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Revision 0

UC-630, 721

Hexone Storage and Treatment Facility Closure Plan

Date Published
November 1992

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United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

DEC 1992
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STATE ENVIRONMENTAL POLICY ACT

ENVIRONMENTAL CHECKLIST FORMS

FOR

HEXONE STORAGE AND TREATMENT FACILITY
CLOSURE PLAN

REVISION 0

November 1992

WASHINGTON ADMINISTRATIVE CODE
ENVIRONMENTAL CHECKLIST FORMS
[WAC 197-11-960]

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A. BACKGROUND

1. Name of proposed project, if applicable:

Closure of the Hexone Storage and Treatment Facility (HSTF).

2. Name of applicants:

U.S. Department of Energy, Richland Field Office (DOE-RL) and Westinghouse Hanford Company (Westinghouse Hanford).

3. Address and phone number of applicants and contact persons:

U.S. Department of Energy
Richland Field Office
P.O. Box 550
Richland, Washington 99352

Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

Contact:

J. D. Bauer, Acting Program Manager
Office of Environmental Assurance, Permits, and Policy
(509) 376-5441

R. E. Lerch, Deputy Director
Restoration and Remediation
(509) 376-5556

4. Date checklist prepared:

November 1992.

5. Agency requesting the checklist:

Washington State
Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

6. Proposed timing or schedule: (including phasing, if applicable):

Since the late 1960's, two underground tanks were used to store liquid mixed waste. Certain closure activities have been completed under interim status. This included pumping out the tanks (excluding the tank heels and sludge), distilling the liquid in a portable distillation system, and decontaminating the distillation system and railcars (used to temporarily store the distillate). Approximately 35,000 gallons

(132,000 liters) of liquid were pumped from the underground tanks and distilled twice, reducing the radioactivity sufficiently to allow incineration in an offsite permitted facility. The distillation took place during July through December 1990. Transportation of the distillate to the incinerator began in November 1991 and was completed in June 1992. Preliminary decontamination of the distillation system and railcars was completed in October 1992.

Closure of the HSTF would be scheduled to be completed within 14 months after approval of the closure plan following notification by the Washington State Department of Ecology (Ecology).

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

There are no plans for future additions, expansions, or use of the HSTF. However, the HSTF is scheduled to be addressed as part of a *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) *of 1980* operable unit at a later date.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

This *State Environmental Policy Act* (SEPA) *of 1971* Environmental Checklist is being submitted to Ecology concurrently with the RCRA closure plan for the HSTF. The Part A, Form 1, was submitted to Ecology in May 1988.

An evaluation of potential environmental impacts associated with closure activities will be prepared for internal documentation purposes.

General information concerning the Hanford Site environment can be found in the *Hanford Site National Environmental Policy Act (NEPA) Characterization* document, PNL-6415, Revision 4, Pacific Northwest Laboratory, 1991, Richland, Washington.

9. Do you know whether applications are pending for government approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No applications to government agencies are known to be pending.

10. List any government approvals or permits that will be needed for your proposal, if known.

In accordance with the Tri-Party Agreement, Ecology is the lead regulatory agency that will approve the HSTF closure plan pursuant to the requirements of Washington Administrative Code (WAC) 173-303-610 and 40 Code of Federal Regulations (CFR), Parts 265.381 and 270.1. A *National Environmental Policy Act* (NEPA) *of 1969* review will be required before closure can proceed.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

The proposed action is to close the HSTF pursuant to regulations promulgated under WAC 173-303 and *Resource Conservation and Recovery Act of 1976*. The features to be closed consist of two carbon steel, 23,575-gallon (89,000-liter) underground storage tanks (tanks 276-S-141 and 276-S-142) and ancillary equipment and piping. The distillation system and railcars have undergone preliminary decontamination and were moved elsewhere at the Hanford Facility and are awaiting decontamination concurrence. Closure would include disposition of all of these features.

The tanks were constructed in 1951 and stored commercial-grade hexone for use in the plutonium and uranium extraction process until 1967. The tanks subsequently were used to store radioactively contaminated liquids from the reduction-oxidation (REDOX) plant and possibly the Hot Semiworks facilities. Monitoring of steady liquid levels in the underground storage tanks (before the contents were removed for distillation) indicated low probability of leakage, though analysis of interior sludge reveals the presence of tank corrosion products.

Tank 276-S-141 held 20,000 gallons (75,700 liters) of essentially pure liquid hexone, contaminated with small amounts of fission products (0.0004 curie). Tank 276-S-142 held 2,000 gallons (7,600 liters) of water and 14,000 gallons (53,000 liters) of a liquid organic mixture consisting of 60 percent hexone, 25.2 percent normal paraffin hydrocarbons, 1.7 percent water, and 12.6 percent tributyl phosphate. Tank 276-S-142 contained substantially more fission products (0.25 curie). The two tanks also held a combined total of 0.7 curie of tritium. After distillation of the tank contents, the tanks hold residual sludge heels of this material (approximately 250 gallons [950 liters] each).

During closure activities, all bulk dangerous waste would be removed from the tanks and ancillary equipment. This equipment would be decontaminated and/or disposed of as required for clean closure. Closure

would be consistent with applicable laws and regulations, and would be in accordance with direction from Tri-Party Agreement regulators.

Before tank decontamination, a visual tank integrity examination would be performed. If no staining from past or present leaks is apparent, soil sampling would be limited accordingly. Soil sampling and field screening (e.g., radiation and organic vapor analyses) would serve to verify clean soil or to ascertain the extent of contamination. If minimal and obvious soil contamination is present, clean up would be included in the RCRA closure activity. If extensive soil contamination is present, cleanup would be deferred until coordination with CERCLA remedial action. The HSTF area would be stabilized in the interim to prevent contaminant migration and water infiltration. If the underlying soils or the groundwater is contaminated, the site would not be considered closed until the remediation of the 200-RO-2 operable unit under CERCLA is complete. Sampling and analysis, and if necessary, contaminant removal, would be in accordance with applicable guidelines and regulations.

Postclosure care would be required if the treatment unit in question cannot attain closure via waste removal.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

The HSTF is located in the south central portion of the 200 West Area, on the central 200 Areas Plateau. Richland, Washington, the nearest population center, is approximately 30 miles (48 kilometers) southeast of the 200 West Area. The HSTF is approximately 2,500 square feet (232 square meters) and is located in Township 12N, Range 25E, Section 12, Willamette Baseline and Meridian.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other_____.

Flat.

b. What is the steepest slope on the site (approximate percent slope)?

The site is essentially flat.

c. What general types of soils are found on the site? (for example, clay, sandy gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

The soil types in the 200 Areas mainly consist of eolian and fluvial sands and gravel.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No. There are no surface indications of slumping, sliding, or instability.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

Approximately 600 cubic yards (450 cubic meters) of fill material might be required to grade the HSTF site after the underground storage tanks are removed. The source of fill likely would be the excavated fill from the HSTF, if determined to be uncontaminated. Additional fill might be brought from existing borrow pits on the Hanford Site.

If the soil beneath the tanks is determined to be uncontaminated, the excavation site would be filled with uncontaminated material. If soil contamination is present above action levels and its extent is minimal and obvious, the contaminated soil would be treated, stored, and/or disposed at a permitted facility. If contaminants in the underlying soil are substantial and widespread, a temporary impermeable barrier would be applied to isolate contamination from the fill placed over it. The contamination would be remediated in coordination with the cleanup of the larger 200-RO-2 operable unit. If clean or protective closure is not selected at this time, the closure plan and the SEPA checklist would be expanded accordingly. Submittal of the remedial investigation/feasibility study for the 200-RO-2 operable unit is scheduled for the year 2005.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Minor wind erosion could occur as dust is raised by excavation activity or construction vehicles.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

Very little of the site is covered with material impervious to precipitation. After remediation, most of the area would be covered with clean fill and gravel to reduce fugitive dust emissions. However, a cover over the underground tank area would be constructed if the waste removal goals of the closure plan cannot be attained.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

A layer of gravel would be applied to minimize erosion if necessary.

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities, if known.

Closure activities would result in the generation of exhaust emissions from heavy equipment and vehicles used to gain access to the HSTF.

Dust might be generated during tank removal, but would cease when activities terminate. Standard work practices would minimize dust generation; for example, wetting the ground surface as necessary.

Although little hexone or related organic substances remain in the HSTF, the potential exists for small amounts of hexone emissions.

b. Are there any offsite sources of emissions or odors that may affect your proposal? If so, generally describe.

While there are minor emission sources in the general 200 Areas Plateau, emissions are not expected to affect the proposed action.

c. Proposed measures to reduce or control emissions or other impacts to the air, if any?

Good engineering practices and any actions to protect the environment and worker safety and health would be performed. Appropriate measures would be taken during decontamination to limit air emissions and protect worker health.

3. Water

a. Surface

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

No. The Columbia River flows through the Hanford Site, and is located approximately 7 miles (11 kilometers) north of the HSTF. In addition, there are several small ephemeral drainages located in the southwest portion of the site. The closest of these is several miles away from the HSTF.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

Closure of the HSTF would not require any activity in or near the described waters and drainages.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

There would be no dredging or filling from or to surface water or wetlands.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

The water supply for the 200 Areas is pumped from the Columbia River. Decontamination activities would require the use of an estimated maximum of 5,000 to 10,000 gallons (19,000 to 35,000 liters) of water.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No.

b. Ground

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

No.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

No liquid or solid waste discharges to the ground would occur.

c. Water Run-off (including storm water)

1) Describe the source of run-off (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

The Hanford Site receives approximately 6 to 7 inches (15 to 18 centimeters) of annual precipitation that seeps into the ground through the porous soils at the site. Because of the low rainfall and the arid climate, this water will return to the air through evaporation.

Accumulation of surface water at the HSTF does not occur, other than puddles that quickly infiltrate. No drainages in the surrounding area are directed to the HSTF. No method of collection and disposal would be implemented, other than equipment secondary containment and precautions to prevent waste migration during and after excavation.

2) Could waste materials enter ground or surface waters? If so, generally describe.

No. During tank removal and other remedial activities, all waste materials would be contained for appropriate disposition after waste designation.

d. Proposed measures to reduce or control surface, ground, and run-off water impacts, if any:

After underground tank removal, the HSTF site would be contoured and covered with gravel or other material to prevent or reduce run-off

and erosion. A cover over the underground tank area would be constructed if the waste removal goals of the closure plan cannot be attained.

4. Plants

a. Check or circle the types of vegetation found on the site.

deciduous tree: alder, maple, aspen, other
evergreen tree: fir, cedar, pine, other
shrubs
grass
pasture
crop or grain
wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
water plants: water lily, eelgrass, milfoil, other
other types of vegetation

There is essentially no vegetation at the HSTF, other than isolated weed species that occasionally sprout in the area and are periodically removed. This practice will continue through closure.

b. What kind and amount of vegetation will be removed or altered?

Essentially no vegetation alteration would occur. After clean closure of the HSTF, the site might be covered with clean gravel to minimize surface erosion. Revegetation of the HSTF would be considered after remediation of the larger CERCLA operable unit.

c. List threatened or endangered species known to be on or near the site.

The HSTF is located within an area that has been heavily industrialized since the mid 1940's. Vegetation at the HSTF is sparse to nonexistent, consisting entirely of introduced weed species. There are no threatened or endangered species known to be on or near the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Until final remediation of the CERCLA operable unit is completed, no attempts would be made to revegetate the site. Revegetation might interfere with or complicate the final CERCLA remediation action. Instead, the site would be stabilized in the interim, as necessary, with gravel and coarse sand.

5. Animals

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other: _____
mammals: deer, bear, elk, beaver, other: _____
fish: bass, salmon, trout, herring, shellfish, other: _____

Raptors (burrowing owls, ferruginous, redtail, and Swainson's hawks) are occasionally seen in the 200 West Area. Small passerines (sparrows, finches) also are present in the general vicinity of the HSTF. Mule deer, elk, rabbits, badgers, and coyotes also are found in the general area.

b. List any threatened or endangered species known to be on or near the site.

The ferruginous hawk, a state threatened species, has been seen in the general area on occasion, but has not been observed to perch, hunt, or nest in the vicinity of the HSTF.

c. Is the site part of a migration route? If so, explain.

The Hanford Site is a part of the Pacific Flyway.

d. Proposed measures to preserve or enhance wildlife, if any:

This project contains no specific measures to preserve or enhance wildlife because the larger area around the HSTF will undergo remediation in coordination with CERCLA in the future. After that is accomplished, measures to preserve or enhance vegetation and wildlife would be evaluated.

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Electricity at the HSTF would be used for closure support activities, and energy use would be stopped when closure activities are completed.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Energy consumption is not anticipated to be significant, and energy conservation features are not readily applicable to this project.

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

There are several health and safety issues associated with closure of the HSTF. These include potential health hazards to onsite personnel due to exposure to hazardous and/or radioactive substances, and risk of fire and explosion. Inhalation or ingestion of radioactive and organic constituents could produce toxic effects in people. Although little hexone (5 to 30 gallons [19 to 115 liters]) remains in the HSTF, hexone is a highly flammable solvent that has a room temperature flash point.

The tarry residue in the still vessels and the sludge heel in the two tanks present a potential health risk to environmental remediation personnel. The substances are considered mixed hazardous and radioactive waste.

In addition, heavy equipment and excavation pose potential worker safety hazards during the removal and decontamination of the underground tanks.

1) Describe special emergency services that might be required.

Hanford Site security, fire response, and ambulance services are on call at all times. Hanford Site emergency services personnel are specially trained to manage a variety of circumstances involving chemical and/or radioactive constituents and situations.

2) Proposed measures to reduce or control environmental health hazards, if any:

Potential fire or explosion hazards would be controlled in several ways, including control of hexone and its vapors; prevention of ignition sources; exclusion of high oxygen concentrations through inert gas blanketing; removal of any residual hexone from the tank offgas stream through high-

efficiency particulate air (HEPA) filtration and activated charcoal filtration.

Chemical and radiological safety hazards would be mitigated by preventing direct contact with the residual chemical constituents; vapor control as mentioned in the previous paragraph; HEPA filtration of all offgas streams; the possible use of a portable greenhouse to enclose and contain the underground storage tanks during decontamination, removal and cleanup; and protective clothing and respiratory protection used by all onsite personnel as necessary.

b. Noise

1) What type of noise exists in the area which may affect your project (for example: traffic, equipment, operation, other)?

While there is a minor amount of traffic, operation, and equipment noise in the vicinity, it is not expected to affect personnel at the HSTF. Appropriate hearing protection would be worn by workers during tank removal and decontamination.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Minor amounts of noise from traffic and equipment are expected on a short-term basis during day shift hours.

3) Proposed measures to reduce or control noise impacts, if any:

If Occupational Safety and Health Administration noise standards are exceeded, appropriate measures to protect workers would be employed.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

The Hanford Site houses reactors, chemical separation systems, waste management facilities, and related facilities. These facilities are being used, or were used in the past, for the production of special nuclear materials. Other scientific and engineering programs are also carried out, primarily in the area of environmental remediation and cleanup activities.

b. Has the site been used for agriculture? If so, describe.

No portion of the 200 Areas, including the site of the HSTF, has been used for agricultural purposes since 1943, if ever.

c. Describe any structures on the site.

There are two underground storage tanks, aboveground pumps, piping, HEPA filters, charcoal drums, and fencing surrounding the HSTF. A distillation system (rail-car mounted) and five tank cars are located on nearby rail spurs within 0.5 mile (1 kilometer).

d. Will any structures be demolished? If so, what?

The piping, tanks, and ancillary equipment would be decontaminated, reused, and/or disposed of in accordance with applicable federal, state, and local guidelines and regulations.

e. What is the current zoning classification of the site?

The Hanford Site is zoned as an Unclassified Use (U) district by Benton County.

f. What is the current comprehensive plan designation of the site?

The 1985 Benton County Comprehensive Land Use Plan designates the Hanford Site as the 'Hanford Reservation'. Under this designation, land on the Site may be used for "activities nuclear in nature." Nonnuclear activities are authorized "if and when DOE approval for such activities is obtained."

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

The entire Hanford Site was designated a National Environmental Research Park in 1977, for use as an outdoor laboratory for ecological research. However, the 200 West Area, and the HSTF in particular, is a previously disturbed industrial area with little to no environmental significance.

i. Approximately how many people would reside or work in the completed project?

None. Postclosure activities might require limited inspection, maintenance, and monitoring activities.

j. Approximately how many people would the completed project displace?

None.

k. Proposed measures to avoid or reduce displacement impacts, if any:

Does not apply.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Does not apply.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

None.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None.

c. Proposed measures to reduce or control housing impacts, if any:

None.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

No structures are proposed for the site.

b. What views in the immediate vicinity would be altered or obstructed?

None.

c. Proposed measures to reduce or control aesthetic impacts, if any:

None.

11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

c. What existing offsite sources of light or glare may affect your proposal?

None.

d. Proposed measures to reduce or control light and glare impacts, if any:

None.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

None.

b. Would the proposed project displace any existing recreational uses? If so, describe.

No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any?

None.

13. Historic and Cultural Preservation

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

Several areas of the Hanford Site are listed, or are proposed for listing, on national, state, or local preservation registers. One of

these, the White Bluffs freight road, crosses diagonally through the 200 West Area. The road, formerly an Indian trail, has been in use since antiquity, and has played a role in Euro-American immigration, development, and agriculture. This property is considered eligible for the National Register of Historic Places. Additional information about Hanford Site cultural resources may be found in the *Hanford Site National Environmental Policy Act (NEPA) Characterization* (PNL 1991).

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

A 328-foot (100-meter) easement protects the White Bluffs freight road from disturbance, and the HSTF lies well outside that boundary. Qualified personnel from the Pacific Northwest Laboratory Hanford Cultural Resources Laboratory conducted a cultural resources review of the HSTF and issued a clearance (HCRC #89-200-007) for closure activities.

Several of the original uranium processing facilities and reactors on the Hanford Site are nearing 50 years of age, and so might be considered for historic status in the near future. The HSTF would not qualify for such status, and closure of the HSTF would not adversely impact facilities that might be considered for protected status in the future.

c. Proposed measures to reduce or control impacts, if any:

Workers are directed to watch for cultural properties during excavation activities. If properties are discovered, personnel from the Hanford Cultural Resources Laboratory would assess the significance of the find and contact the State Historic Preservation Officer.

14. Transportation

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

Not applicable to the proposed project.

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

The facility is not accessible to the public and is not served by public transit.

c. How many parking spaces would the completed project have? How many would the project eliminate?

Not applicable to the proposed project.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

The HSTF includes seven railcars on the Hanford Site rail system track used occasionally for freight transport. No other major transport system is in the immediate vicinity of the HSTF.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

Although workers would be present during closure activities, traffic and parking is not expected to significantly impact the general area. The increase in vehicular trips would be temporary, and would cease when the closure is completed.

g. Proposed measures to reduce or control transportation impacts, if any:

Not necessary.

15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

Not applicable to the proposed project.

b. Proposed measures to reduce or control direct impacts on public services, if any:

Not applicable to the proposed project.

16. Utilities

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

Electricity, water, refuse service, telephone, and a septic system are available at or near the HSTF.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Electricity would be used during closure activities, and general construction would include activities such as excavation of the tanks and decommissioning of associated equipment and piping. Utility use is generally not a significant part of these activities.

C. SIGNATURES

The above answers are true and complete to the best of my knowledge. We understand that the lead agency is relying on them to make its decision.

James D. Bauer

James D. Bauer, Acting Program Manager
Office of Environmental Assurance,
Permits, and Policy
U.S. Department of Energy
Richland Field Office

Date 11/23/92

R E Lerch

R. E. Lerch, Deputy Director
Restoration and Remediation
Westinghouse Hanford Company

Date 11-5-92

HEXONE STORAGE AND TREATMENT FACILITY CLOSURE PLAN

FOREWORD

The Hanford Facility is owned by the U.S. Government and operated by the U.S. Department of Energy, Richland Field Office. Dangerous waste and mixed waste (containing both radioactive and dangerous components) are managed and produced on the Hanford Facility, a portion of the 560 square mile (1,450 square kilometer) Hanford Site. The dangerous waste is regulated in accordance with the *Resource Conservation and Recovery Act of 1976* and the *State of Washington Hazardous Waste Management Act of 1976* (as administered through the Washington State Department of Ecology *Dangerous Waste Regulations*, Washington Administrative Code 173-303). The radioactive component of mixed waste is interpreted by the U.S. Department of Energy to be regulated under the *Atomic Energy Act of 1954*; the nonradioactive dangerous component of mixed waste is interpreted to be regulated under the *Resource Conservation and Recovery Act* and Washington Administrative Code 173-303.

For purposes of the *Resource Conservation and Recovery Act* and the Washington State Department of Ecology *Dangerous Waste Regulations*, the Hanford Facility is considered to be a single facility. The single dangerous waste permit identification number issued to the Hanford Facility by the U.S. Environmental Protection Agency and the Washington State Department of Ecology is U.S. Environmental Protection Agency/State Identification Number WA7890008967. This identification number encompasses over 60 treatment, storage, and/or disposal units within the Hanford Facility. Over half of the treatment, storage, and/or disposal units are no longer operating and will be closed under interim status (using final status standards in Washington Administrative Code 173-303-610).

Westinghouse Hanford Company is a major contractor to the U.S. Department of Energy, Richland Field Office and serves as co-operator of the Hexone Storage and Treatment Facility, the unit addressed in this closure plan.

Westinghouse Hanford Company is identified in the closure plan as a "co-operator" and signs in that capacity. Any identification of Westinghouse Hanford Company as an 'operator' elsewhere in this closure plan is not meant to conflict with Westinghouse Hanford Company's designation as a co-operator but rather is based on Westinghouse Hanford Company's contractual status (i.e., as an operations and engineering contractor) for the U.S. Department of Energy.

The *Hexone Storage and Treatment Facility Closure Plan* consists of a Part A Permit Application (Revision 2) and a closure plan. An explanation of the Part A Permit Application revision is provided at the beginning of the Part A section. The closure plan consists of nine chapters and four appendices.

This *Hexone Storage and Treatment Facility Closure Plan* submittal contains information current as of October 15, 1992.

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ACRONYMS AND ABBREVIATIONS

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE-RL	U.S. Department of Energy, Richland Field Office
Ecology	Washington State Department of Ecology
EII	Environmental Investigation Instructions
EPA	U.S. Environmental Protection Agency
HBL	health-based level
HEPA	high-efficiency particulate air
HSTF	Hexone Storage and Treatment Facility
IRIS	integrated risk information system (database)
NEPA	*National Environmental Policy Act of 1969*
PVC	polyvinyl chloride
QAPjP	quality assurance project plan
QI	quality instruction
QR	quality requirement
RCRA	*Resource Conservation and Recovery Act of 1976*
REDOX	reduction-oxidation (Plant)
RI/FS	remedial investigation/feasibility study
TSD	treatment, storage, and/or disposal
WAC	Washington Administrative Code

DEFINITION OF TERMS

Definitions are based on use throughout this document.

