Each site had from one to eight boilers. Each had a wood-stave soft water storage tank and an open-boxed pit for the sluicing and removal of ashes by means of clamshell crane. Some also had liquid waste disposal ponds that received waste water and chemicals.

These ponds or trenches, referred to as Liquid Seep Ponds in Denton and Buslach (1987), are believed to have existed at each fixed boiler house and to have received "industrial and commercial waste common to the period." A phone conversation with the authors revealed that the most likely chemical to have been released to the ponds would have been "water softener brine."

Such pits are evident at most boiler house sites. Most measure about 60 x 20 x 5 ft deep and are filled with wind-blown debris and tumbleweeds. They are unlined and without foundation or side walls. No obvious signs of contamination are present.

4.8 SUSPECT WASTE SITE -- HANFORD TOWNSITE DOMESTIC LANDFILL 2

Numerous instances of domestic debris are evident in a large area immediately north of the Hanford Lake described in Section 3.8. The entire area between the lake and the intersection of Highways 2 North and 11A appears to have been used for dumping of domestic refuse during an early time period, probably pre-1944. Heavy concentrations of tin cans, bottles, auto parts, and other domestic debris are evident.

Bulldozing marks are evident, and it appears that landfill debris has been covered over and that additional concentrations may exist below grade.

It seems probable that the entire area from Highway 11A south through the inner and outer radius of the horseshoe bend of the irrigation canal was utilized by preMED era Hanford residents as a community dump site, or landfill. For purposes of this report, however, the area is divided into sites north and south of Lake Hanford. The lake itself may have been located on landfill.

4.9 SUSPECT WASTE SITES -- SERVICE STATIONS AND POTENTIAL UNDERGROUND TANKS

Four automotive service stations existed at the Hanford Construction Camp (DuPont 1945). Three may be located on old maps, while the location of the fourth is unknown (see Figure 6).

DuPont (1945) states that a total of ten pumps existed at the four stations. It states that two of the stations have underground fuel tanks, but is silent on the other two.

A site visit revealed open grass-covered fields with some asphalt rubble, but no signs of buildings or gas pumps and no visual evidence of the existence of underground tanks.

4.10 SUSPECT WASTE SITE -- HONEY DUMP STATIONS

Denton and Buslach (1987) mention "Honey Dump Sites" located at the Hanford Site. These were dumping and cleaning stations for the portable toilets used at various Hanford construction sites from 1943 to 1945. One such site was located at the north end of West Lake and is not a subject of this report. Another was located southeast of the Hanford Construction Camp. It was located a few hundred yards south of the southern limits of the camp, immediately west of the number 3, or southernmost, sewage treatment plant, in which toilet waste was processed.

This area is shown on the site map provided in DuPont (1945), but is not described in its text. It is also visible on the USGS (1948) aerial photo series. The DuPont map names the site "Salv. and Cleaning Units," and site personnel recall that wooden platforms were located there for purposes of dumping and cleaning.

The site, and the sewage treatment plant, would have received toilet chemicals and waste.

4.11 SUSPECT WASTE SITE -- THREE TRENCHES

Three trenches are located about 1 mi south of the Hanford Construction Camp, along the gravel road that is an extension of Avenue A. They are located about 100 ft west of the road. Each is about 50 x 10 x 2 m deep with spoil piles pushed to the west side of the trenches. Each trends north to south and parallels the road. No debris is evident in the trench bottoms, and their purpose is unclear. The trenches are visible on USGS (1948) aerial photo series.

4.12 SUSPECT WASTE SITE -- SMALL ARMS RANGE

A small arms target range is located approximately 2 mi northwest of the Hanford Construction Camp. It operated from the mid-1940's through the 1950's as a practice range for handguns, rifles, shotguns, machine guns, hand grenades, smoke bombs, and other small arms and incendiary devices. Complete information on all types of ordnance used is not readily available.

The site is located along the north shoulder of Gable Mountain that provided the backdrop for the target areas. The hillside immediately behind the target areas is heavily laden with expended rounds, mostly lead with some steel, brass and other metals.

The general area of the target range is currently closed because of potential risk from unexploded ordnance that might remain in the hillside and areas adjacent to the range.