Accuracy--The degree of agreement between a measurement (or the mean value of a set of measurements) to the true value. For purposes of sampling activities, accuracy is the measure of the bias in a measurement system. Sampling accuracy normally is assessed through the evaluation of sample blanks, while analytical method accuracy and specific sample matrix effects are assessed through the analysis of control standards and spiked samples.

Audit--For the purposes of sampling activities, audits are considered to be systematic checks to verify the quality of operation of one or more elements of the total measurement system. In this sense, audits could be of two types: (1) performance audits, in which quantitative data are independently obtained for comparison with data routinely obtained in a measurement system or (2) system audits, involving a qualitative onsite evaluation of laboratories

or other organizational elements of the measurement system for compliance with established quality assurance program and procedure requirements. For environmental investigations at the Hanford Site, performance audit requirements are fulfilled by periodic submittal of blind samples to the primary laboratory or the analysis of split samples by an independent laboratory. System audit requirements are implemented through the use of standard surveillance procedures.

Comparability--For the purposes of sampling activities, comparability is an expression of the relative confidence with which one data set might be compared with another.

Completeness--For the purposes of sampling activities, completeness is a quantitative parameter expressing the percentage of measurements judged to be valid.

Deviation--For the purpose of sampling activities, deviation refers to a planned departure from established criteria that might be required as a result of unforeseen field situations or that might be required to correct ambiguities in procedures that may arise in practical applications.

Facility/facility--Dependent on context, the term 'facility', as used in this closure plan, could refer to the following.

The Hanford Facility is a single *Resource Conservation and Recovery Act* (RCRA) *of 1976* facility, identified by the EPA/State Identification Number WA7890008967, that consists of over 60 treatment, storage, and/or disposal (TSD) units included in the *Hanford Facility Dangerous Waste Part A Permit Application* (DOE-RL 1988b). The Hanford Facility consists of the contiguous portion of the Hanford Site that contains these TSD units and, for the purposes of RCRA, is owned and operated by the U.S. Department of Energy (excluding lands north and east of the Columbia River, river islands, lands owned by the Bonneville Power Administration, lands leased to the Washington Public Power Supply System, and lands owned by or leased to the state of Washington).

A facility as defined in WAC 173-303-040, i.e., building nomenclature commonly used at the Hanford Facility. In this context, the term 'facility' remains as part of the title for various TSD units (e.g., 2727-S Storage Facility, Hexone Storage and Treatment Facility).

Nonconformance--A nonconformance is a deficiency in characteristic, documentation, or procedure that renders the quality of material, equipment, services, or activities unacceptable or indeterminate. When the deficiency is of a minor nature, does not effect a permanent or significant change in quality if it is not corrected, and can be brought into conformance with immediate corrective action, the deficiency shall not be categorized as a nonconformance. However, if the nature of the condition is such that it cannot be immediately and satisfactorily corrected, it shall be documented in compliance with approved procedures and brought to the attention of management for disposition and appropriate corrective action.

Precision--Precision is a measure of the repeatability or reproducibility of specific measurements under a given set of conditions. Specifically, precision is a quantitative measure of the variability of a group of measurements compared to their average value. Precision normally is expressed in terms of standard deviation, but also could be expressed as the coefficient of variation (i.e., relative standard deviation) and range (i.e., maximum value minus minimum value). Precision is assessed by means of duplicate and/or replicate sample analysis.

Quality assurance--For the purposes of sampling activities, quality assurance refers to the total integrated quality planning, quality control, quality assessment, and corrective action activities that collectively ensure that the data from monitoring and analysis meet all end user requirements and/or the intended end use of the data.

Quality assurance project plan--The quality assurance project plan is an orderly assembly of management policies, project objectives, methods, and procedures that defines how data of known quality will be produced for a particular project or investigation.

Quality control--For the purposes of sampling activities, quality control refers to the routine application of procedures and defined methods to the performance of sampling, measurement, and analytical processes.

Replicate sample--Replicate samples are two aliquots removed from the same sample container in the laboratory and analyzed independently.

Representativeness--For the purposes of sampling activities, representativeness is the degree to which data accurately and precisely represent a characteristic of a population parameter, variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is most concerned with the proper design of a sampling program.

Site-wide background--The natural background established for the Hanford Site. Includes all contributions from anthropogenetic sources unrelated to Hanford Site operations.

Validation--For the purposes of sampling activities, validation refers to a systematic process of reviewing a body of data against a set of criteria to provide assurance that the data are acceptable for their intended use.

Verification--For the purposes of sampling activities, verification refers to the process of determining whether procedures, processes, data, or documentation conform to specified requirements. Verification activities might include inspections, audits, surveillances, or technical review.

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PART A

The Part A, Form 1, included in this closure plan was submitted to the Washington State Department of Ecology in May 1988. The Part A, Form 1, consists of three pages.

The original Part A, Form 3 (Revision 0), was submitted to Ecology in November 1987. Revision 0 included the treatment design capacity, description of the unit, dangerous waste codes and quantities, and the waste source. Revision 1 of the Part A, Form 3, was prepared to incorporate distillation and incineration as treatment methods. The waste designation was modified as well. Revision 2 of the Part A, Form 3, was prepared to account for a change from planned onsite to offsite incineration (process code T03 was deleted), to expand the waste designation to include D001, WT02, and WC02 waste codes, to change the classification of the tank cars from 'tanks' to 'containers', and to address the current state of decommissioning.

The Part A, Form 3 (Revision 2), included with this closure plan consists of five pages, three figures, and one photograph.

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FORM 1

State of Washington Department of Ecology

WASHINGTON STATE

DANGEROUS WASTE PERMIT GENERAL INFORMATION

(Read "Form 1 Instructions" before starting)

I. EPA/STATE I.D. NUMBER: WA7890008967

II. NAME OF FACILITY
U.S. DEPARTMENT OF ENERGY-HANFORD SITE

III. FACILITY CONTACT

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

IV. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX	B. CITY OR TOWN	C. STATE	D. ZIP CODE
P.O. BOX 550	RICHLAND	WA	99352

V. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER	B. COUNTY NAME	C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE (if known)
HANFORD SITE	BENTON	RICHLAND	WA	99352	005

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

A. FIRST	B. SECOND
9711 NATIONAL SECURITY	8922 NUCLEAR NONCOMMERCIAL DEVELOPMENT AND EDUCATION
C. THIRD	**D. FOURTH**
9611 ADMINISTRATION AND GENERAL ECONOMICS PROGRAM	4911 STEAM-ELECTRIC GENERATION

VII. OPERATOR INFORMATION

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

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

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

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

509 376 7803

E. STREET OR P.O. BOX	F. CITY OR TOWN	G. STATE	H. ZIP CODE
PO BOX 550/PO BOX 1970	RICHLAND	WA	99352

VIII. INDIAN LAND
Is the facility located on Indian lands? [ ] YES [X] NO

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

COMPLETE BACK PAGE

ECY 020-51

ECL4 -075

9 3 1 2 8 9 0 5 5 4

IX. MAP

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

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

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

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

XI. CERTIFICATION *(see instructions)*

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

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

WA7890008967

FORM 1

DANGEROUS WASTE PERMIT GENERAL INFORMATION

XI. CERTIFICATION

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

Michael J. Lawrence — 5-19-88
Date

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

W. M. Jacobi — 5/13/88
Date

William M. Jacobi
President
Westinghouse Hanford Company
Co-operator

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 character/inch).

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

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

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED *(mo., day, & yr.)*	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

MO.	DAY	YR.
0 1		5 2

FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

☐ 2. NEW FACILITY *(Complete item below)*

MO.	DAY	YR.

FOR NEW FACILITIES, PROVIDE THE DATE *(mo., day, & yr)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Section I above)*

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES - CODES AND CAPACITIES

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the *(Section III-C)*.

B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.

1. AMOUNT - Enter the amount.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D82	*ACRES OR HECTARES*
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

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

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

LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	B. 2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	B. 2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
	S 0 2	48,000	G		7				
2	T 0 4	3,000	U		8				
3	S 0 1	40,000	G		9				
4					10				

CONTINUE ON REVERSE

Continued from the front.

PROCESSES (continued)

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

S02 T04 S01

The Hexone Storage and Treatment Facility (HSTF) is located in the southeast corner of the 200 West Area of the Hanford Facility. The HSTF consists of two 24,000 gallon (91,000 liter) belowgrade carbon steel tanks--276-S-141 (S-141) and 276-S-142 (S-142), a distillation system, and railroad tank cars. The HSTF received liquid mixed waste from the Reduction/Oxidation (REDOX) Plant and possibly the Hot Semiworks Plant. The HSTF was used from 1951 through 1967 to store reagent-grade methyl isobutyl ketone (hexone) for makeup as a solvent for the REDOX Plant. After 1967, the HSTF contained distilled hexone, part or all of which had been used in the REDOX Plant. The S-142 tank also contained normal paraffin hydrocarbon (NPH) and tributyl phosphate (TBP) from a one-time campaign to separate americium, curium, and promethium from Shippingport reactor blanket fuel in 1966. Approximately 200 gallons (760 liters) of water was added to the S-141 tank in 1988. The S-142 tank received approximately 1,300 gallons (5,000 liters) of water in 1967, 500 gallons (1,900 liters) in the mid-1970's, and 200 gallons (760 liters) in the mid-1980's. The combined storage design capacities of the Tanks (S-141 and S-142) is 48,000 gallons (182,000 liters) (S02). The treatment design capacity of the distillation system was 3,000 gallons (11,400 liters) of waste per day (T04). The storage design capacity of the railroad tank cars was 40,000 gallons (152,000 liters) (S01).

The mixed waste was pumped from the S-141 and S-142 tanks through a distillation system to decrease the radioactivity of the waste. The distilled waste was sent to temporary storage in railroad tank cars located within the HSTF, until completion of transfers to an offsite incinerator in June of 1992. Three distillation vessels containing process residue have been sampled and are stored at the Hanford Site as mixed waste. The S-141 and S-142 tanks currently each contain up to 5 to 30 gallons (19 to 114 liters) of liquid mixed waste containing 93% NPH and 7% hexone and up to 250 gallons (950 liters) of phosphate tar. The phosphate tar will be stored at the Hanford Site as mixed waste. The railroad tank cars have been emptied, cleaned, and moved to another onsite location. The HSTF is being closed under interim status.

IV. DESCRIPTION OF DANGEROUS WASTES

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

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

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

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

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

D. PROCESSES

1. PROCESS CODES:

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

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

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

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

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

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

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

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (If a code is not entered in D(1))
	D054	900	P	T03 D80	
	D002	400	P	T03 D80	
X-3	D001	100	P	T03 D80	
X-4	D002			T03 D80	included with above

 CONTINUE ON PAGE 3

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

IMBER *(entered from page 1)*

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

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*				D. PROCESSES 2. PROCESS DESCRIPTION *(If a code is not entered in D(1))*
1	D001	245,400	P	S02	T04	S01		Storage-Tank/Treatment-Other-
2	F003							Distillation/Storage-Container
3	WC02							
4	WT02							Included with above
6								
7								
8								
9								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
25								
26								

Continued from the front.

DESCRIPTION OF DANGEROUS WASTES (continued)

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

The S-141 tank was used to store waste hexone (F003) that was used as a solvent in the REDOX Plant. The mixed waste was considered ignitable (D001) and a toxic state-only waste (WT02, dangerous waste). The estimated annual quantity of waste that was treated and stored in the S-141 tank was approximately 20,000 gallons (76,000 liters).

The S-142 tank also was used to store waste hexone. In addition, the S-142 tank also stored waste NPH and TBP. This mixture was designated F003, D001, WT02, and a carcinogenic state-only waste (WC02, dangerous waste). These wastes resulted from a one-time campaign to separate americium, curium, and promethium from Shippingport reactor blanket fuel in 1966. The estimated annual quantity of waste that was treated and stored in the S-142 tank was approximately 16,000 gallons (61,000 liters).

V. FACILITY DRAWING

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

VI. PHOTOGRAPHS

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

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

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

VIII. FACILITY OWNER

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

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

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

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

IX. OWNER CERTIFICATION

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

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy nd Field Office	John D. Wagoner	11/18/92

RATOR CERTIFICATION

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

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

 CONTINUE ON PAGE 5

X. OPERATOR CERTIFICATION

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

John D. Wagoner

Owner/Operator
John D. Wagoner, Manager
U.S. Department of Energy
Richland Field Office

11/18/92
Date

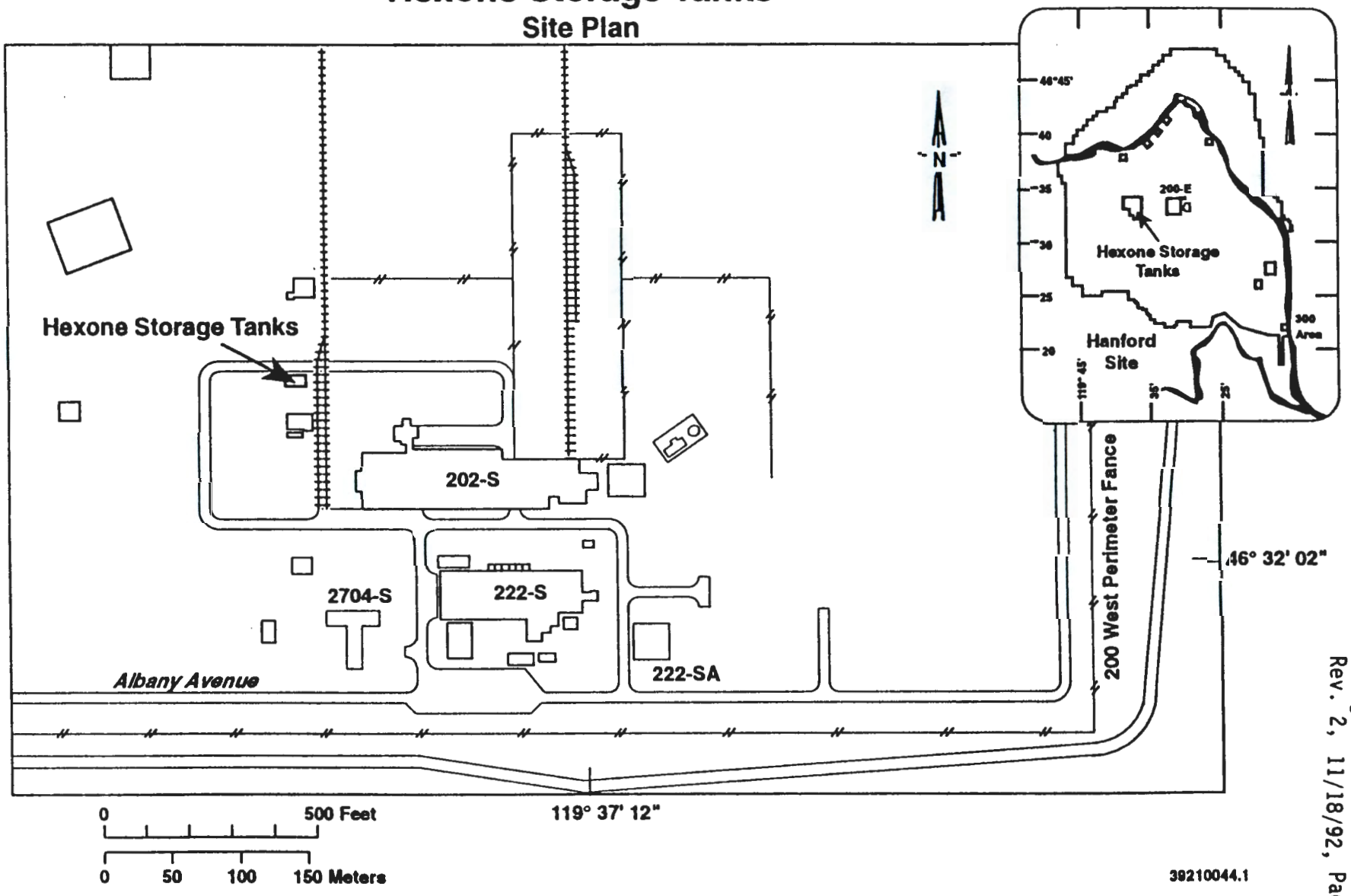
Thomas M. Anderson

Co-operator
Thomas M. Anderson, President
Westinghouse Hanford Company

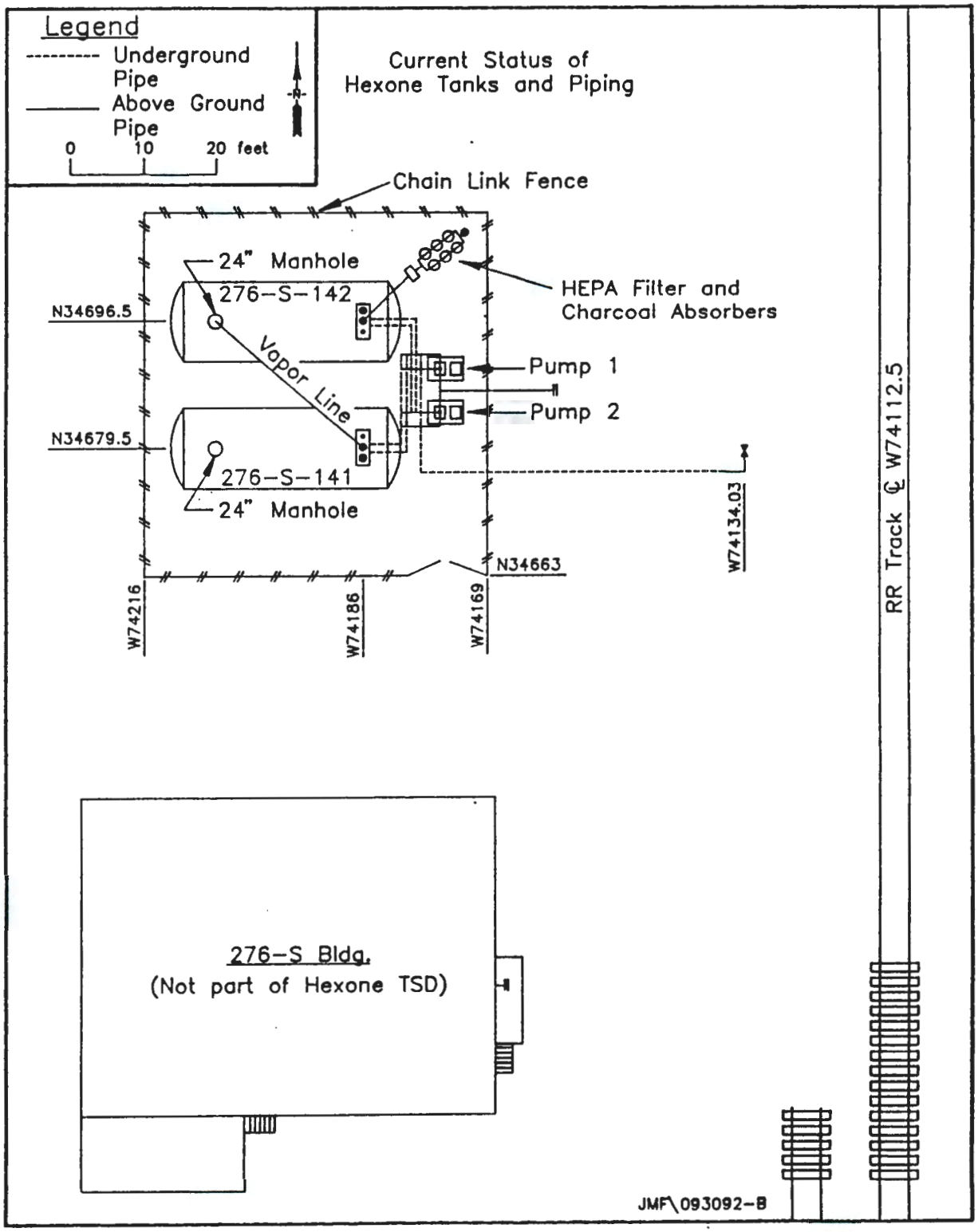
10-30-92
Date

9312 0 9 0 5 6 1

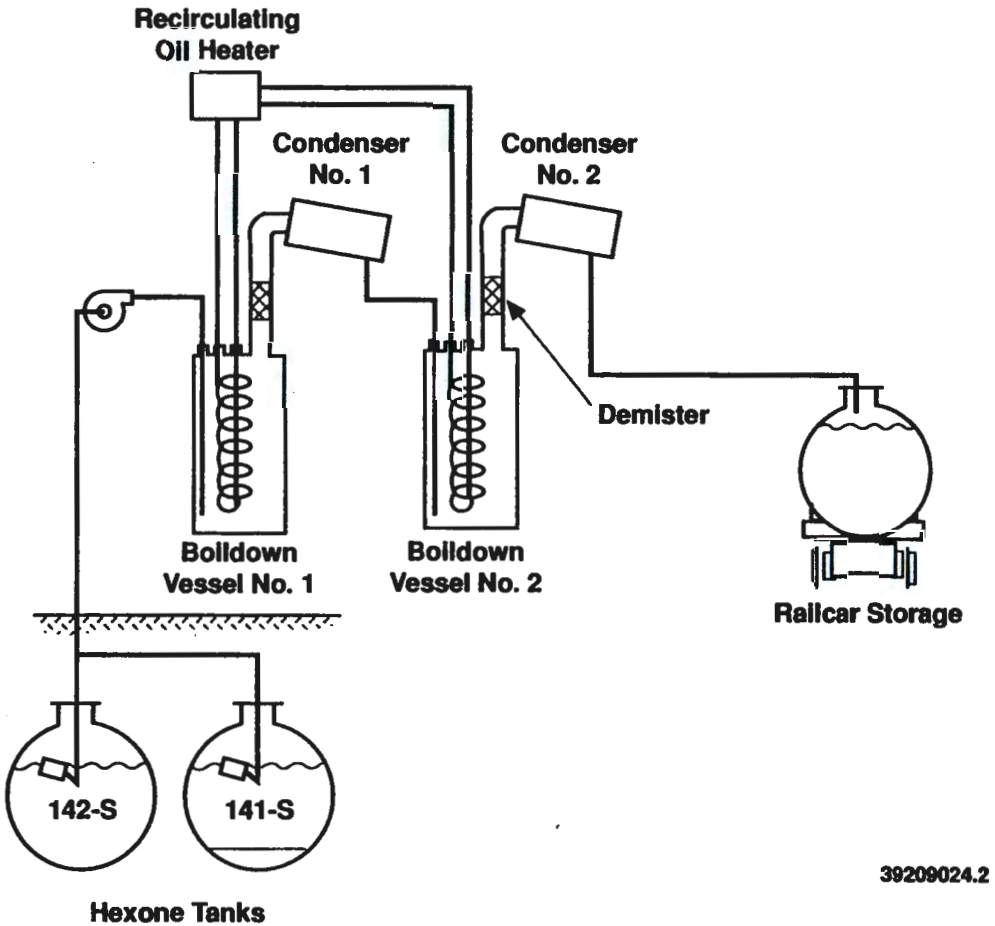
276-S-141 and 142
Hexone Storage Tanks
Site Plan



Hexone Storage Tanks



Hexone Treatment System Schematic



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276-S-141 AND 142
HEXONE STORAGE TANKS

46°32'08"
119°37'23"

8706421-7CN
(PHOTO TAKEN 1987)

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1.0 INTRODUCTION

This chapter provides background information for the Hexone Storage and Treatment Facility (HSTF) and provides an overview of the contents of the HSTF closure plan.

1.1 BACKGROUND

The HSTF is a storage and treatment unit subject to the requirements for the storage and treatment of dangerous waste. Closure is being conducted under interim status and will be completed pursuant to the requirements of Washington State Department of Ecology (Ecology) *Dangerous Waste Regulations*, Washington Administrative Code (WAC) 173-303-610 and WAC 173-303-640. Because dangerous waste does not include the source, special nuclear, and by-product material components of mixed waste, radionuclides are not within the scope of WAC 173-303 or of this closure plan. The information on radionuclides is provided only for general knowledge where appropriate.

The HSTF stored commercial-grade hexone for use in reactor fuel processing in the 1950's and 1960's. In 1967, radioactive material associated with the operation and shutdown of the reduction-oxidation (REDOX) plant was added. The HSTF consists of two 23,575-gallon (89,000-liter) carbon steel underground storage tanks and a distillation system that was added in 1990 to separate radionuclides from the liquid waste. The distillation system includes a rail mounted double still, five tank cars, a flat car for spare equipment, and ancillary piping and equipment. The pumpable contents of the underground tanks underwent distillation in 1990, leaving the tanks virtually empty of liquid. The distillate was stored in clean tank cars for approximately 18 months, before being trucked to an offsite incinerator. Offsite incineration of the distillate and tank car decontamination was completed in 1992 (Rasmussen et al. 1992). The known hazardous/dangerous waste remaining at the site before commencing other closure activities consists of the still vessels, a tarry sludge in the storage tanks, and residual contamination in equipment, piping, filters, etc. The treatment and removal of waste at the HSTF are closure activities as defined in the *Resource Conservation and Recovery Act* (RCRA) *of 1976* and WAC 173-303.

The preferred closure strategy is to remove all bulk waste and to dispose of or decontaminate all solid materials that have contacted dangerous and/or radioactive waste. The HSTF is located within the 200-RO-2 operable unit (source and groundwater) as designated in *Preliminary Operable Units Designation Project* (WHC 1992a). The 200-RO-2 operable unit is scheduled to be addressed through the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) process. Characterization work on the 200-RO-2 operable unit is not expected to begin until sometime after fiscal year 2000. Soil cleanup, if required, might be coordinated with the CERCLA process.

1.2 HEXONE STORAGE AND TREATMENT FACILITY CLOSURE PLAN CONTENTS

The HSTF closure plan consists of the following nine chapters:

- Introduction (Chapter 1.0)
- Facility Description (Chapter 2.0)
- Process Information (Chapter 3.0)
- Waste Characteristics (Chapter 4.0)
- Groundwater Monitoring (Chapter 5.0)
- Closure Performance Standards (Chapter 6.0)
- Closure Activities (Chapter 7.0)
- Postclosure Plan (Chapter 8.0)
- References (Chapter 9.0).

A brief description of each chapter is provided in the following sections.

1.2.1 Facility Description (Chapter 2.0)

This chapter provides a brief description of the Hanford Site and the location and description of the HSTF. Information on Hanford Site security also is provided.

1.2.2 Process Information (Chapter 3.0)

This chapter describes how the HSTF processed the waste and explains the overall waste treatment system.

1.2.3 Waste Characteristics (Chapter 4.0)

This chapter discusses the waste inventory and the characteristics of the waste that was treated at the HSTF.

1.2.4 Groundwater Monitoring (Chapter 5.0)

This chapter discusses the probability that groundwater contamination has not occurred and that groundwater monitoring is not needed.

1.2.5 Closure Performance Standards (Chapter 6.0)

This chapter discusses the closure strategy, performance standards for protection of health and the environment, and closure activities.

1.2.6 Closure Activities (Chapter 7.0)

This chapter discusses sampling and analysis activities for closure. A closure schedule and a certification are included.

1.2.7 Postclosure Plan (Chapter 8.0)

This chapter outlines provisions for postclosure care if required.

1.2.8 References (Chapter 9.0)

References used throughout this closure plan are listed in this chapter. All references listed here, which are not available from other sources, will be made available for review, upon request, to any regulatory agency or public commentor. References can be obtained by contacting the following:

Administrative Records Specialist
Public Access Room H4-22
Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

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2.0 FACILITY DESCRIPTION

This chapter briefly describes the Hanford Site, the Hanford Facility, and the location of the HSTF, and provides information on Hanford Site security.

2.1 GENERAL HANFORD SITE DESCRIPTION

The Hanford Site covers approximately 560 square miles (1,450 square kilometers) of semiarid land that is owned by the U.S. Government and managed by the U.S. Department of Energy, Richland Field Office (DOE-RL). The Hanford Site is located northwest of the city of Richland, Washington (Figure 2-1). The city of Richland adjoins the southeasternmost portion of the Hanford Site boundary and is the nearest population center. In early 1943, the U.S. Army Corps of Engineers selected the Hanford Site as the location for reactor, chemical separation, and related activities for the production and purification of special nuclear materials and other nuclear activities. The mission of the Hanford Site recently has focused on waste management and environmental remediation and restoration.

Activities on the Hanford Site are centralized in numerically designated areas. The reactors are located along the Columbia River in the 100 Areas. The reactor fuel reprocessing units are in the 200 Areas, which are on a plateau approximately 7 miles (11 kilometers) from the Columbia River. The 300 Area, located adjacent to and north of Richland, contains the reactor fuel manufacturing plants and the research and development laboratories. The 400 Area, 5 miles (8 kilometers) northwest of the 300 Area, contains the Fast Flux Test Facility used for testing liquid metal reactor systems. The 600 Area covers all locations not specifically given an area designation. Adjacent to and north of Richland, the 1100 Area contains offices associated with administration, maintenance, transportation, and materials procurement and distribution. The 3000 Area, between the 1100 Area and 300 Area, contains engineering offices and administrative offices. Administrative offices also are located in the 700 Area, which is in downtown Richland.

2.2 HANFORD FACILITY DESCRIPTION

The Hanford Facility is a single RCRA facility, identified by the U.S. Environmental Protection Agency (EPA)/State Identification Number WA7890008967, that consists of over 60 treatment, storage, and/or disposal (TSD) units included in the *Hanford Site Dangerous Waste Part A Permit Application* (DOE-RL 1988b). The Hanford Facility consists of the contiguous portion of the Hanford Site that contains these TSD units and, for the purposes of RCRA, is owned and operated by the U.S. Department of Energy (excluding lands north and east of the Columbia River, river islands, lands owned by the Bonneville Power Administration, lands leased to the Washington Public Power Supply System, and lands owned by or leased to the state of Washington).

2.3 DESCRIPTION OF HEXONE STORAGE AND TREATMENT FACILITY

The HSTF is located in the 200 West Area of the Hanford Site (Figures 2-1 and 2-2). Photographs of the HSTF are presented as Figures 2-3 and 2-4. Appendix 2A contains an inventory of HSTF equipment and provides the current status of the equipment. The HSTF consists of the following components: two underground storage tanks, a distillation unit, tank cars for storing distilled hexone and water, and ancillary equipment and piping. The rail-mounted distillation unit and tank cars (collectively referred to as the distillation system) were brought to the HSTF in 1990 to treat and store the underground tank waste. Distillation of organics and water pumped from the tanks was completed in 1990 as an interim status cleanup measure. Temporary piping connecting the underground tanks to the distillation system was removed after the completion of distillation operations. The distillation vessel/demister units and the main distillation components are stored at the HSTF. The ancillary distillation equipment has been rinsed or dismantled and removed from the site. The tank cars are free of dangerous materials and have been moved from the HSTF (and are being retained, unused, on the Hanford Site) to await regulatory concurrence of closure.

The ground surface of the HSTF is nondescript, unpaved (sand and gravel), and is approximately level at grade surface. The HSTF is enclosed by two chain link fences. Maps of the HSTF before, during, and after the distillation operation are included in Appendix 2B. These maps are drawn to scale and give the positions of the underground tanks, piping, railway, railcars, and permanent structures in and around the HSTF.

In the following sections, the HSTF is described in terms of two systems; (1) the underground storage tanks and (2) the distillation system.

2.3.1 Underground Storage Tanks

The underground storage tanks of the HSTF have the Hanford Site identification numbers 276-S-141 and 276-S-142. Both are 23,575-gallon (89,000-liter) capacity carbon steel tanks (Figure 2-5 and Appendix 2B), similar to petroleum storage tanks. The tank shells are 28 feet (8.5 meters) in length with dished heads welded onto the end of the shells, 11.5 feet (3.5 meters) in diameter, and were constructed with 3/8-inch (0.95-centimeter) thick walls. The tops of the tanks are 3 feet (0.9 meter) underground. Construction specifications and plans for the underground tanks are provided in Appendix 2B. The tank area is surrounded by a chain link fence. The ancillary equipment associated with the tanks consists of the following:

- Two centrifugal transfer pumps

- Aboveground and belowground piping for receiving, blending, and transferring hexone solvents (Figures 2-6 and 2-7); part of the original piping was removed in the 1970's (Chapter 3.0, Section 3.1)

- Aboveground vent piping; tank 276-S-141 vents to tank 276-S-142 through a flame arrestor and 3-inch (7.6-centimeter) vent pipe; tank

276-S-142 vents to the atmosphere via a flame arrestor, 3-inch (7.6-centimeter) vent piping, a high-efficiency particulate air (HEPA) filter, and two parallel sets of three 55-gallon (208-liter) charcoal absorption containers (Figure 2-8); the tanks are connected via a pressure demand regulator (currently inactive) to a nitrogen double insulated tank. Nitrogen gas blanketing and offgas filtration were implemented in 1990 for the distillation

- Obsolete mercury manometer for measuring liquid (out of use since the mid-1970's); the manometer is still intact and has not leaked

- Weight factor liquid level instrumentation.

The HSTF underground storage tanks were constructed in 1951. Monitoring of liquid levels in these tanks (before removal of liquid for distillation in 1990) and inspections of tanks of similar age and structure suggest that the tanks have not leaked. Inspection of the tank interior sludge reveals areas of moderate corrosion (rust). Past tank integrity testing has indicated an average wall thickness of 90 percent of the original 3/8-inch (0.95-centimeter) width (Fong 1976).

2.3.2 Distillation System

The distillation system (Figure 2-7) was moved to the HSTF in early 1990 to remove and distill the contents of the underground storage tanks. The distillation system consisted of a railcar-mounted double distillation unit, four storage tank cars (U.S. Department of Transportation 103-W 10,000 gallons [37,850 liters]) for temporary distillate storage, one tank car for secondary containment/rainwater, and one railcar for spare pipes and equipment. The distillation unit (Figure 2-9) consisted of a distillation module and an electric heating system for heat-transfer oil. The distillation module consists of two separate stills. The sacrificial still vessels (Figure 2-10) are 250-gallon (950 liter) capacity and contain built-in oil-circulation heating coils. The vessels are suspended from a steel and concrete framework that provides support and radioactive and heat shielding. Each still used a two-stage demister unit and a fan-cooled condenser. A 30-gallon (115-liter) accumulation tank and a transfer pump were used to move the distillate to the rail tank cars for interim storage. The oil pressure of the heating system was greater than the pressure of the still vessel interior (due to pump pressure when operating) including power-off intervals (head pressure from the reservoir mounted above the heating module at an elevation greater than that of the still vessel contents). The heating module and oil did not contact HSTF waste.

All (hexone-carrying) pipe joints from the underground tanks to the distillation system were welded (excluding connections at the ends). Where screwed fittings and flexible hoses were used, secondary containment was in place. This was true of the distillation system piping as well. Two secondary containment systems for the distillation process were employed, one for the fenced area of the underground tanks, and one for the distillation system. The latter included track pans under the tank cars; a containment pan

under the distillation module; a transfer pump, sump, and piping for collection of any spillage; and a tank car for any liquid accumulation. All secondary containment inside the underground tank enclosure drained into the underground tanks via seal loops.

Three still vessels were partially filled with solid tar during, and resulting from, the treatment. These vessels are being stored at the HSTF, before transport to a Hanford Facility mixed waste storage unit. The distillation system has been dismantled partially and/or rinsed to remove radioactive and hazardous materials and placed in a temporary standby mode. The distillation module is in a moth-balled condition and is stored on the Hanford Facility pending regulatory concurrence for late 1992 dismantlement.

2.4 SECURITY INFORMATION

The entire Hanford Site is a controlled-access area. Access control to operational areas of the Hanford Site is expected to remain for the foreseeable future [while active institutional control is likely to continue indefinitely, for purposes of conservatism, a 100-year active institutional control period was assumed with passive controls after that time (DOE 1987)]. The Hanford Site maintains around-the-clock surveillance for the protection of government property, classified information, and special nuclear materials. The Hanford Patrol maintains a continuous presence of armed guards to provide Hanford Site security.

Manned barricades are maintained around the clock at checkpoints on vehicular access roads leading to the operational areas of the Hanford Site. All personnel accessing these areas must have a U.S. Department of Energy-issued security identification badge indicating the appropriate authorization. Personnel also might be subject to a search of items carried into or out of these areas.

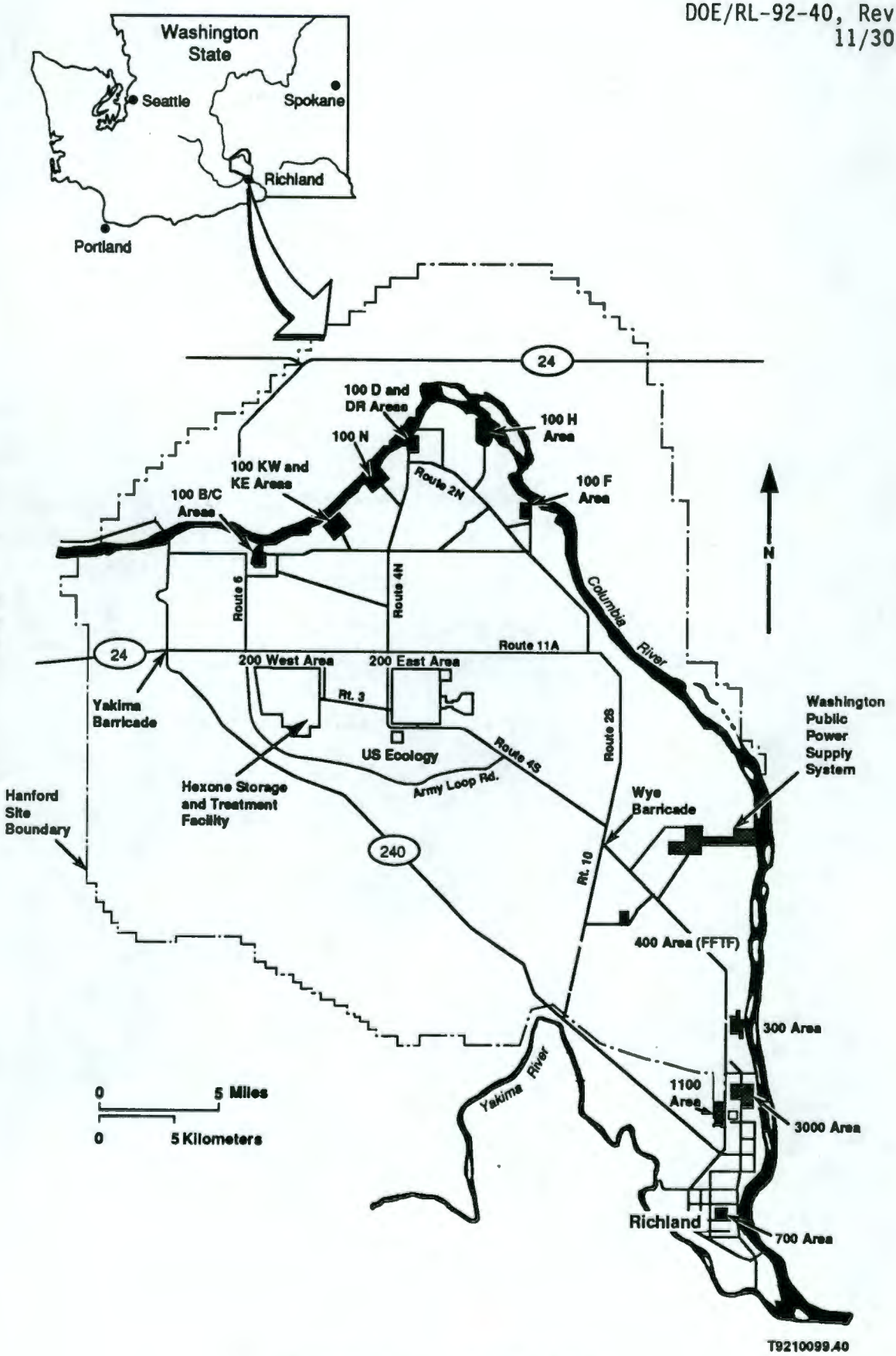

Figure 2-1. Hanford Site.

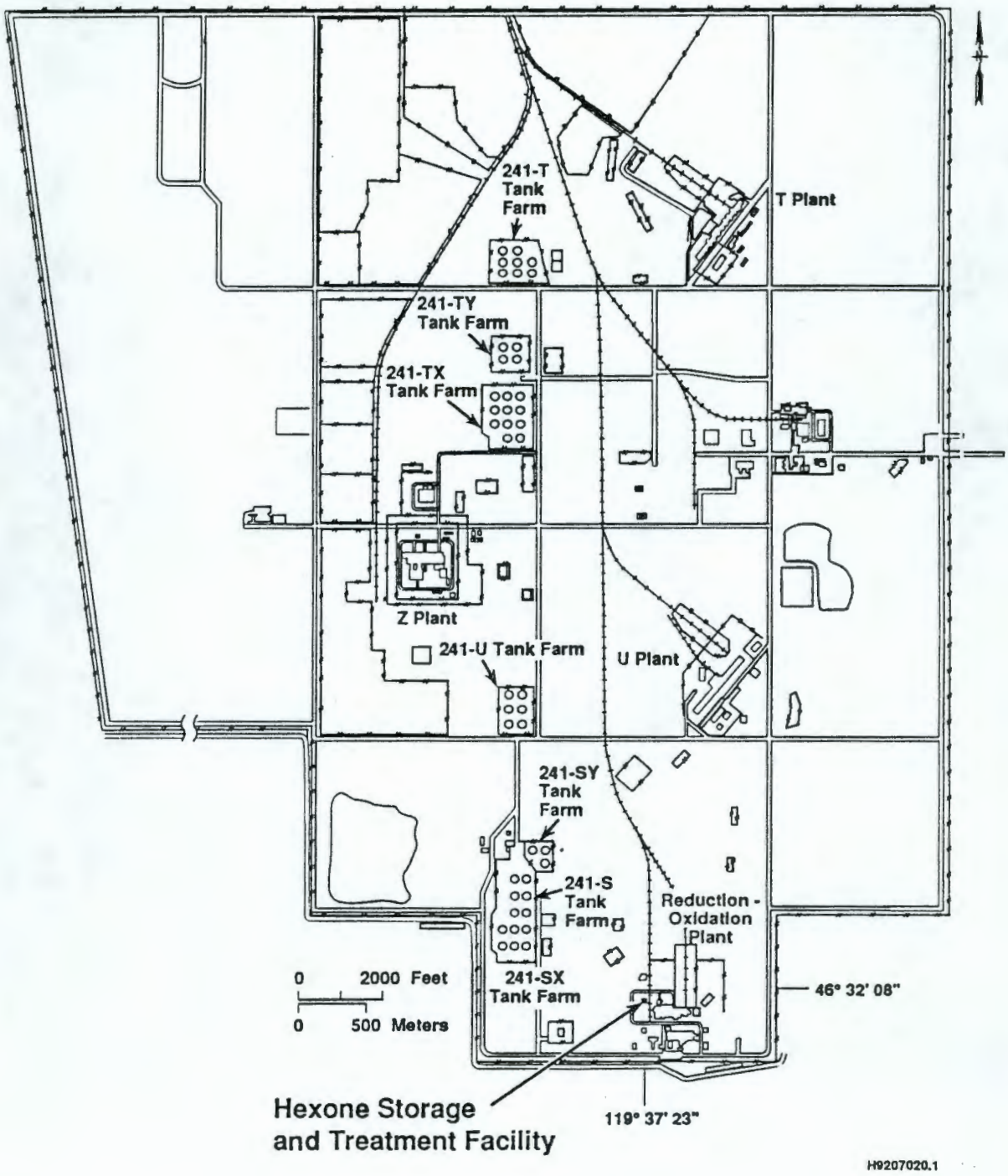

Figure 2-2. 200 West Area.