4.13 SUSPECT WASTE SITES -- FOUR BURN AND BURIAL PITS

Four burn and burial pits exist a few hundred feet south of the Honey Dump Site described in Section 4.10. Each pit is about 150 x 75 x 6 to 12 ft deep. They are close together and are arranged to form a single rectangle that trends northwest to southeast (see Figure 6 for location and arrangement).

The pit floors have been partially backfilled, and debris is evident throughout, including fire-cracked rock, glass, china, jars, bottles, metal, kitchen materials, broken toilet bowl, and other materials. Bulldozer marks suggest that debris has been covered. The pits vary in depth, apparently because of varying levels of backfill.

No fencing or warning signs exist. No soil discoloration or vegetation stress is apparent. Vegetation exists on pit floors.

The pits are shown in DuPont (1945) maps but are not described in text. They are also visible on the USGS (1948) aerial photographs of the area.

4.14 SUSPECT WASTE SITE -- SEPTIC TANKS AND DRAIN FIELD, P-11 SITE

Two septic tanks and a drain field were in use at the P-11 Critical Mass Laboratory and probably remain in place. All other P-11 site facilities and the P-11 Crib were removed after the unplanned

release described in Section 3.10. No evidence could be located, however, that suggests that the sanitary sewage system was removed.

Hanford Drawing H-7-617, dated 1949, describes a preMED era septic tank and a replacement tank at Hanford coordinates N63558 W25890. The older, original tank is shown as having been dirt filled. The replacement tank is supported by a herringbone-type drain field beginning at Hanford coordinates N63558 W25757 and running eastward for 60 ft. The feed line is 4-in. vitrified clay bell and spigot pipe. The drain field material is described as "4-in. open joint field tile." The older, original septic tank is not described, but the replacement tank is described as a "500-gal rust resisting alloy steel tank, asphalt enameled inside and out" buried with its upper surface no less than 3 ft below grade. (see Figure 2 for P-11 location).

5.0 REFERENCES

- BHI, 1994, *Waste Information Data System (WIDS)*, Bechtel Hanford, Inc., Richland, Washington.
- Cushing, C.E., 1988, *Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Pacific Northwest Laboratory, Richland, Washington.
- Denton, L. and R. Buslach, 1987, *3004 Historical Review*, Unpublished (in possession of author).
- DOE, 1987, *Hanford Site Waste Management Units Report*, U.S Department of Energy, Richland Operations Office, Richland, Washington.
- DuPont, 1945, *Construction, Hanford Engineer Works: History of the Project*, HAN-10970, Vol. III, E.I. DuPont de Nemours and Company, Wilmington, Delaware.
- Gerber, M.S., 1993, *Manhattan Project Buildings and Facilities at the Hanford Site: A Construction History*, WHC-MR-0425, Westinghouse Hanford Company, Richland, Washington.
- Hanford Drawing H-7-617, *P-11 Project-Plot Plan*, General Electric Company, Richland, Washington.
- Harmon, K.M. and J.C. King, 1975, *Resource Book - Decommissioning of Contaminated Facilities at Hanford*, PNL-MA-588, Pacific Northwest Laboratory, Richland, Washington.
- Raile, M.N., 1974, *P-11 Facility Cleanup Summary Report*, ARH-ST-109, Atlantic Richfield Hanford Company, Richland, Washington.
- Roos, R.C., 1988, *Mystery Site Field Data Sheets*, Westinghouse Hanford Company, Richland, Washington. Documents are in possession of author.
- Stenner, R.D., K.H. Cramer, K.A. Higley, S.J. Jette, D.A. Lamar, T.J. McLaughlin, D.R. Sherwood, and N.C. Van Houten, 1988, *Hazard Ranking System Evaluation of CERCLA Inactive Waste Sites at Hanford*, PNL-6456, Pacific Northwest Laboratory, Richland, Washington.
- USGS, 1948, *Hanford Site Aerial Photo Series* (photos are in possession of author).

DISTRIBUTION

ONSITE (27 copies)

D. H. DeFord (12)	H6-02
W. L. Pamplin, Jr.	H4-86
R. W. Ovink	H6-03
R. P. Henckel	H6-01
C. W. Hedel (3)	H4-89
S. D. Johnson (2)	H4-79
Environmental Resource Center	H6-07
Document Control (3)	H4-79
BHI Project File (3)	H6-08