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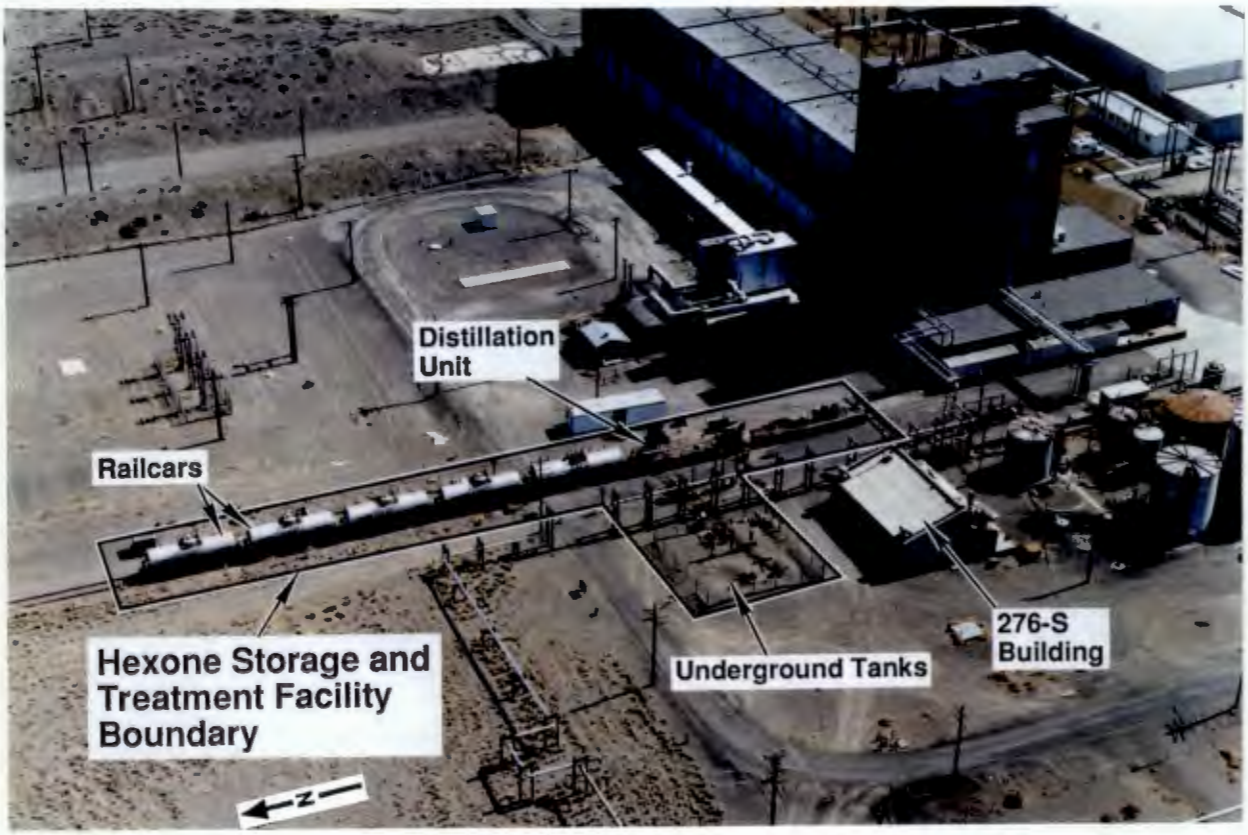

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(PHOTOGRAPH TAKEN 1990)

Figure 2-3. Aerial Photograph of the Hexone Storage and Treatment Facility and the Reduction-Oxidation Plant.

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(PHOTOGRAPH TAKEN 1990)

Figure 2-4. Fenced Enclosure of the Hexone Storage and Treatment Facility Underground Storage Tank Area.

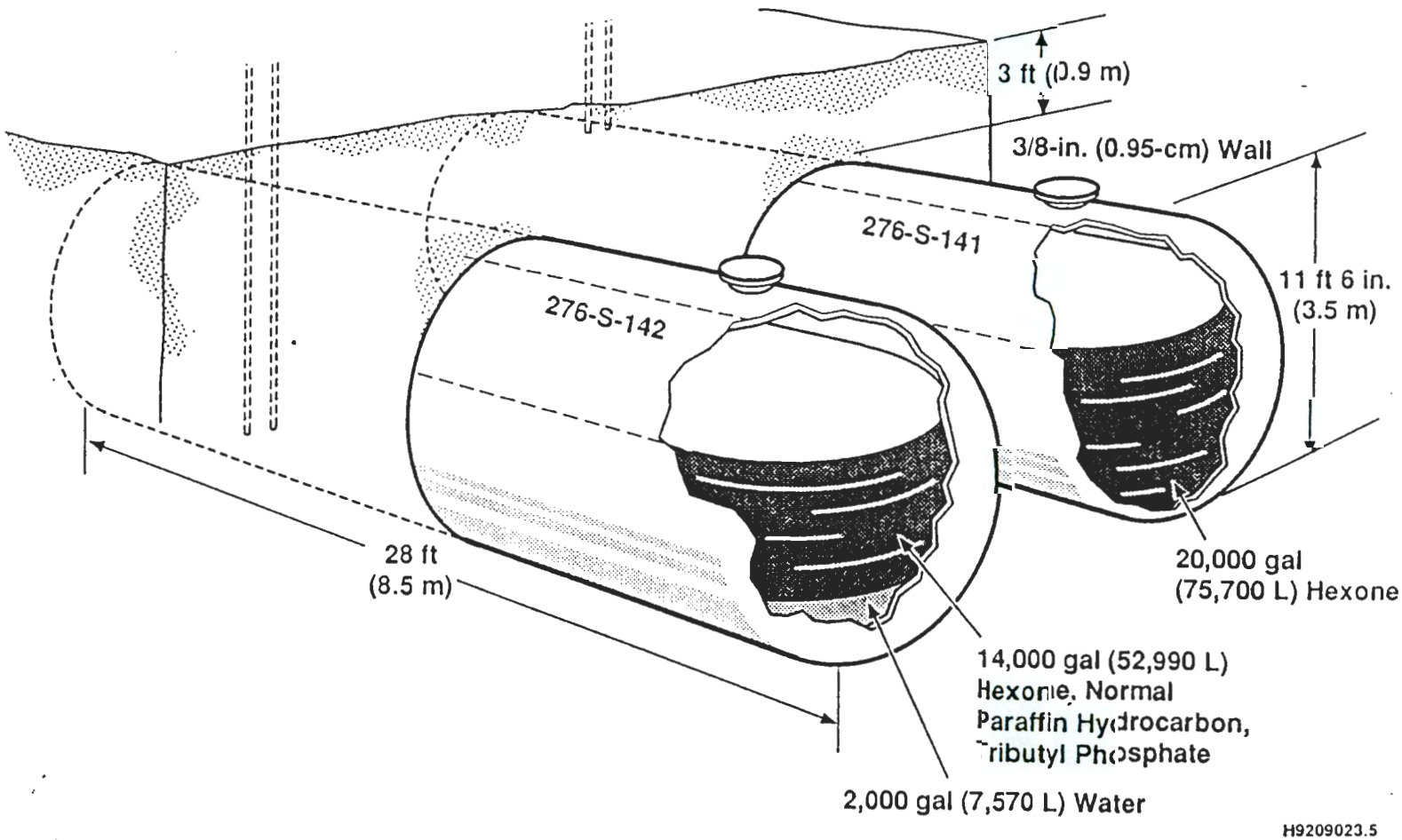

Figure 2-5. The Hexone Storage and Treatment Facility Underground Storage Tanks Before Removal of Solvent and Water Inventory.

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(PHOTOGRAPH TAKEN 1989)

Figure 2-6. The Hexone Storage and Treatment Facility Underground Storage Tank Piping and Pumps Before Addition of the Charcoal Canister and High-Efficiency Particulate Air Filter Vent System.

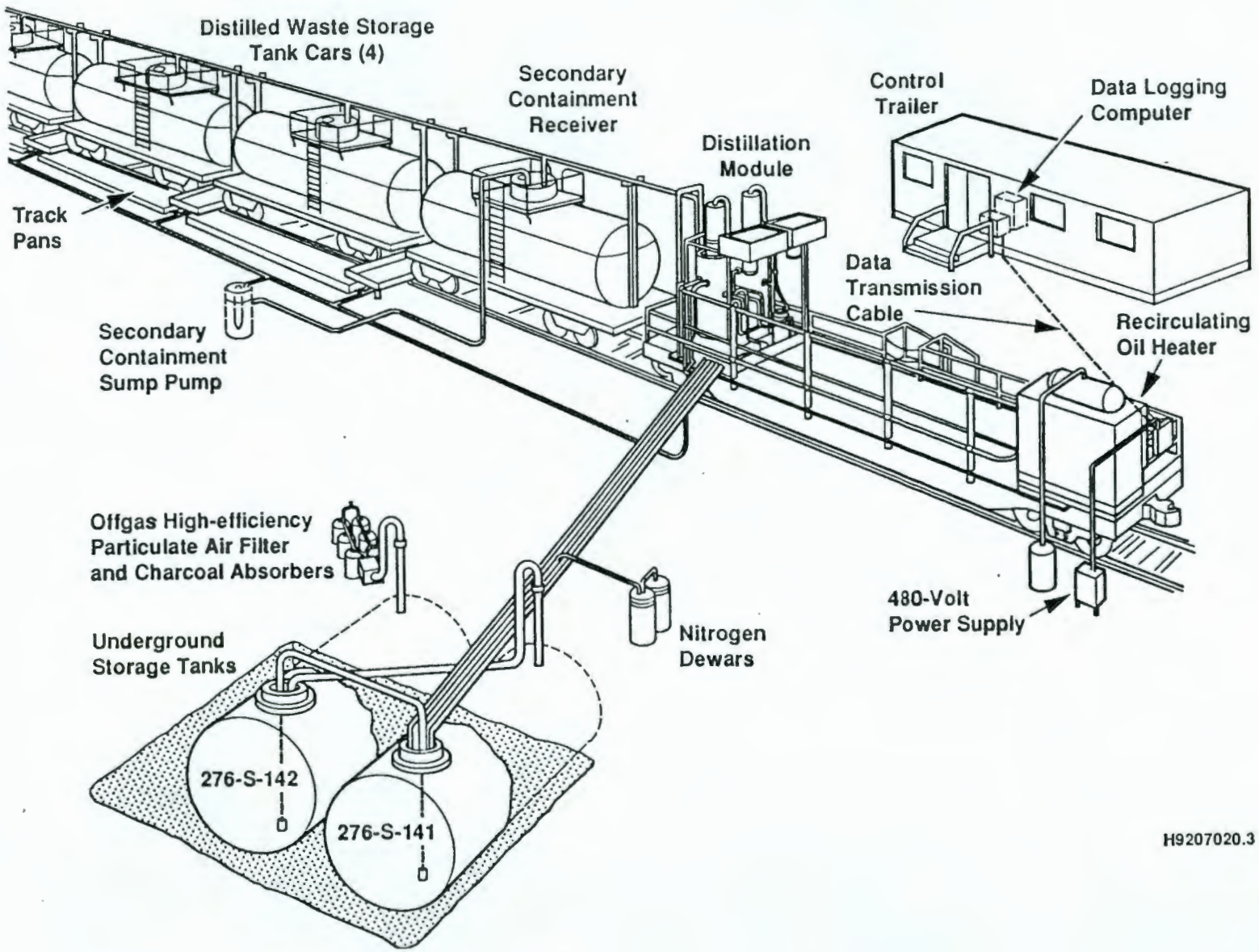

Figure 2-7. The Hexone Storage and Treatment Facility Distillation System. (Configuration during distillation operations).

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90110118-8CN
(PHOTOGRAPH TAKEN 1990)

Figure 2-8. The Hexone Storage and Treatment Facility Underground Tank Offgas System, Including Flame Arrestor, High-Efficiency Particulate Air Filter, and Charcoal Absorption Drums.

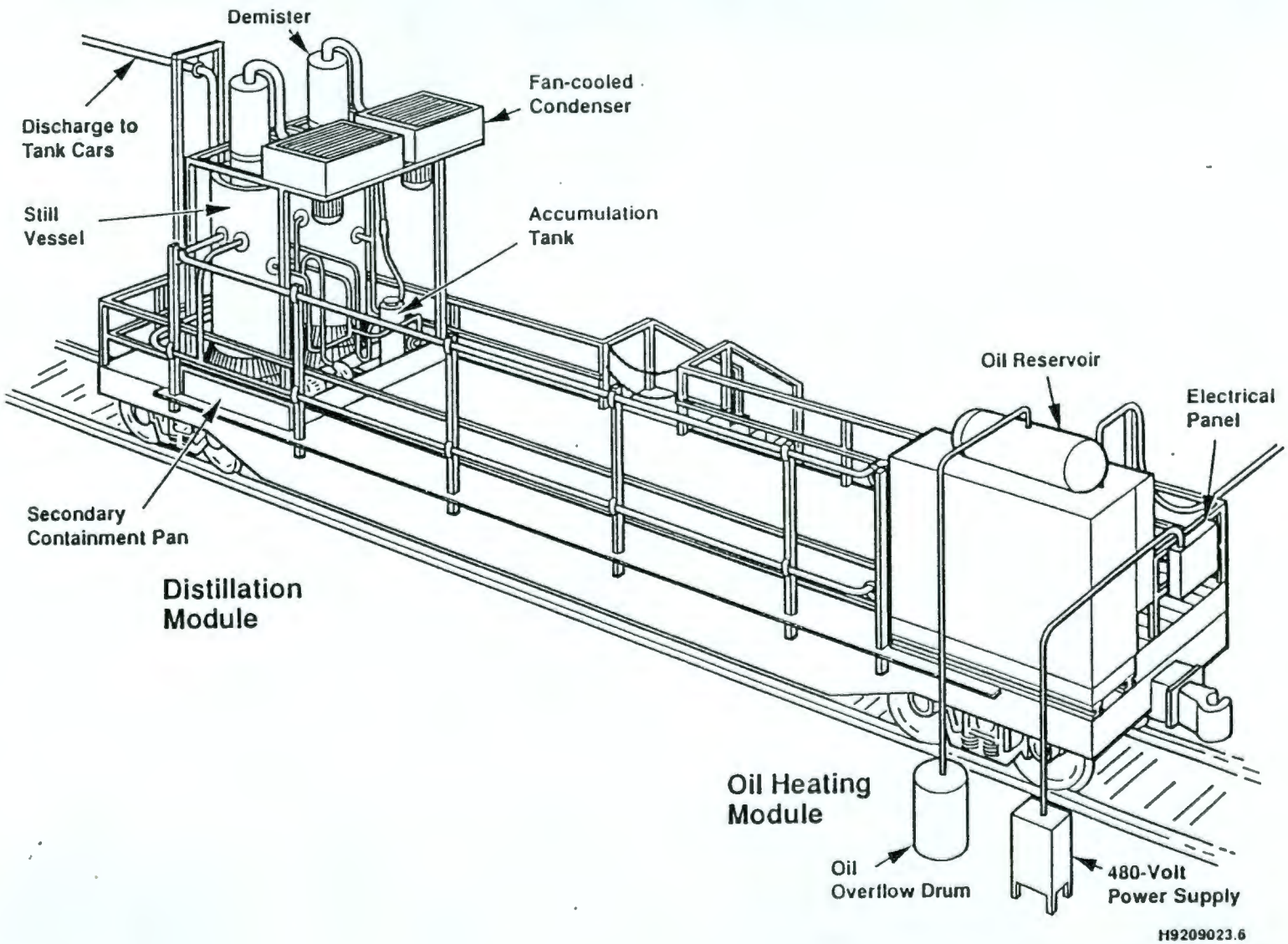

Figure 2-9. The Hexone Storage and Treatment Facility Still Unit.

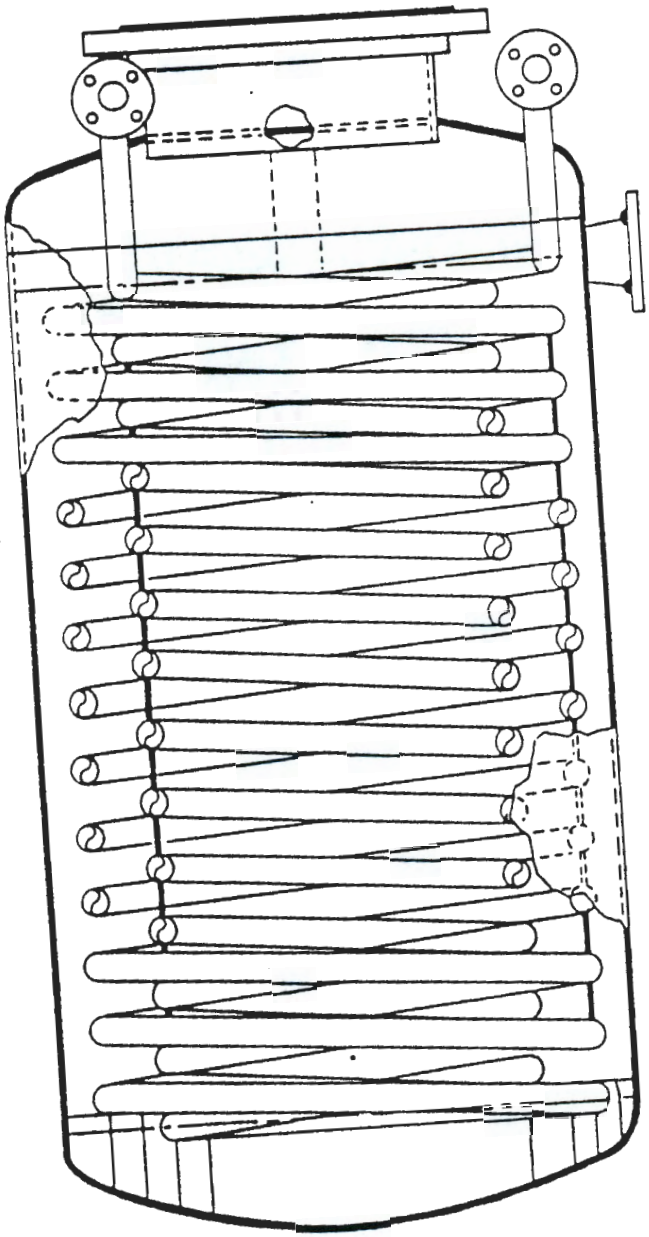

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Figure 2-10. The Hexone Storage and Treatment Facility Still Vessel. (Flanges and coils for hot oil circulation are shown.)

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3.0 PROCESS INFORMATION

This chapter describes how the waste was processed at the HSTF.

3.1 UNDERGROUND STORAGE TANKS

The underground storage tanks were installed in 1951 and used to receive commercial-grade hexone from vendors by tank car. A loading platform and hose connection provided access to the railcars. A buried pipe led to two aboveground centrifugal pumps that moved the hexone into either of the two underground tanks. The pumps were equipped with manifolded piping that allowed the following transfer operations:

- From the railcars to the underground tanks
- Recirculation of underground tank contents (within each tank)
- Transfer from tank to tank
- Transfer from underground tanks to the adjacent REDOX 276-S organic makeup and treatment facility via overhead piping.

These operations were terminated in 1967. In 1967, radioactively contaminated organic liquids associated with the shutdown of the REDOX plant were added to the tanks [it is possible that small amounts of hexone from the Hot Semi-Works (pilot-scale plant operating in the 1940's and 1950's for developing and refining plutonium extraction methods) also were placed in the tanks]. These spent radioactive solvents [hexone, tributyl phosphate, normal paraffin hydrocarbon (a purified derivative of kerosene containing straight-chain hydrocarbons in the range of $C_{10}H_{22}$ through $C_{18}H_{38}$)] and solvent-saturated water were stored in the tanks until 1990. In the mid-1970's, approximately 500 gallons (1,890 liters) of water were added to tank 276-S-142 to adjust the liquid level to change the organic/water interface level after the weight factor dip tube corroded through (this tube is thin-walled relative to the tank walls). Sodium hydroxide then was added to decrease the corrosiveness of the water. Approximately 200 gallons (760 liters) of water were added in 1988 to each of the two tanks to hydrostatically test the emergency transfer pumps and piping. The contents of both tanks were transferred into the distillation system during July through December 1990. The underground storage tanks currently are empty except for a heel of approximately 250 gallons (950 liters) of sludge/tar and 5 to 30 gallons (19 to 115 liters) of liquid (water and solvents) in each tank.

The original pump system remains intact except for the railcar unloading ramp and hose system, and the overhead transfer pipe to the 276-S Building. These were removed in the early 1970's and 1980's (Appendices 2A and 2B). The temporary piping that connected the underground tanks to the distillation system was dismantled and containerized in early 1992. During pumping to the distillation system, some water was added to float the remaining hexone, allowing better pump access. The underground storage tanks then were flushed

with normal paraffin hydrocarbon after the tanks had been pumped out (to dissolve and remove remaining accessible hexone); the pumpable normal paraffin hydrocarbon was processed through the distillation system.

3.2 DISTILLATION SYSTEM

The distillation system was installed in early 1990 to remove and distill the solvent waste in tanks 276-S-141 and 276-S-142. The distillation process is depicted in the Part A. The waste was drawn from the underground tanks with a gear pump mounted on the distillation flat car. The gear pump fed an overflow weir that maintained a constant level in the first stage still vessel. Excess liquid overflowed back into the underground tank via a seal loop and pipeline. The waste was evaporated in the coil-heated still vessel and the vapor passed through a two-stage demister unit into an air-cooled finned-tube condenser. Radioactive residues remained in the still vessel and slowly filled the vessel with a solid tar. The condensate drained to a second identical distillation unit where the distillate again was evaporated, demisted, condensed, and collected in a condensate accumulation tank. Any gases that did not condense were routed to the underground tank for venting. From the accumulation tank, distillates were pumped to the four distillate storage tank cars.

The distillation yielded decontamination efficiencies for plutonium, americium, and hard beta emitters in excess of 99.9 percent (Rasmussen et al. 1992). Following completion of the distillation operation, the distillates were sampled, analyzed, and trucked (November 1991 through June 1992) to the Diversified Scientific Services, Incorporated commercial incinerator in Kingston, Tennessee for destruction. The Diversified Scientific Services, Incorporated incinerator is a RCRA-permitted hazardous waste treatment facility. The tank cars were emptied, rinsed, vented, and air-dried. The radioactive still residues were accumulated in three sacrificial still vessels that were removed from the system and are stored temporarily at the HSTF.

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4-2. Physical Characteristics of Waste Constituents Treated and/or Stored at the Hexone Storage and Treatment Facility T4-2

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4.0 WASTE CHARACTERISTICS

This chapter describes the underground storage tank waste. The waste that was generated during treatment of source waste (i.e., the distillate and still bottom residue) is discussed in Chapter 7.0.

Tables 4-1 and 4-2 present the maximum waste inventory and physical characteristics of waste constituents treated and/or stored at the HSTF, respectively. Table 4-1 also provides concentrations of radioactive materials.

The waste stored at the HSTF (before distillation) was contained in underground storage tanks. These compounds were hexone, tributyl phosphate, normal paraffin hydrocarbon, and water. The water and the organic liquids held dissolved radionuclides, including tritium and transuranic elements. In tank 276-S-142, the three organic compounds comprised a mixture (single phase) that floated on water. Tank 276-S-141 held only hexone and, subsequently, hexone and water. Hexone (methyl isobutyl ketone) is a colorless, flammable, and volatile liquid with a distinctive odor. The properties of normal paraffin hydrocarbon are similar to those of kerosene. Like hexone, tributyl phosphate is a strong solvent for metals but is relatively difficult to ignite. The organics can be toxic to humans through ingestion and inhalation. During storage and distillation, the hexone and normal paraffin hydrocarbon were stable.

Tributyl phosphate breaks down (at temperatures encountered during distillation) to dibutyl phosphate, monobutyl phosphate, and finally, phosphoric acid. Phosphoric acid reacts with metals to form phosphate salts, in this case, primarily iron phosphate (from rust) and sodium phosphate (from sodium hydroxide added for pH adjustment). Smaller amounts of other metal phosphates, such as chromium phosphate, also are present. The tributyl phosphate decomposition yields primarily butene gas that was vented through the tank offgas system. The other decomposition product is butanol that would have been distilled over, collected in the tank cars, and incinerated.

Analysis of the distillate during storage in tank cars yields apparent detection for phosphate esters, acetone, and fluoride (Chapter 7.0, Table 7-3). Tributyl phosphate, dibutyl phosphate, and monobutyl phosphate are phosphate esters and generically are identified as such. Acetone, if present, might have originated with the hexone. Acetone is a ketone that is an impurity in the manufacture of hexone. The source of fluoride, if present, is uncertain.

4.1 PERIOD 1951 TO 1967

Tanks 276-S-141 and 276-S-142 stored commercial-grade hexone. The hexone was delivered by rail tank car from vendors. Hexone was pumped as needed to the 276-S Building for makeup as REDOX solvent.

4.2 PERIOD 1967 TO 1990

Tank 276-S-141--The tank stored approximately 20,000 gallons (75,700 liters) of distilled hexone, part or all of which had been used in the REDOX plant. In 1988, 200 gallons (760 liters) of water were added. Table 4-1 lists the waste content during this period.

Tank 276-S-142--A mixture of hexone, normal paraffin hydrocarbon, and tributyl phosphate was stored in this tank along with a separate water phase. The hexone shared the same source as that stored in tank 276-S-141. The normal paraffin hydrocarbon and tributyl phosphate were transferred into the tank in 1967; the source of the normal paraffin hydrocarbon and tributyl phosphate was a one-time campaign to separate americium, curium, and promethium from Shippingport reactor blanket fuel in 1966. This operation is described in Boldt and Ritter (1969). The normal paraffin hydrocarbon and tributyl phosphate were washed to remove the bulk of radionuclides before storage, but approximately 0.25 curie of alpha emitters and fission products remained in the organic mixture. Along with the mixed solvents, tank 276-S-142 received about 1,300 gallons (4,900 liters) of water in 1967. Approximately 500 gallons (1,900 liters) of water were added in the mid-1970's and another 200 gallons (760 liters) in the mid-1980's (Chapter 3.0). Table 4-1 provides for maximum waste content during this period.

The tank contents were sampled twice (Strachan 1976; Rasmussen 1992). The 1976 analytical work characterized the material in both tanks and included preliminary distillation tests. The 1988 work obtained fully representative samples of the organic and aqueous phases, and measured radioisotopic concentrations with the goal of determining a practical means for treating and disposing of the waste. The results are consistent with the operator-based knowledge of process information. The analytical results and historical knowledge are summarized as follows:

Tank 276-S-141

20,000 gallons (76,000 liters) of essentially pure hexone

Tank 276-S-142

2,000 gallons (7,600 liters) of water

14,000-gallon (53,000-liter) mixture of 60 percent hexone, 25.2 percent normal paraffin hydrocarbon, 12.6 percent tributyl phosphate, and 1.7 percent water

100 gallons (380 liters) tarry sludge resting on the base of the tank.

4.3 PERIOD 7/1990 TO 12/1990

Both tank 276-S-141 and tank 276-S-142 were pumped out and rinsed with water and normal paraffin hydrocarbon. The contents of these tanks and the rinse were processed through the distillation system.

4.4 PERIOD 12/1990 TO PRESENT

Each tank contains an estimated 200 to 250 gallons (760 to 950 liters) of sludge and 5 to 30 gallons (19 to 115 liters) of liquid, primarily water with lesser amounts of normal paraffin hydrocarbon, tributyl phosphate, and hexone. The sludge consists of a combination of rust and tarry distillation residues. The distillation residues resulted from still vessel siphoning to the underground tanks due to periodic pipeline blockages by tar accumulation. The residue has not been sampled but is assumed to be identical to the still vessel residue.

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Table 4-1. Waste Inventory for Tanks 276-S-141 and 276-S-142 (1989).

Tank	Phase	Composition %				Volume (liters)	Composite sample Picocuries/liter (10^{-12} Ci/L)			
		Hexone	NPH	TBP	Water		Total alpha	Total beta	I-129	Tritium*
276-S-141	Organic	98.4	--	--	1.6	75,700	<31	4,910	5,460	7,470,000
276-S-142	Organic	60.5	25.2	12.6	1.7	52,000	2,070,000	871,000	34,500	3,162,000
	Water	1.5	--	--	98.5	7,600	31,000	12,500,000	Not analyzed	5,638,000

*Estimate from distillate data.
NPH = normal paraffin hydrocarbon.
TBP = tributyl phosphate.
Ci/L = curie per liter.

Table 4-2. Physical Characteristics of Waste Constituents Treated and/or Stored at the Hexone Storage and Treatment Facility.

Waste identity		Physical and chemical properties				
Chemical identification	C.A.S.[a] number	Phys. state at STP[b]	Flash point (°C/°F)	Specific gravity (liquid)	Vapor pressure (mm Hg)	Miscellaneous
Hexone	108-10-1	liquid	22.7/73[d]	0.802[c]	15.7 @ 20 °C[d]	vol, flammable
Normal paraffin hydrocarbon[e]	8008-20-6*	liquid	> 38/100	0.8	<5 @ 38 °C	s-vol
Tributyl phosphate	123-76-8	liquid	146/295[d]	0.978[d]	7.3 @ 150 °C[f]	s-vol

[a]C.A.S., Chemical Abstract Service Registry Numbers. Chemical Abstract Service is a division of the American Chemical Society.

[b]STP = Standard Temperature and Pressure (1 atmosphere, 25 °C).

[c](Verschueren 1983), specific gravity is at 20°C referenced to water at 4°C.

[d](Sax 1987).

[e]Data from Material Safety Data Sheet (Hanford No. 1284).

[f]Data from Material Safety Data Sheet (Hanford No. 1739).

* C.A.S. number is for kerosene.

s-vol = semivolatile.
vol = volatile.
°C = degree Celcius.
°F = degree Fahrenheit.
mm Hg = millimeter of mercury.

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5.0 GROUNDWATER MONITORING

The HSTF is not subject to the groundwater monitoring requirements of WAC 173-303-610(7)(a) if there is no waste left in place, as is consistent with the preferred closure strategy (Chapter 6.0). The HSTF will not be operated, and has not been operated, as a dangerous waste surface impoundment, waste pile, land treatment unit, or landfill as defined in WAC 173-303-645(1)(a). Therefore, if clean or protective closure can be attained, groundwater monitoring is not required.

No evidence of leakage from the HSTF underground storage tanks has been found. Tank integrity testing performed in 1976 (Fong 1976) yielded the following results.

- Ultrasonic measurements of the tank wall thickness (vertical profile, both tanks) indicated a maximum corrosion rate of less than 0.005 inch (0.013 centimeter) per year; the average wall thickness for the tanks was 0.34 inch (0.86 centimeter) (tank 276-S-141) and 0.35 inch (0.89 centimeter) (tank 276-S-142), very close to the original thickness of 0.375 inch (0.95 centimeter) (3/8 inch). For both tanks, all but one measurement out of 100 (0.288 inch [0.73 centimeter]) was between 0.327 and 0.363 inch (0.83 and 0.92 centimeter).

- Organic waste and radioactive contamination were not detected around the outside of the tanks during ultrasonic testing (only the west ends of the tanks were excavated).

- Routine surveillance of the tanks since 1976 shows no change in liquid level, except those reflecting specific water additions.

Continued surveillance of liquid levels until the tanks were emptied in 1990 revealed no unexpected changes. These data are input to records from the computer automated surveillance system tank monitoring system at the Hanford Site. In addition, many underground tanks of similar age and construction (petroleum tanks) containing noncorrosive solutions at the Hanford Site have been removed and show no signs of leakage. Consequently, no leakage is believed to have taken place from these tanks.

Based on this, groundwater monitoring in the immediate vicinity of the HSTF is not planned. When the tanks are exhumed and removed, the tank surface and surrounding soil bed will be examined for leakage, and soil sampling and analysis will be performed, along with a radiation survey. In the unlikely event that either tank leaked and evidence exists that groundwater contamination occurred, characterization and remediation of this contamination will be included in the 200-RO-2 operable unit remedial investigation/ feasibility study and subsequent action(s).

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6.0 CLOSURE STRATEGY AND PERFORMANCE STANDARDS

This chapter describes the closure strategy, closure performance standards, and closure activities.

6.1 CLOSURE STRATEGY

The HSTF will be closed via removal of dangerous waste. This will consist of (1) disposal or treatment of all dangerous waste inventory and (2) decontamination of equipment and piping. The closure strategy for the HSTF and potentially contaminated soil is depicted in flow diagrams in Figures 6-1 and 6-2. The process for closure of the HSTF will be carried out in accordance with all applicable requirements described in WAC 173-303. As indicated in Figure 6-2, coordination with CERCLA will be performed as necessary.

All bulk dangerous waste will be removed from the HSTF and disposed of at a RCRA-compliant facility (for mixed waste, this will be a RCRA-compliant mixed waste unit). Removal will include the dangerous waste content of the underground tanks, tank cars, the distillation unit, and ancillary equipment (some waste has been removed before the submittal date of this closure plan Chapters 3.0 and 7.0). These components will be decontaminated and/or disposed of properly. Cleaning and disposal (possibly recycling as scrap) are the only actions being considered for the underground storage tanks. The underground tanks will be decontaminated (Chapter 7.0) with the goal of disposal as nonhazardous and nonradioactive, though the attainment of radioactivity-release levels is considered unlikely. The tank cars and distillation unit will be decontaminated (some distillation unit components will be disposed of and replaced instead of being decontaminated) and dismantled or released as useable equipment. All dangerous waste produced during decontamination procedures will be handled and disposed of as dangerous waste. Soil removed during excavation will be treated or disposed of at a RCRA-compliant facility if the soil is contaminated with dangerous waste.

In addition, it must be determined whether or not other soil surrounding the tanks and associated piping has been contaminated. Before tank decontamination, a visual tank integrity examination will be performed. If no tank leak or staining from present or past leakage is apparent, soil sampling will be limited to the number of samples described in Chapter 7.0, Section 7.2.3.1. If evidence of leakage is encountered, additional samples could be taken to evaluate soil contamination. Soil sampling and analysis and field screening for analytes of concern (Section 6.1.2) will serve to demonstrate that the soil is or is not contaminated. Soil radiation monitoring will be conducted to assist in the evaluation of potential contamination from the HSTF and surrounding area. The concentrations of contaminants indicated by chemical analysis and radiation levels will be compared with action levels to facilitate cleanup decisions. Soil treatment or disposal will be performed if exceedance of all action levels is significant for any analyte of concern that is a dangerous waste (based on WAC 173-303).

If the extent of contamination is apparent and minimal, soil remediation will take place expeditiously under RCRA. Otherwise, or if HSTF-derived soil contaminants are present with other soil contamination that is above action levels, all soil remediation will be coordinated with the CERCLA remediation process as part of the 200-RO-2 operable unit, which includes the HSTF.

6.1.1 Action Levels

Action levels are concentrations of constituents that prompt an action, such as soil removal and/or treatment or further evaluation. Initial action levels will be the greater of two levels: background or limit of quantitation. Background will be Hanford Site-wide soil background threshold values as defined in *Hanford Site Soil Background* (DOE-RL 1992b). The limit of quantitation is the level above which quantitative analyses can be obtained with a specific degree of confidence (generally the mean background signal plus 10 standard deviations). If concentrations exceed initial action levels, health-based action levels will be assessed. The HSTF action levels are intended to be consistent with CERCLA remedial action levels.

The health-based levels will be based on equations and exposure assumptions presented in the *Hanford Site Baseline Risk Assessment Methodology* (DOE-RL 1992a). For noncarcinogens, the principal variable relating human health to action levels is the oral reference dose. The reference dose is defined as the level of daily human exposure at or below which no adverse effect is expected to occur during a lifetime. For carcinogens, the cancer slope factor is the basis for determining human health effects; it is a measurement of risk per unit dose. The oral reference dose and cancer slope factor are chemical-specific and are obtained from the *Integrated Risk Information System* (IRIS) database (EPA 1991). Health-based levels will be based on values that are current at the time of approval of this closure plan.

Action levels will not be applied to contaminated equipment. Equipment that has contacted HSTF dangerous waste will be decontaminated (Bracken 1991; or other appropriate procedure) or disposed of in compliance with applicable regulations.

Radioactive and nonradioactive materials at the HSTF are intimately associated. Radiation detection capabilities for these substances generally are more effective (lower detection) than chemical analytical techniques. Consequently, radiation detection might be used to supplement or replace chemical analytical methods. For the purposes of radioactive waste management, radioactivity release levels will be based on standard U.S. Department of Energy guidelines. The term 'releasable' in this document indicates that radioactivity levels are low enough that no radioactive material management is required.

6.1.2 Analytes of Concern

The principal analytes of concern for decisions of remediation are hexone, normal paraffin hydrocarbon, and tributyl phosphate. Analysis of the

still vessel contents has revealed the presence of chromium, cadmium, barium, and lead in trace amounts. This is representative of the present underground tank contents because virtually all of the original tank contents were pumped to the distillation system, and still vessel overflow returned to the underground storage tanks. During the distillation process, tributyl phosphate breakdown produced the following constituents: dibutyl phosphate, monobutyl phosphate, phosphoric acid, phosphate salts, butanol, and butene (Chapter 4.0). Analysis of hexone, tributyl phosphate, normal paraffin hydrocarbon, phosphate, butanol, butene, chromium, cadmium, barium, and lead will be performed and is addressed in the sampling and analysis plan (Chapter 7.0, Section 7.2).

6.2 CLOSURE PERFORMANCE STANDARDS

The closure performance standards in WAC 173-303-610(2) require the owner or operator to close the TSD unit in a manner that:

"(a)(i) Minimizes the need for further maintenance;

(ii) Controls, minimizes or eliminates to the extent necessary to protect human health and the environment, postclosure escape of dangerous waste, dangerous constituents, leachate, contaminated run-off, or dangerous waste decomposition products to the ground, surface water, ground water, or the atmosphere; and

(iii) Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity."

6.2.1 Minimize the Need for Future Maintenance

The closure performance standard in WAC 173-303-610(2)(a)(i) requires the owner or operator of a TSD unit to close the site in a manner that minimizes the need for further maintenance. As discussed in Section 6.1, the strategy proposed for closure (i.e., that the site is clean by demonstration that the contaminants are below action levels or waste removal) will minimize the need for future maintenance.

6.2.2 Protect Human Health and the Environment

The HSTF is to be closed. Consistent with this intent and strategy, the following actions will be/or have been taken (as necessary) in advance of closure certification.

- The closure will be verified by chemical analysis and a radiation survey.

- All equipment contaminated during the performance of closure activities will be decontaminated or disposed of at a RCRA-compliant facility.

- Surface soils will be sampled for dangerous waste constituents.

- If necessary, contaminated soil will be removed and/or treated to reduce constituent concentrations in site surface soils to acceptable soil cleanup values as determined by methods prescribed in WAC 173-340 and implemented by the *Hanford Site Baseline Risk Assessment Methodology* (DOE-RL 1992c).

6.2.3 Return Land to the Appearance and Use of Surrounding Land

In accordance with WAC 173-303-610(2)(a)(iii), the owner or operator of a TSD unit is required to close the unit in a manner that returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

When closed, the HSTF closure area will be returned to the appearance and continued use of the surrounding 200 West Area.

6.3 CLOSURE ACTIVITIES

The following closure activities were completed in 1991 and 1992, before closure plan approval with notification to Ecology:

- Incineration of the tank distillate

- Removal of remaining dangerous waste from tank cars followed by decontamination of the tank cars

- Disposal of still vessels at approved disposal/storage site

- Disposal/decontamination of the distillation unit and associated piping

- Disposal/decontamination of piping and ancillary equipment.

The following closure activities will be implemented if the activities are consistent with, and do not duplicate the efforts of, integrated regulatory cleanup or stabilization of the 200 West Area, including the HSTF:

- Removal of remaining bulk waste residue in underground tanks

- Decontamination of the tanks (as is practical and feasible)

- Disposal/decontamination of remaining piping and ancillary equipment

- Disposal of the tanks

- Cleanup/removal of soil as necessary, or restriction of access to the site until final remediation

- Closure will be verified by chemical analysis and radiation survey.

All equipment used in performing closure activities will be decontaminated or disposed of at a RCRA-compliant facility.

Closure activities will be monitored by an independent registered professional engineer who will certify that closure activities are accomplished in accordance with the specifications of the approved closure plan. The certification will be sent by registered mail or an equivalent delivery service.

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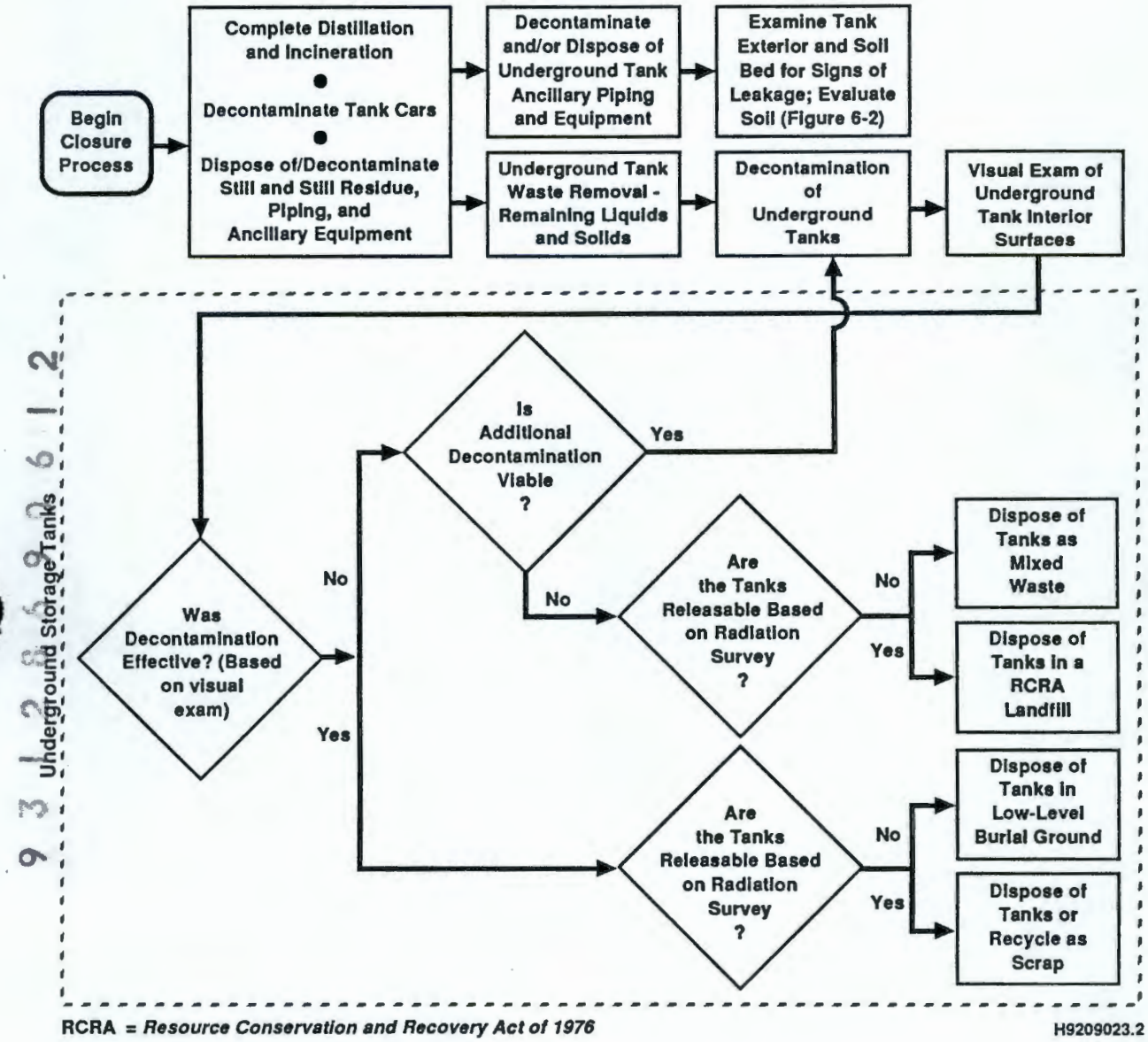

RCRA = *Resource Conservation and Recovery Act of 1976*

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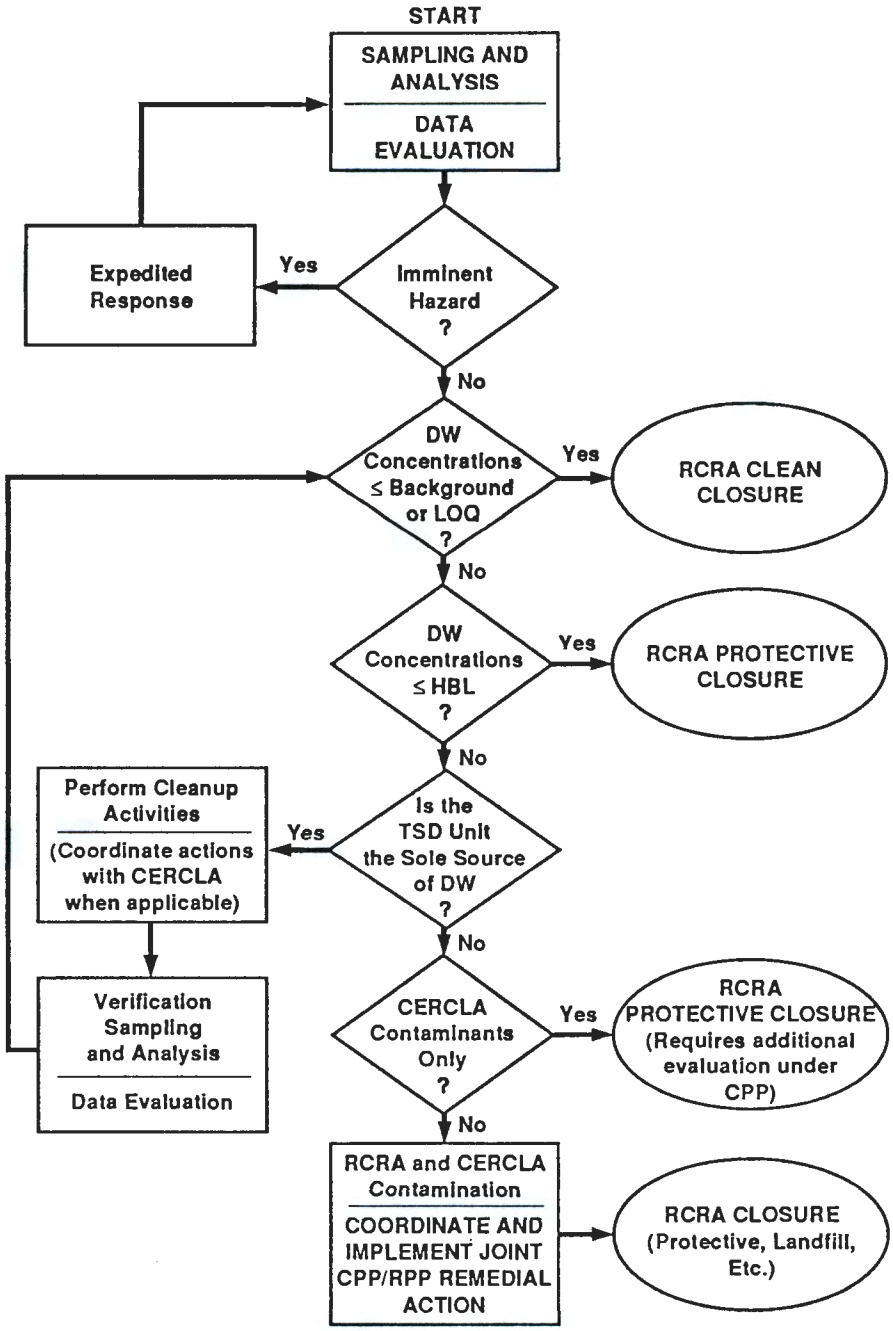
Figure 6-1. Flow Chart of the Closure Strategy for the Hexone Storage and Treatment Facility.



Background = Hanford Site-wide background threshold (upper limit of the range of concentrations) for soil (DOE-RL 1992b).
Clean Closure = Closure based on the criterion that dangerous waste is not present in concentrations greater than background or LOQ; no further remedial action to be taken.
CPP/RPP = CERCLA past practice/RCRA past practice.
DW = Dangerous waste as defined in WAC 173-303.
HBL = Health-based levels.
LOQ = Limit of quantitation; the level above which quantitative analysis can be obtained with a specified degree of confidence; generally $10\sigma \pm 3\sigma$.
Protective Closure = Closure based on the criterion that dangerous waste concentrations are less than or equal to HBL; no further remedial action to be taken.
Verification Sampling = Sampling and analysis used to evaluate the success of contamination removal.

Figure 6-2. Flow Chart of the Soil Closure Strategy for the Hexone Storage and Treatment Facility.

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7.0 CLOSURE ACTIVITIES

This chapter describes the activities necessary to close the HSTF. Included are sampling and analysis information and procedures and a schedule for completing the closure activities. The overall closure strategy is described in Chapter 6.0. Details that are beyond the scope of this document will be discussed in a decommissioning work plan, a dangerous waste operating plan, and a radiation work permit. These are standard Hanford Facility documents that will be prepared before commencement of the underground storage tank decommissioning. These documents are unit-specific and will be made available to Ecology upon request.

7.1 REMOVAL OF DANGEROUS WASTE INVENTORY

All but a few hundred gallons of dangerous waste have been removed from the HSTF underground storage tanks, treated, stored in tank cars at the HSTF, and transported offsite to an incinerator (Chapter 3.0). The remaining dangerous waste exists as residual liquids or solids in the underground tanks and in still vessels or contaminated equipment. Disposition of this waste is discussed in Sections 7.3 and 7.4.

7.2 SAMPLING AND ANALYSIS

This section addresses post-1992 sampling and analysis. A quality assurance project plan for this work is presented in Appendix 7A. Analytical work performed before the submittal of this closure plan served to characterize the underground storage tank contents, tank car secondary containment rainwater, still vessel contents, and other equipment contamination. These results are described and/or referenced in Chapter 4.0 and in the following sections that are specific to the cleanup of the distillation system (activities that predated submittal of this closure plan).

7.2.1 Purpose of Sampling Efforts

The purpose of the sampling efforts is to collect sufficient data to determine whether or not a release of a regulated substance(s) occurred at the site, tentatively evaluate the extent of any contamination of tanks and soil, and make decisions regarding remediation of the site. Data collected also could be used to designate what treatment, if any, would be applied to the soil. The analytes of concern are listed in Chapter 6.0, Section 6.1.2.

Analytical Level III, as defined by EPA (1987) will be required. The EPA methods (EPA 1990) will be employed where possible. Detection limits will be those established in EPA guidelines or other implemented analytical procedures. The data quality objective for precision will be 25 relative

percentage difference, and for accuracy, will be 25 percent. Because of the complexity of the matrix and potential radioactivity, the data may be flagged, but will not be invalidated or disqualified if these data quality objectives are not met.

7.2.2 Field Screening

Before the collection of samples, and as conditions allow, field instruments will assist in the identification of sample locations. Field instruments such as photoionization detectors, flame ionization detectors, and radiation detectors can be used for this purpose as well as monitoring the site for health and safety precautions. Procedures for the use of these instruments are discussed in *Environmental Investigations and Site Characterization Manual* (WHC 1988a).

7.2.3 Soil Sampling and Analysis

The soil sampling and analysis procedure has been developed based on the Ecology's *Guidance for Site Checks and Site Assessments for Underground Storage Tanks* (Ecology 1991). This document outlines the minimum requirements for sampling to determine if a release has occurred at an underground storage tank site. A number of the field activities described in this procedure are currently addressed in existing procedures, such as Environmental Investigation Instructions (EII) outlined in *Environmental Investigations and Site Characterization Manual* (WHC 1988a). These EIIs will be referenced when applicable. Additional information regarding the implementation of the Ecology guidance can be found in *Site Assessment for Underground Storage Tank Removal* (WHC 1992b). The soil analytical work methodology and quality assurance are addressed in this chapter and in Appendix 7A.

7.2.3.1 Soil Sample Selection Criteria. Sampling of the soil at the HSTF will follow Ecology guidelines. Soil samples will be collected from around the tanks and the associated piping using the following criteria to determine the location of samples:

- From the center of any visually stained soil areas, or soil areas corresponding to visually stained areas on tank exteriors detected before or following tank removal

- Where field instruments detect potential contamination.

The point of interface between native soils and backfill materials should be investigated as a natural site of collection of any released substance. In the event that no obvious contamination is discovered, the following guidelines will be used to locate soil samples.

- A minimum of three soil samples must be taken from the excavation pit when a single tank is being removed. One of the samples will be collected from beneath the tank; the remaining two samples will be taken from the sidewalls of the excavation pit. When multiple tanks

are being removed from a single excavation pit, one additional sample will be collected from beneath each additional tank being removed (i.e., a minimum of four samples for two tanks). In addition, one discrete sample will be collected for every 25 cubic yards (19.1 cubic meters) of stockpiled, excavated material. The specific location of each of these samples will be where field instruments indicate contamination is most likely to be present.

- Collect one soil sample from around the piping system location for every 50 feet (15.2 meters) of piping. Soil samples around piping should be collected adjacent to known previous positions of piping joints or elbows and should be spaced to provide maximum distance between samples, unless evidence indicates contamination is more likely to be present at different locations along the piping. (Ecology 1991)

One exception to these guidelines will be the determination of the need to collect samples from the excavated material. The guidelines are intended for use in performing site assessments on underground storage tanks storing petroleum hydrocarbons. The HSTF was not operated as a storage unit for petroleum hydrocarbons, but rather for storage of commercial-grade hexone and subsequent storage of radioactively contaminated hexone, normal paraffin hydrocarbon, tributyl phosphate, and water. Because the presence of radioactive constituents above background levels would indicate that tank waste material might have come in contact with the surrounding soils, screening for radioactivity will serve as a reliable indicator for both the presence of radioisotopes and chemical parameters. This also is supported by the environmental persistence of the radioisotopes in contrast with that of the volatile organic compounds stored in the tanks. Considering this, screening of excavated soil for both radioisotopes and volatile organics will serve as guidance for the collection of samples. Typically during the removal of underground storage tanks, excavated material is placed in 10-cubic yard (9-cubic meter) piles. Soil samples will be collected where screening indicates the potential for the presence of radioisotopes or volatile organics [generally not to exceed one sample per 25 cubic yards (23 cubic meters)]. If no evidence of contamination is found based on field screening, a minimum of one sample will be collected for each 100 cubic yards (90 cubic meters) of excavated material.

For sampling purposes, close groupings of pipes will be treated as a single pipe. No samples will be taken in the vicinity of any distillate-only lines. These lines were routed above secondary containment. In addition, the feed lines to and from the distillation system will not require sampling. All piping added for the distillation process was welded or had secondary containment consisting of steel catch pans under threaded fittings and flexible lines (Rasmussen et al. 1992). Also, given consideration of the controlled and monitored nature of the distillation process, it is assumed this sampling would be unnecessary.

In addition to the sample(s) discussed previously, one sample will be judgmentally located at the connect/disconnect point used for the unloading of hexone into the tanks. This location will be evaluated for contamination with

sampling (and field screening) conducted where contamination is most likely to have occurred. If contamination is evidenced, a second sample will be taken at a depth of 2 feet (0.61 meter) below the ground surface at a point determined to be beneath the connect/disconnect. All sample locations for the HSTF will be located in the field by the Field Team Leader at the time of tank excavation and removal.

7.2.3.2 Location of Sample Points. Using the previously mentioned guidance to determine the number of samples and their general location, an estimate can be made of the minimum number of samples to be collected as follows.

- Three samples will be taken from the excavation pit plus one additional sample for the removal of the second tank for a total of four samples.

- A minimum of one sample per 100 cubic yards (90 cubic meters) of excavated material. It is estimated that there will be roughly 550 cubic yards (500 cubic meters) of excavated material. This indicates that six samples are required of the excavated material. Samples to be collected in accordance with this criterion will be taken during excavation. Samples will be selected randomly at the direction of the Field Team Leader; from the backhoe bucket or other excavation equipment used to perform this task.

- There are five piping groups where samples will be required to be collected. These five piping groups are as follows.

  - The pipes between tank 276-S-141 and the manifold grouping. When considered as one pipe, there is roughly 12 feet (3.6 meters) of pipe. There will be one sample taken where either field screening indicates the likelihood of contamination, or beneath the points where the elbows were located. This also will apply to the pipes leading to and from tank 276-S-142. A minimum of one sample each will be taken, for a total of two samples.

  - The entire manifold area will be considered one group of pipes and is roughly 10 feet (3 meters) in length. A minimum of one sample will be located as discussed for previous piping.

  - The fill/discharge line from the unloading ramp to the tank manifold system. There was roughly 70 feet (21 meters) of pipe, for a minimum of two samples to be collected.

  - The pipe from the HSTF to the 276-S Building is approximately 115 feet (35 meters) in length. This length will require a minimum of three samples to be taken.

All buried piping will be exposed. After visual investigation and field screening of the soil around the piping, the piping will be removed so that visual and field screening inspection of the underlying soil can be performed. Sample point selection will proceed as discussed previously. Table 7-1 gives

a synopsis of the minimum number of samples to be collected and the corresponding area for these samples.

7.2.3.3 Soil Sampling Procedures. Guidance to be used for soil sampling activities at the HSTF is contained in the *Environmental Investigations and Site Characterization Manual* (WHC 1988a) and the *Site Assessment for Underground Storage Tank Removal* (WHC 1992b). The implementation document *Site Assessment for Underground Storage Tank Removal* (WHC 1992b) discusses the specific application of EIIs to closure activities.

7.2.3.4 Sample Analysis. Analytical methods are selected based on meeting specific data quality objectives (Section 7.2.1). In addition, the possibility of detecting constituents not identified on the target analyte list also must be factored into the selection of analytical methods.

7.2.3.4.1 Methyl Isobutyl Ketone (Hexone). The SW-846 Method 8040 (EPA 1990) has been selected as a method that will allow detection over the range of miscellaneous solvents that have been tentatively identified in previous sampling efforts of HSTF waste (Rasmussen 1992 and Table 7-2).

7.2.3.4.2 Normal Paraffin Hydrocarbons (Kerosene). The EPA Method 413.1 (EPA 1983) will be used to enable analysis of the range of straight chain hydrocarbons in this group that are collectively referred to as normal paraffin hydrocarbon, for total recoverable oil and grease. This method requires the use of 5 milliliters of hydrochloric acid for a preservative.

7.2.3.4.3 Tributyl Phosphate. For the analysis of tributyl phosphate, EPA SW-846 Method 8270 (EPA 1990) for semivolatile organics will be used. This will require the analytical laboratory to specifically calibrate for the detection of tributyl phosphate because it is not within the normal calibration range for this method. In addition to tributyl phosphate, the analytical laboratory will look for the tributyl phosphate degradation products dibutyl phosphate and monobutyl phosphate.

7.2.3.4.4 Miscellaneous Constituents. There are a few miscellaneous constituents that might be detected in the samples. These miscellaneous constituents consist of degradation products and metals that have been detected in the still vessel tars. The constituents on this list are as follows: phosphate (EPA 300.0) (EPA 1983), butanol (SW-846 8070) (EPA 1990), and butene (SW-846 040) (EPA 1990). As discussed in Chapter 6.0, Section 6.1.2, metals detected in the still vessel tar analysis (chromium, cadmium, and barium [SW-846 6010], and lead [SW-846 7421]) will be analyzed in the soil samples.

7.2.4 Sample and Analysis Plan Modification

Circumstances or changing objectives might require modifications of the sampling and analysis plan. In this case, the Field Team Leader will submit the following information to the Cognizant Engineer for approval and inclusion in the Project File:

- Sampling plan title

- Section/paragraph to be modified (chapter, title, page number), quoting section as given in sampling and analysis plan

- Modifications or deviations, recording modified, deleted, or added statement

- Technical summary of change

- Approvals by original signers of the document or appropriate replacement.

Such modifications could be carried out immediately with a verbal concurrence from the Cognizant Engineer.

7.2.5 Reporting

After completion of the sampling effort, verification documents will be provided for actual sample locations, number of samples, and specific methods used for collection, if different from those provided in this closure plan. Data received from the laboratory will be reviewed, interpreted, and summarized statistically.

7.2.6 Sample Quality Assurance and Quality Control

A detailed quality assurance project plan for this project is given in Appendix 7A.

Quality assurance and quality control of sample analysis and results will be ensured by concomitant field and laboratory procedures. Procurement and/or coordination of laboratory services will be the responsibility of a sample management organization, which will ensure that contractor laboratories will meet minimum quality assurance and quality control requirements. To expedite closure, reporting requirements, and/or site cleanup, sample analysis data will be provided to the Cognizant Engineer for immediate review. The sample management organization also will be responsible for the review of all laboratory quality assurance and quality control programs.

7.2.6.1 Field Quality Assurance and Quality Control. Field quality assurance and quality control will require the collection of at least one duplicate sample for every 20 samples collected. Duplicate samples only will be identified as such in the field logbook. A transport (trip) blank also will be included for each sampled matrix.

When samples have been collected, the samples will be controlled according to the requirements outlined in EII 5.2 "Soil and Sediment Sampling" (WHC 1988a). All samples will be labeled, sealed, and placed in a container for preservation on ice or other appropriate cooling medium. Holding times specified in SW-846 (EPA 1990) will be used as goals.

7.2.6.2 Field Logbooks. All field activities will be recorded in a field logbook according to the protocols outlined in EII 1.5, "Field Logbooks" (WHC 1988a). All entries will be made in ink, signed, and dated. Photographs should be taken of each sampling location and of any unusual circumstances encountered during the investigation.

7.2.6.3 Chain of Custody. Chain-of-custody records will be kept to meet the requirements of EII 5.1, "Chain of Custody" (WHC 1988a). The chain-of-custody form will establish the documentation necessary to ensure the traceability of the sample from time of collection to disposal.

7.2.6.4 Sample Analysis Request. A sample management organization-approved laboratory will be selected to conduct all analyses. The request for appropriate analyses will be included on the sample analysis request form as provided in EII 5.2, "Soil and Sediment Sampling" (WHC 1988a). Laboratory-specific forms could be used in lieu of the sample analysis request form and will be made available by the sample management organization.

7.3 REMOVAL OF WASTE RESIDUE AND CONTAMINATED MATERIAL

This section describes waste removal and decontamination at the HSTF.

7.3.1 Distillate Tank Cars

Four tank cars were used for less than 2 years for storing liquid resulting from the distillation process (tank cars 10H-3684, 10H-3687, 10H-3688, and 10H-3685). The HSTF process inventory of these railcars is shown in Table 7-2. The distillate was pumped into a 5,100-gallon (1,900-liter) highway trailer, transported to the Diversified Scientific Services, Incorporated incinerator in Kingston, Tennessee in eight trips, and was destroyed by burning. Each tank car interior was rinsed twice with a global spray head inserted into the vessel via a 2-inch (5-centimeter) polyvinyl chloride (PVC) pipe. The nozzle was positioned in the center of each end of the car to provide full spray coverage. The rinse sequence for each car was as follows:

1. A minimum of 50 gallons (190 liters) of a 2 percent solution of PACE-T-10X* detergent and water via global spray

2. A minimum of 20 gallons (76 liters) of rinse water via global spray

3. Transfer of the rinsate into the tank trailer

4. Repositioning of the rinse nozzle to the other end of the car

5. Repetition of steps 1, 2, and 3

---

*PACE-T-10X is a trademark of Pacific Chemical.

6. Drain tank car flush heel via bottom outlet [approximately 8 to 10 gallons (30 to 38 liters) per car] and transfer into the tank trailer

7. The rinsed tank car was vented to atmosphere to allow drying

8. Inspection and/or testing of the tank car; the tanks were found to be dry. The tank car interior surfaces were tested for organic vapors using a photoionization detector. All measurements were below detection.

The overhead transfer lines were rinsed with PACE-T-10X and water at the rate of 0.0054 gallon per square inch (0.0032 liter per cubic meter) minimum. This piping was removed as nondangerous waste. All rinsate was transported to the Diversified Scientific Services, Incorporated incinerator with the distillate shipments. After decontamination, the tank cars underwent vapor space analysis for hexone. Initial analyses (June 1992) yielded below-detection concentrations for tank cars 3684 and 3687. Tank cars 3688 and 3685 had 0.3 and 6.5 parts per million hexone, respectively. Later analytical results (October 1992) were below detection for all tank cars. The tank cars will be closed pending authorization from Ecology (Izatt 1992). Documentation of this decontamination procedure will serve as demonstration of closure of the tank car component of the HSTF.

7.3.2 Secondary Containment Tank Car (10H-3802)

This tank car received rain water drainage from the distillation system secondary containment accumulation pan and from the 22 tank car drain pans via the rainwater catch drum and transfer pump. Accumulated water was routinely sampled, inspected for separate organic phase, tested for total activity (radionuclides), and drained. The total activity measurement was considered the most sensitive measurement possible for the presence of tritium-contaminated distillate (2,690 to 15,200 picocuries per milliliter). All samples were below detection (50 picocuries per milliliter). No other evidence of spillage or leakage of the tank waste was found. This tank car will be considered closed after authorization from Ecology.

7.3.3 Distillation Unit

The still vessels and demister assemblies were removed (1991 and 1992) and stored temporarily at the site. All radioactive piping, pumps, and filters wetted by nondistilled feed material and distillation bottom liquor were removed, size-reduced (as necessary), and packaged into lined U.S. Department of Transportation 17C galvanized 55-gallon (208-liter) containers for disposal and/or storage as mixed waste. Other remaining systems wetted by distilled solvents, including the condensers and the product tank, were rinsed with PACE-T-10X solution (2 percent) and water. The three waste-containing still vessels have been sampled and analyzed; and will be packaged, designated, and shipped to an onsite mixed waste storage unit. Used demister elements and housings also will be packaged and shipped to a mixed

waste storage unit. All rinsate was transported to the Diversified Scientific Services, Incorporated incinerator with the distillate shipments. Further details of waste disposition are provided in Appendix 2A.

7.3.4 Underground Storage Tanks

All bulk dangerous waste will be removed from the underground storage tanks, and decontamination procedures will be applied. The tanks will be disposed of or recycled as scrap. The type of disposal unit for the waste will depend on the effectiveness of cleaning, as illustrated in Chapter 6.0, Figure 6-1.

7.3.4.1 Tank Excavation. The tanks will be excavated by removing all overburden to below the centerline, approximately 9 feet (2.7 meters) in depth. An upper limit of 600 cubic yards (550 cubic meters) is estimated for soil removal. The excavation walls will be sloped (1 to 1.5 or less [vertical:horizontal]) if worker entry is required. The objective of excavation is (1) to expose the soil below the tank for inspection and (2) to enable removal and disposal as required. Care will be taken to preserve the 'bed' surface beneath the tanks to better allow evaluation of any contamination. For removal (if required), tanks typically are exposed to the base at one end; this end is hoisted with a sling, tilting the tank and allowing the wrapping of a second sling toward the lower end; the tank is moved upward and out of the pit with the slings. Excavation is expected to be performed with a backhoe. Soil removal will be monitored closely for sampling purposes and placed in a planned location. Precautions will be taken to prevent the spread of contamination. For example, if contamination is indicated by field screening, a suitable cover or fixative would be applied to the spoils pile. Buried piping will be removed and the surrounding soil sampled as excavation work progresses.

7.3.4.2 Tank Interior Liquids. During the distillation of the underground tank contents, water was added and the tanks were rinsed with normal paraffin hydrocarbon (Chapters 3.0 and 4.0). These liquids were processed through the distillation system. Apparently, the bulk of this normal paraffin hydrocarbon did not evaporate (unlike the normal paraffin hydrocarbon stored in the underground tanks). The liquid residue was removed from the still vessels, packaged, and is being stored as mixed waste at the Hanford Central Waste Complex (Appendix 2A). The remaining 5 to 30 gallons (19 to 114 liters) of liquid will be removed by evaporation (nitrogen purge) or pumped from tank-bottom puddles using a peristaltic pump. Any pumped liquids will be accumulated in 15-gallon (57-liter) 17E containers, over-packed in lined 55-gallon (208-liter) 17E containers, designated based on radionuclide and chemical analysis, and disposed of or appropriately stored at a RCRA permitted storage or disposal unit

7.3.4.3 Tank Interior Solids. Each of the two tanks contains an estimated 200 to 250 gallons (760 to 950 liters) of tarry sludge and rust flakes. These solids will be removed in the following two-step operation.

1. Bulk Sludge Removal by Vacuum Transfer--In this operation, sludge will be vacuumed through the existing tank access ports into lined containers or other suitable containers, such as the spare still vessels. If necessary, a new access port will be cut into the south end of each tank. Vacuum cleaning of a similar size tank (241-CX-70) at the Hanford Facility was completed (in 1991) in a very successful and effective manner. Mechanical sludge transport also could be used as required. All waste produced during this phase of cleaning will be designated and appropriately disposed of or stored as mixed waste.

2. Final Cleaning by Abrasive Blasting--This operation will attempt to remove all remaining waste by abrasive grit or dry-ice blasting and vacuuming. The goal is to dispose of the tanks as nonradioactive waste or, though less likely, as recyclable scrap. Evaluation of radioactivity levels will allow selection of cleaning via staffed entry or remote operation. Precedence for both of these alternatives is found at the Hanford Site. Manual sand blasting was used in the 50-foot (15-meter)-tall B-Cell of the 201-C Building; remote sand blasting was used in the 200-foot (61-meter)-tall, 13-foot (4.0-meter)-diameter 291-C stack. Remote sand blasting uses a commercial rotary sandblast head that easily covers all areas of a 12-foot (3.7-meter)-diameter vessel. Manual sand blasting would use a high-pressure (1,000 pound per square inch [70 kilograms per square centimeter]) water injection system to reduce dust generation to a very low level during operation. Dry-ice blasting is an alternative blasting medium that currently is being evaluated. While dry-ice blasting is not as powerful as grit blasting, it does have the major advantage of leaving no grit residue, as the dry ice pellets evaporate after impact. All blasting residue will be vacuumed from the tanks and packaged in lined 55-gallon (208-liter) 17C galvanized containers for disposal and/or storage in a RCRA permitted storage or disposal unit. All waste produced during this decontamination procedure will be designated and appropriately stored or disposed of as mixed waste.

7.3.5 Piping and Ancillary Equipment

All of the HSTF piping, pumps, HEPA filter, charcoal drums, and associated equipment that have contacted the HSTF liquid- or solid-state dangerous and radioactive waste will be decontaminated or disposed of as dangerous or mixed waste, as appropriate. Decontamination will be based on Bracken (1991) or a similar procedure, or will be tailored to specific equipment. The mercury manometer will be recycled or disposed of as mixed waste. Vapor-only equipment will be classified as radioactive or nonradioactive and disposed of accordingly. Appendix 2A lists the disposition of specific HSTF equipment. Any and all waste generated during decontamination will be treated, stored, and/or disposed of in accordance with all applicable regulations.

7.4 OTHER CLOSURE ACTIVITIES

If soil contamination is found, and if cleanup of this contamination is deferred to remediation of the 200-RO-2 operable unit (Chapter 6.0, Section 6.1), stabilization and/or monitoring of the excavation area might be necessary during the time interval between underground tank removal and soil remediation. Stabilization will occur if this time interval is significant and will serve to (1) enhance worker safety and (2) prevent rainfall or other potential contaminant drivers from accumulating in the excavation. This measure will consist of, for example, fencing off and covering the excavated area and posting it or marking the surface under which contamination exists, isolating contaminated soil with a durable membrane, and backfilling over this barrier with clean soil. The surrounding soil surface will be contoured to prevent surface water from approaching the contaminated area. The HSTF will be inspected a minimum of once a year.

7.5 SITE SAFETY

A dangerous waste operations plan is required for all dangerous waste sampling sites. It is intended to specify information pertinent to field assignments and serves as a guide in unusual situations or emergencies. A site-specific version of the general RCRA/CERCLA investigation health and safety manual will be developed for use in sampling at the HSTF. The site-specific health and safety plan will be prepared in accordance with EII 2.1, "Preparation of Hazardous Waste Operations Permits" (WHC 1988a).

7.5.1 Personnel Training

Appendix 7B contains a brief description of the training courses. Training for soil sampling personnel is covered within the EIIs. All personnel entering the treatment, storage, and/or disposal (TSD) unit during closure must have 40 hours of hazardous waste training (Appendix 7B). Before performing actual closure activities, specific work plans will be submitted to the lead regulatory agency for review. These documents will detail the specific work activities and will not be written until the latest technology and specific materials and equipment are known.

7.5.2 Standard Safety Procedures

The following safety procedures will apply each time personnel make a site entry for closure activities.

- No personnel will be at the site without a designated 'buddy'.
- One of the people entering the site will be designated to be in charge.

- Personal protective equipment will be worn as specified. Approved deviations will be entered in the field logbook and signed by the Field Team Leader (Cognizant Engineer) and the site safety officer.

- Field work will be planned before the site is entered.

- Equipment needed for work will be inventoried and inspected before the site visit to insure that all equipment is present and in operable condition.

7.6 DISPOSAL OF MATERIALS

All waste will be designated and disposed of or treated appropriately. Disposal of equipment in general at the HSTF will follow these criteria.

- If the material is a dangerous waste (only), it will be transported and disposed of at a RCRA-permitted disposal unit.

- If the material is mixed waste, the mixed waste will be transferred to the Hanford Central Waste Complex for interim storage and future treatment or disposal. Hanford Facility requirements for radioactive solid waste packaging, storage, and disposal (WHC 1988c) will be followed when preparing waste for storage and/or disposal.

- If the material is low-level waste only, the low-level waste will be disposed of onsite in the Low-Level Burial Grounds.

- If the material is not dangerous or low-level waste, the waste will be disposed of at a solid waste landfill that meets the standards of WAC 173-304 and applicable local standards, or recycled as scrap.

7.7 SCHEDULE FOR CLOSURE

Closure of the HSTF underground storage tanks and associated equipment will begin upon notification by Ecology of plan approval. Closure will proceed according to the schedule presented in Figure 7-1. This schedule addresses closure activities to be performed after approval of the closure plan.

7.8 AMENDMENT OF CLOSURE PLAN

The closure plan for the HSTF will be amended whenever changes in operating plans or unit design affect the closure plan; whenever there is a change in the expected year of closure; or if, when conducting closure activities, unexpected events require a modification of the closure plan. The closure plan will be modified in accordance with WAC 173-303-610. This plan may be amended any time before certification of final closure of the HSTF.

If an amendment to the approved closure plan is required, the DOE-RL will submit a written request to Ecology to authorize a change to the approved plan. The written request will include a copy of the closure plan amendment for approval.

7.9 CERTIFICATION OF CLOSURE AND SURVEY PLAT

Within 60 days of closure of the HSTF, the DOE-RL will submit to the Benton County Auditor and the lead regulatory agency a certification of closure and a duly certified survey plat. The certification of closure will be signed by both the DOE-RL and a registered independent professional engineer, stating that the unit has been closed in accordance with the approved closure plan. The certification will be submitted by registered mail or an equivalent delivery service. Documentation supporting the independent registered professional engineer's certification will be supplied upon request of the regulatory authority. The DOE-RL and the independent professional engineer will certify with a document similar to Figure 7-2.

Official copies of the closure plan will be located at the following office:

U.S. Department of Energy,
Richland Field Office
Federal Building
825 Jadwin Avenue
P.O. Box 550
Richland, Washington 99352.

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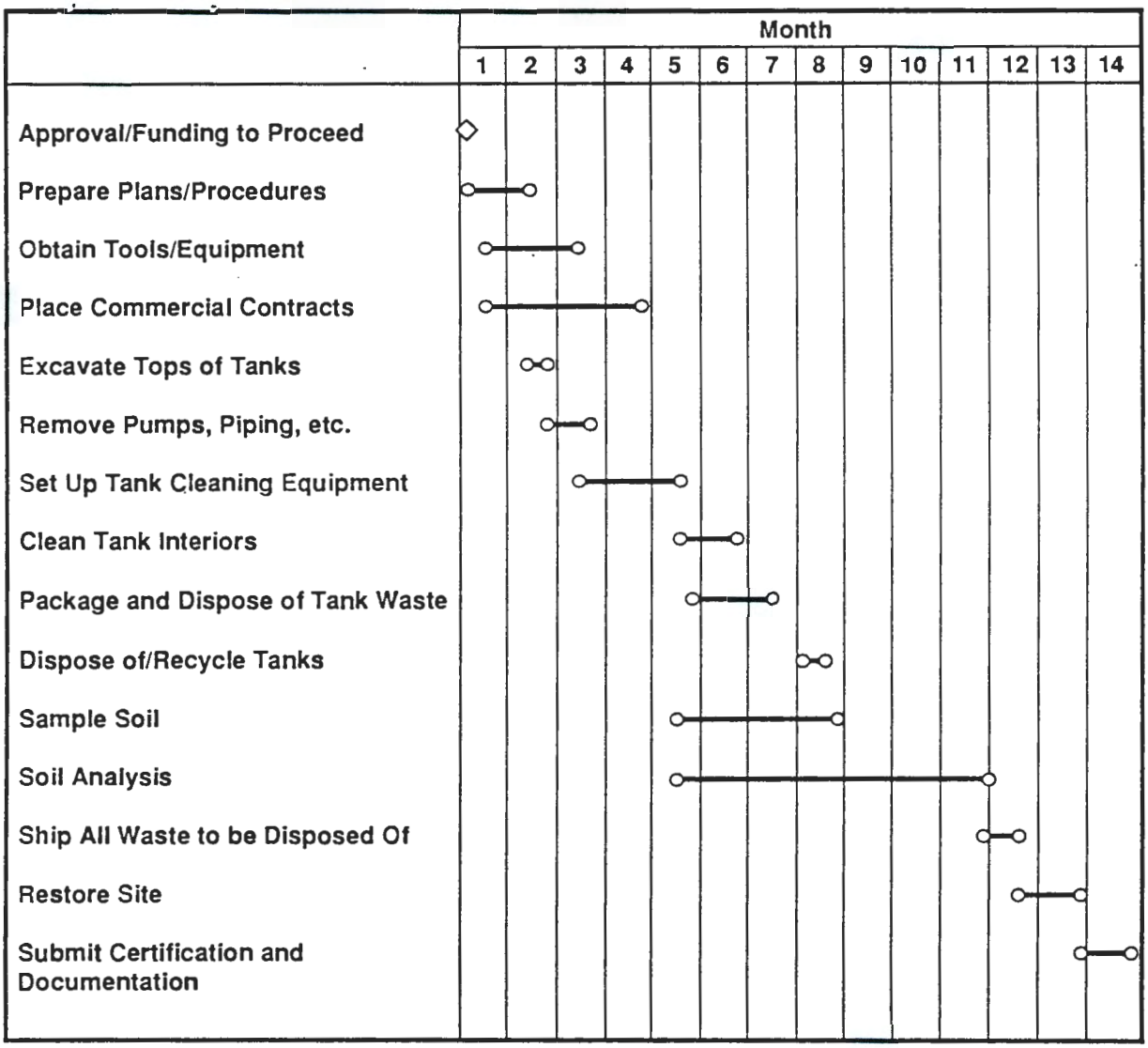

Figure 7-1. The Hexone Storage and Treatment Facility Closure Schedule.

CLOSURE CERTIFICATION
FOR

_____

Hanford Site
U.S. Department of Energy, Richland Field Office

We, the undersigned, hereby certify that all _____ _____ closure activities were performed in accordance with the specifications in the approved closure plan.

_____ _____
Owner/Operator Signature DOE-RL Representative Date
(Typed Name)

_____ P.E.# _____ State ___ _____
Signature Independent Registered Professional Engineer Date
(Typed Name, Professional Engineer license number, state of issuance, and date of signature)

Figure 7-2. Closure Certification for the Hexone Storage and Treatment Facility.

Table 7-1. Minimum Number and Location of Soil Samples.

General sample location	Minimum number of samples to be collected
Excavation pit	4
Excavation spoils	6
Piping tank 276-S-41 to manifolds	1
Piping tank 276-S-42 to manifolds	1
Manifold piping	1
Hexone unloading piping	2
Discharge line to 276-S Building	3
Quality assurance/quality control samples	1 per 20 field samples
TOTAL (excluding quality assurance/ quality control samples)	18

9 3 1 2 8 . 9 0 6 3 2

Table 7-2. Analytical Results for Samples Taken from the Four Tank Cars Holding Hexone Storage and Treatment Facility Distillate (1992).

Analysis		Organic				Aqueous			
Car number		3684	3687	3688	3685	3684	3687	3688	3685
Sample number**		1	2	3	4	1-liter	2-liters	3-liters	4-liters
Radionuclides									
Alpha	pCi/ml	<0.157	<0.157	0.365	<0.286	0.367	0.218	0.477	<0.157
Beta	pCi/ml	1.08	1.25	1.98	1.90	2.25	2.5	2.06	1.25
Tritium	pCi/ml	9,960	4,930	2,690	3,450	15,200	13,600	5,210	3,230
Physical									
Specific gravity	g/ml	0.802	0.805	0.796	0.79	1.002	1.006	1.0	1.0
Flash point	°F	74	78	>145	129	--	--	--	--
Fluoride	ug/g	<10	<10	25	<10	<10	<10	<10	<10
Chloride	ug/g	<1000	<1000	<1000	<1000	<100	<100	<120	<120
Sulfate	ppm	--	--	<1000	<1000				
Total organic carbon	g/L	--	--	--	--	11.7	14.7	3.62	3.7
pH		--	--	--	--	6	6	6	6
Metals									
Zinc	mg/L			0.098	0.057	4,800	5,900	5.7	690
Barium	mg/L	0.1	0.094	0.029				1.4	0.12
Copper	mg/L			0.072					0.34
Cadmium	mg/L			0.030					
Chromium	mg/L			0.15	0.10				
Nickel	mg/L			0.11					
Hexone	%	98.4	98.4	68.6	55.9				
Kerosene*	%	--	--	25.9	39.3				
Acetone	%	--	--	2.6	2.0				
Misc. solvents, acid esters and tributyl phosphate	%	--	--	1.2	1.5				
Water	%	1.6	1.6	1.7	1.3	98-99	98-99	98-99	98-99
Volume	Gallons	8,405	8,286	5,596	6,602	234	234	2,420	1,283
	Liters	31,813	31,363	21,181	24,989	886	886	9,160	4,856
Total activity	Tritium curies	0.317	0.155	0.060	0.086	0.013	0.012	0.048	0.016

(28,889 gallons (109,340 liters) organic; 4,171 gallons (15,790 liters) aqueous; 33,060 total)
(Total tritium = 0.71 curies)

*Kerosene calculated by material balance.

**Complete sample number has prefix HEX-1214.

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8.0 POSTCLOSURE PLAN

In the event that the HSTF cannot be clean closed and that residual soil contamination remains after soil removal activities, a HSTF postclosure permit application will be submitted in accordance with WAC 173-303 regulations.

8.1 NOTICE IN DEED BOOK

This closure plan proposes that the HSTF be closed with no residual soil contamination that would pose a threat to human health or the environment. However, if closure cannot be secured, the following action will be taken in accordance with WAC 173-303-610(1)(b). Within 60 days of the certification of closure, the DOE-RL will sign, notarize, and file for recording the notice indicated below. The notice will be sent to the Auditor of Benton County, P.O. Box 470, Prosser, Washington, with instructions to record this notice in deed book. A survey will be conducted, as necessary, to enable a legal description of the HSTF.

TO WHOM IT MAY CONCERN

The United States Department of Energy, Richland Field Office, an operations office of the United States Department of Energy, which is a department of the United States Government, the undersigned, whose local address is the Federal Building, 825 Jadwin Avenue, Richland, Washington, hereby gives the following notice as required by 40 CFR 265.120 and WAC 173-303-610(10) (whichever is applicable):

(a) The United States of America is, and since April 1943, has been in possession in fee simple of the following described lands: (legal description of the Hexone Storage and Treatment Facility)

(b) The United States Department of Energy, Richland Field Office, by operation of the Hexone Storage and Treatment Facility, has disposed of hazardous and/or dangerous waste under other terms of regulations promulgated by the United States Environmental Protection Agency and the Washington State Department of Ecology (whichever is applicable) at the above described land

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

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

(e) The United States Department of Energy, Richland Field Office has filed a survey plat with the Benton County Planning Department and with the United States Environmental Protection Agency, Region 10, and the Washington State Department of Ecology (whichever are

applicable) showing the location and dimensions of the Hexone Storage and Treatment Facility and a record of the type, location, and quantity of waste treated.

8.2 POSTCLOSURE CARE

Postclosure care is required when a TSD unit has residual contamination that poses a problem to human health or the environment. At the HSTF, underlying soils and possibly groundwater might have been contaminated by waste treated during HSTF operations. Under the Tri-Party Agreement, source contamination and groundwater operable units will be investigated and remediated through the CERCLA process.

With the general exception of an imminent environmental hazard, any extensive soil remediation will take place through the CERCLA process. While awaiting remediation under CERCLA, some level of RCRA monitoring might be necessary to ensure that the HSTF poses no threat to human health or the environment. The scope of the monitoring would be limited to contaminated soil that would pose a threat to human health or the environment. The HSTF might not be considered closed until the remediation through the CERCLA process is complete. Before soil remediation under CERCLA, steps might be taken to isolate any contamination (Chapter 7.0). The exact nature of these steps would be determined at the time the need was identified, and this information would be added to the closure plan. In addition, access to the areas of contamination would be controlled, to protect personnel and prevent the migration of contamination.

During the period between closure of the HSTF and soil remediation under CERCLA, the closure areas would be inspected yearly at a minimum. The inspections would determine the need for maintenance of any temporary covers or other physical barriers. Any required maintenance would be performed by Hanford Site personnel.

Any data obtained from sampling and analyses during RCRA closure activities will be part of the official record and will be included in the closure plan. These data will be taken into account and used during the CERCLA evaluation of the 200-RO-2 operable unit, as well as any data collected specifically for the CERCLA evaluation.

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9.0 REFERENCES

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WHC, 1988a, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988b, *Quality Assurance Manual*, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988c, *Hanford Site Solid Waste Acceptance Criteria*, WHC-EP-0063-3, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989, *Document Control and Records Management Manual*, WHC-CM-3-5, Westinghouse Hanford Company, Richland, Washington.

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WHC, 1990b, *Sample Management and Administration*, WHC-CM-5-3, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992a, *Preliminary Operable Units Designation Project*, WHC-EP-0216, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992b, *Site Assessment for Underground Storage Tank Removal*, DWP-G-020-00001, Rev. A-8, Westinghouse Hanford Company, Richland, Washington.

9.2 CODE OF FEDERAL REGULATIONS AND FEDERAL REGISTER

29 CFR 1910, "Occupational Safety and Health Standards," Title 29, *Code of Federal Regulations*, Part 1910, as amended, Occupational Safety and Health Administration, Washington, D.C.

40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, as amended, U.S. Environmental Protection Agency, Washington, D.C.

51 FR 43, "Hazardous Waste Management System, Supplement to Preamble and Final Codification Rule," Vol. 51, *Federal Register*, No. 43, pp. 7,722.

54 FR 13, "Hazardous Waste Management System; Testing and Monitoring Activities" (Proposed Rule), Vol. 54, *Federal Register*, No. 13, pp. 3212-3228.

9.3 FEDERAL AND STATE ACTS

Atomic Energy Act of 1954, 42 USC 2011 et seq.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601 et seq.

National Environmental Policy Act of 1969, 42 USC 4321 et seq.

Resource Conservation and Recovery Act of 1976, 42 USC 6901 et seq.

9.4 REVISED CODE OF WASHINGTON AND WASHINGTON ADMINISTRATIVE CODE

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

WAC 173-340, *Model Toxics Control Act*, Washington State Department of Ecology, Olympia, Washington.

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APPENDICES

2A STATUS AND DISPOSITION OF HEXONE STORAGE AND TREATMENT FACILITY COMPONENTS

2B TANKS AND PIPING SCHEMATICS FOR HEXONE STORAGE AND TREATMENT FACILITY

7A QUALITY ASSURANCE PROJECT PLAN FOR SOIL SAMPLING AND ANALYSIS FOR THE HEXONE STORAGE AND TREATMENT FACILITY

7B TRAINING COURSE DESCRIPTIONS

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APPENDIX 2A

STATUS AND DISPOSITION OF HEXONE STORAGE AND TREATMENT FACILITY COMPONENTS

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Status and Disposition of Hexone Storage and Treatment Facility Components.
(sheet 1 of 4)

Component	At site	Status	Near-term actions (by 12/92) planned	Final closure after approval of closure plan
A. HEXONE STORAGE TANK SYSTEM				
1. Underground storage tank 276-S-141 (23,500-gal capacity)	1951-present	Empty, pumped to minimum heel. 200-250 gal phosphate tar/sludge. 5 to 30 gal liquid (water plus layer of organic [93% normal paraffin hydrocarbon, 7% hexone]).	-Maintain inert gas blanket -Take monthly level readings -Remove additional liquid, if feasible, for storage at Hanford Central Waste Complex in laboratory-packed 15-gal 17E containers	-Remove sludge and liquid -Blast (sand or dry ice pellets) to nonhazardous status -Dispose of
2. Underground storage tank 276-S-142 (23,500-gal capacity)	1951-present	Same as tank 276-S-141.	Same as tank 276-S-141	Same as tank 276-S-141
3. Hexone transfer pump No. 1	1951-present	Empty, in working condition.	None	Pump to radioactive mixed waste section of Hanford Central Waste Complex. Transport to low-level burial grounds.
4. Hexone transfer pump No. 2	1951-present	Empty, scrap.	None	Same as (3.)
5. Hexone transfer pump manifold and piping	1951-present	Empty.	None	Cut up, ship to radioactive mixed waste section of Hanford Central Waste Complex.
6. Hexone tank car unloading pipe	1951-present	Partially removed 1980. Underground portion to pump manifold remains. East end of pipe blanked near ground level.	None	Same as (5.)
7. Hexone tank car unloading ramp	1951-1986	Partially removed as scrap 1986. Vertical I-beams remain.	None	Cut up I-beams and release to excess (scrap).
8. Hexone transfer line from pump manifold to 276-S Building (overhead pipe)	1951-1984	Removed as radioactive waste 1984; 25 ft remain at pump manifold, blanked.	NA	Same as (5.)
9. Mercury manometers (2)	1951-present	In place, out of service.	None	Sample for radioactivity. Recycle or ship to radioactive mixed waste section of Hanford Central Waste Complex.
10. Flame arresters	1951-present	In place, connected to vent system 1990.	None	Transport to low-level burial grounds.

Status and Disposition of Hexone Storage and Treatment Facility Components.
(sheet 2 of 4)

Component	At site	Status	Near-term actions (by 12/92) planned	Final closure after approval of closure plan
11. Vent system (vent pipes, HEPA filter, activated carbon absorbers)	1990-present	In place, operational.	None	Dismantle, test for hexone, ship to radioactive mixed waste Hanford Central Waste Complex or low-level burial ground as appropriate.
12. Demand regulator for inert gas	1990-present	Out of service, operable.	None	Remove and excess
13. Weight factor level system	1990-present	Out of service, used for adding inert gas to tanks.	Continue nitrogen purge.	Remove and excess
14. Hexone tank fencing	1990-present	In place, supplemented by REDOX perimeter fence 1991.	None	Remove and reuse or excess
B. HEXONE DISTILLATION UNIT 1990-1992				
1. Distillation unit (mounted on rail car)	1990-1992	Partially dismantled to remove radioactive components. Stored at Hanford Site pending reuse or excess.	Reuse or excess	NA
a. Distillation vessels No. 1 and No. 2 (first distillation stages)	1990-present	Removed from distillation system. Each vessel contains 125 gal of radioactively contaminated rust, hydrocarbon tars, and phosphate tar. Vessels are dry. Liquid (100 gal of 93% normal paraffin hydrocarbon, 7% hexone) was shipped in laboratory-packed 15-gal 17E containers to Hanford Central Waste Complex, 1 gal absorbent added to each vessel to absorb any moisture or organic. Each vessel contains one demister element. Radionuclide content 0.1 alpha and 0.1 beta. Vessels are stored at the Hexone Storage and Treatment Facility.	Shipping boxes will be procured and the vessels shipped to the mixed waste section of the central waste complex.	NA
b. Distillation vessel #3 (second distillation stages)	1990-present	Removed from distillation system. Vessel contains approx 5 gal of hydrocarbon and phosphate tar lightly contaminated with radionuclides. Vessel is dry with 1 gal of absorbent added. Vessel contains one long demister element absorbent added (as in B.1.a.). Vessel is stored at HSTF.	(Same as B.1.a.)	NA
c. Demisters and demister housings (2)	1990-present	Two demister housing sets are stored at HSTF. Each set holds one demister element. Three demister elements are packaged in distillation vessels.	Demister housings to be shipped to mixed waste section of central waste complex in metal boxes.	NA

Status and Disposition of Hexone Storage and Treatment Facility Components.
(sheet 3 of 4)

Component	At site	Status	Near-term actions (by 12/92) planned	Final closure after approval of closure plan
d. Condensers, air cooled (2)	1990-1992	Triple rinsed with detergent and water designated nonhazardous and nonradioactive. Rinsate incinerated by DSSI.	Reuse or excess	NA
e. Product tank, condensate pump and piping	1990-1992	(Same as b.)	Reuse or excess	NA
f. Radioactive feed, overflow and vent piping	1990-1992	Cut up and stored as radioactive mixed waste at Hanford Central Waste Complex in lined 55-gal galvanized drums.	None	NA
g. Radioactive feed pump	1990-1992	Motor and magnetic coupling remain in place. Pump to central waste (same as d.).	None	NA
h. Oil heating system and oil transfer piping	1990-1992	Nonhazardous, nonradioactive. Remains on distillation car.	Reuse or excess	NA
i. Secondary containment pan	1990-1992	Partially dismantled. Remains on distillation car.	Reuse or excess	NA
j. Flat car	1990-1992	Never contacted waste. To be reused after distillation equipment is removed.	Remove distillation equipment.	NA
C. DISTILLATE STORAGE SYSTEM 1990-1992				
1. Distillate storage tank cars	1990-1992	Rinsed with detergent and water. Rinsate incinerated by DSSI, Inc. Verified dry, and free of hexone by organic vapor detector (less that 0.1 ppm) stored at the Hanford Site pending approval for reuse or excess.	Reuse or excess	NA
2. Distillate transfer piping to tank cars (overhead pipe)	1990-1992	Triple rinsed with detergent and water. Cut up and packaged in low-level radioactive waste drums (nonmixed).	Ship to low-level radioactive landfill to complete closure.	NA
3. Tank car vent piping	1990-1992	Same as C.2. but not rinsed	Ship to low-level waste landfill.	NA
4. Secondary containment pans (20)	1990-1992	Never contacted waste. Eighteen pans radiologically released and stored on railroad flat car at KEH siding in 200 West Area; two pans cut up and stored as radioactive low-level waste (nonmixed) in burial box at HSTF.	Ship to low-level waste landfill.	NA

Status and Disposition of Hexone Storage and Treatment Facility Components.
(sheet 4 of 4)

Component	At site	Status	Near-term actions (by 12/92) planned	Final closure after approval of closure plan
5. Secondary containment piping, sump drum and pump	1990-1992	Never contacted waste. Cut up and packaged in 55-gal painted carbon steel drums as internal radiation survey/release not practical.	Ship to low-level waste landfill.	NA
6. Secondary containment tank car	1990-1992	Never contacted waste. All rainwater batches sampled for radioactivity and found below detection limit (less than 50 μg/ml). No organic or organic fumes. Released as nonhazardous, nonradioactive. Stored at Hanford Site pending approval for reuse or excess.	Reuse or excess	NA
D. NONPROCESS/SPARE EQUIPMENT 1990-1992				
1. Spare equipment flat car (includes light pole, spare clean distillation vessels, spare demisters, piping, etc.)	1990-1992	Never contacted waste. To be reused or excessed.	Reuse or excess	NA
2. Control trailer		Never contacted waste. Remains adjacent to HSTF.	To be used as office trailer for decommissioning projects.	NA
3. Computer/data logger		Never contacted waste. Salvaged for reuse.	Reuse	NA
4. Electrical power supply		Never contacted waste. Conduits to distillation car removed 1992. Junction box, disconnect panel, and 200-A breaker remain in place.	Reuse or remove for excess	NA
5. Electrical ground system		Never contacted waste. Underground cables and ground rods remain in place. Aboveground cables removed 1992.	Leave in place	NA

DSSI = Diversified Scientific Services, Inc.
HEPA = high-efficiency particulate air (filter).
KEH = Kaiser Engineers Hanford.
NA = not applicable.
REDOX = Reduction-Oxidation Plant.

APPENDIX 2B

TANKS AND PIPING SCHEMATICS FOR HEXONE STORAGE AND TREATMENT FACILITY

9 3 1 2 8 5 9 0 6 5 2

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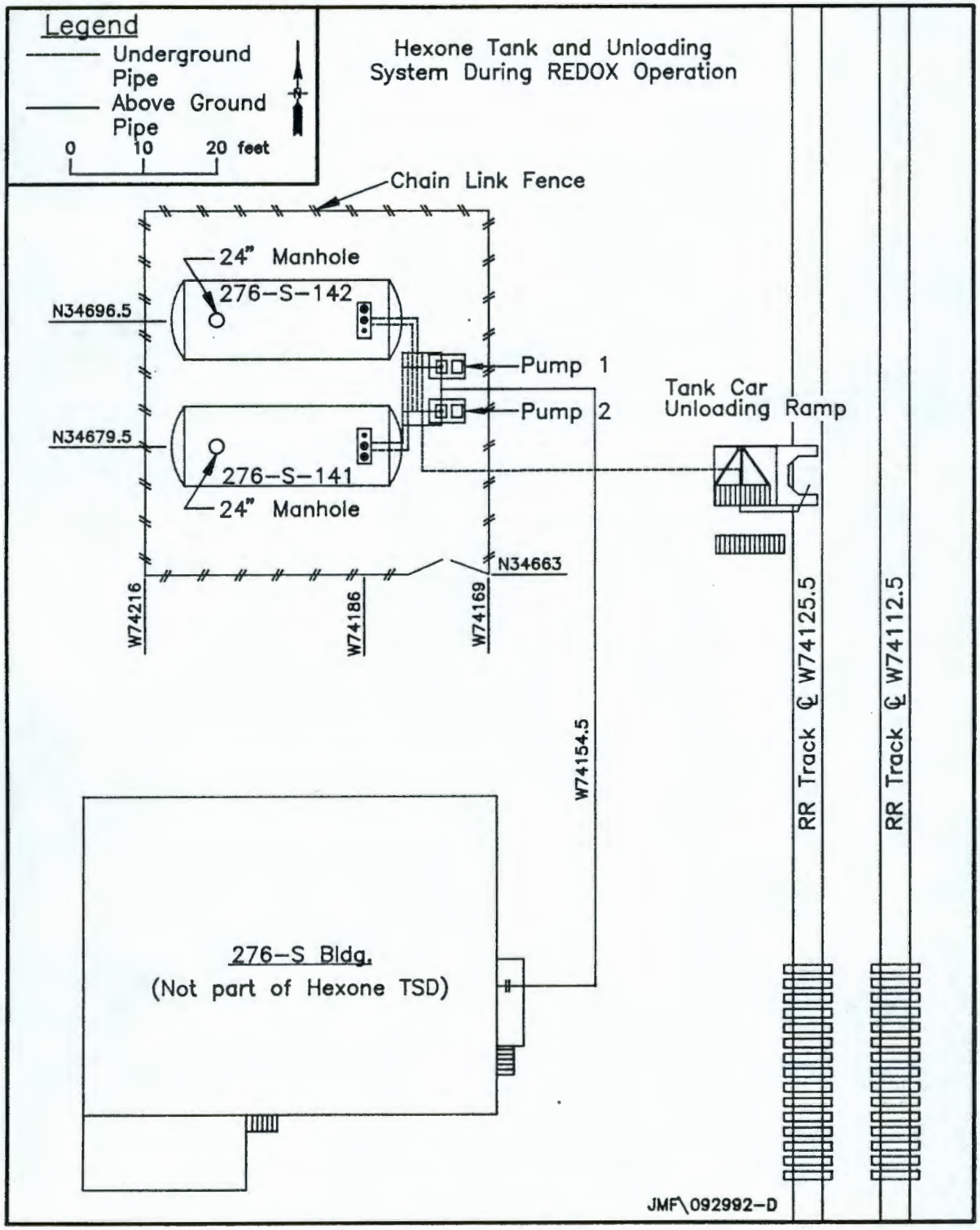


Figure 2B-1. Hexone Tank and Unloading System During Reduction Oxidation Plant Operation.

9 3 1 2 8 · 9 0 6 5 4

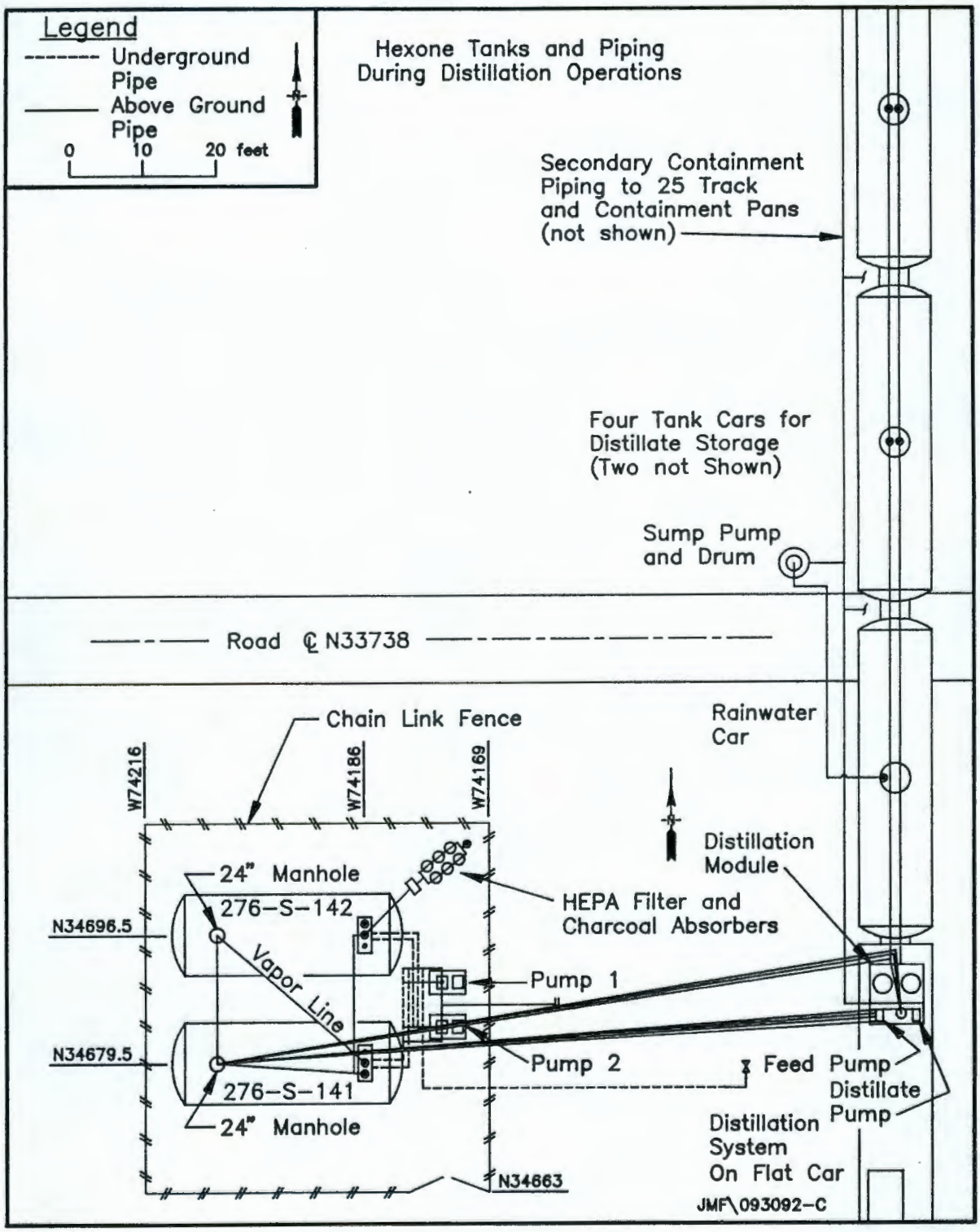


Figure 2B-2. Hexone Tanks and Piping During Distillation Operations.

9 3 1 2 8 . 7 0 6 5 5

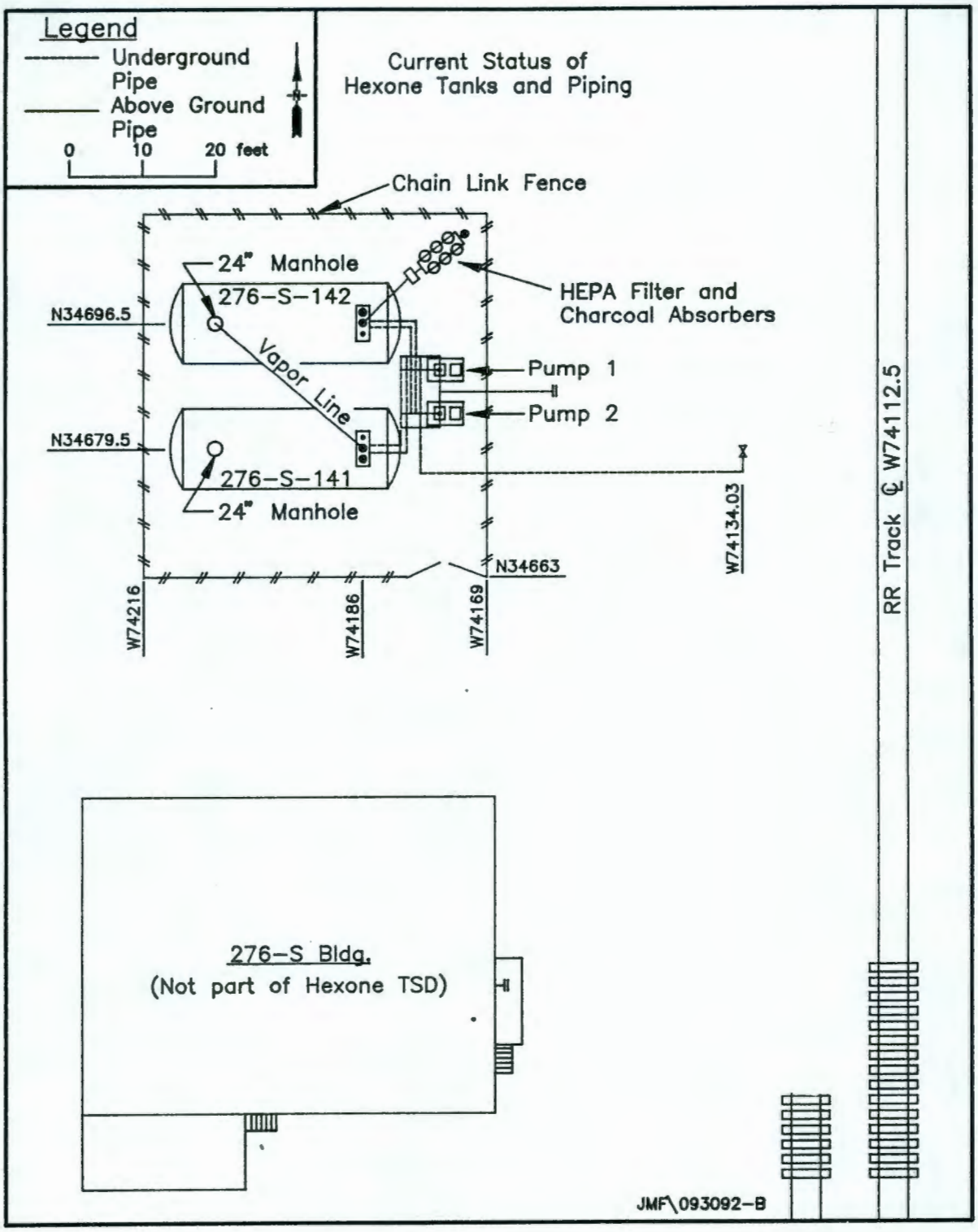
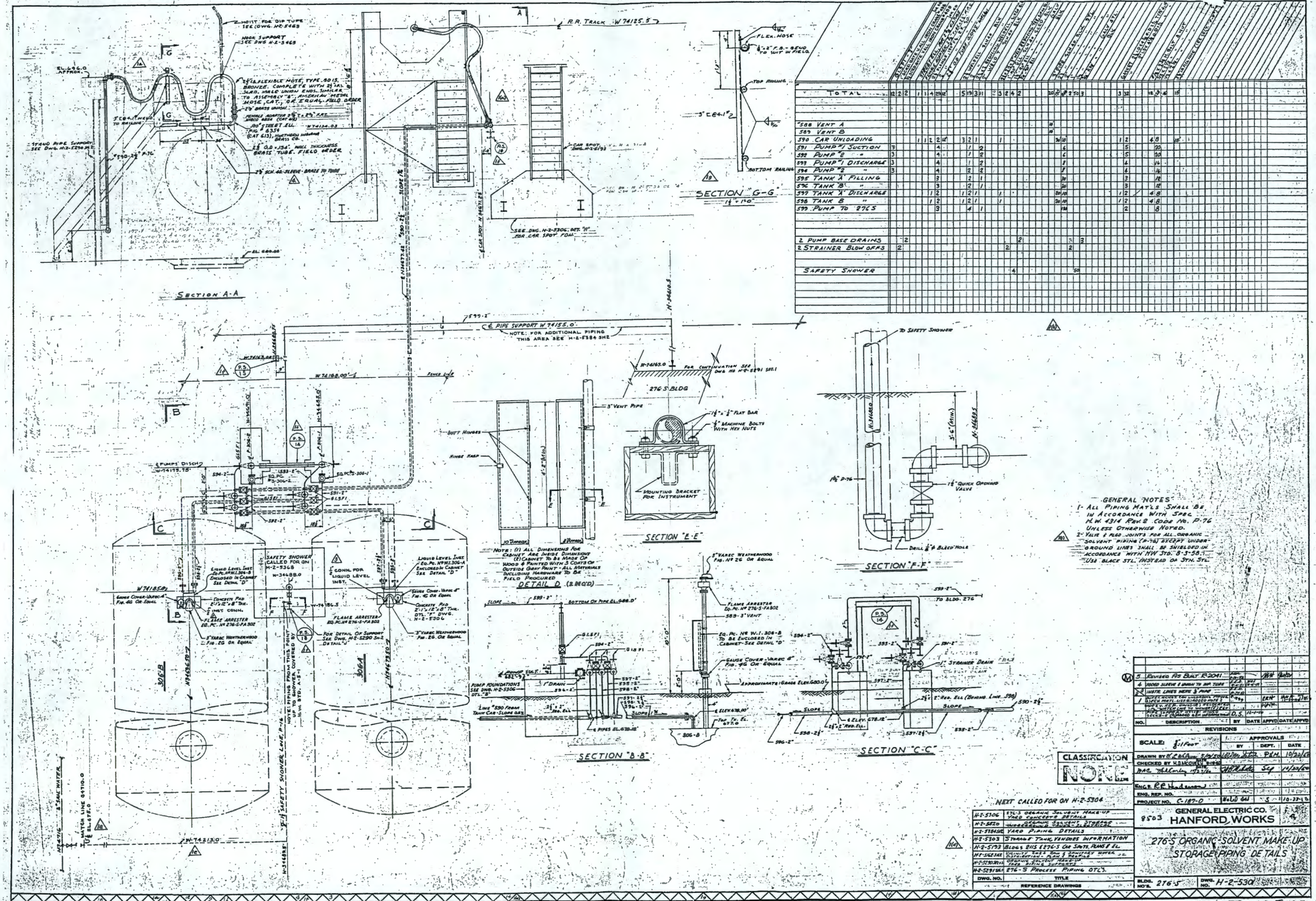


Figure 2B-3. Current Status of Hexone Tanks and Piping.

9 3 1 2 8 9 0 6 5 6

Figure 2B-4. Hexone Storage and Treatment Facility and 276-S Piping Details.



	276-S Organic Solvent Make-Up Yard Concrete Details	276-S Organic Solvent Storage Underground Tank Supports	Yard Piping Details	Storage Tank Vendors Information	Bldgs 211S & 276-S Or Shts. Plns & El.	Vicinity Maps & Plan & Sanitary Water Distribution & Plan & Trenches	Organic Solvent Make-Up Yard Piping Supports	276-S Process Piping Dtl's.
TOTAL	12 2 2	1 1 4 29 12	5 19 3 11	3 5 2 4 2	20 20 2 50 3	3 32	18 3 6	15
588 Vent A					10			
589 Vent B					10			
590 Car Unloading		1 1 2 2 12	3 2 1	1	20 10	1 2	4 8	15
591 Pump #1 Suction	3	4	1 2		6	5	20	
592 Pump #2 "	3	4	1 2		6	5	20	
593 Pump #1 Discharge	3	4	1 2		7	6	16	
594 Pump #2 "	3	4	2 2		7	6	16	
595 Tank A Filling		3	2 1		3a	3	16	
596 Tank B "		3	2 1		3a	3	16	
597 Tank A Discharge		1 2	1 2 1	1	20 10	1 2	4 8	
598 Tank B "		1 2	1 2 1	1	20 10	1 2	4 8	
599 Pump To 276-S		3	4 1		14	2	8	
2 Pump Base Drains	2			2	3 3			
2 Strainer Blow Offs	2			2	2			
Safety Shower				4	50			

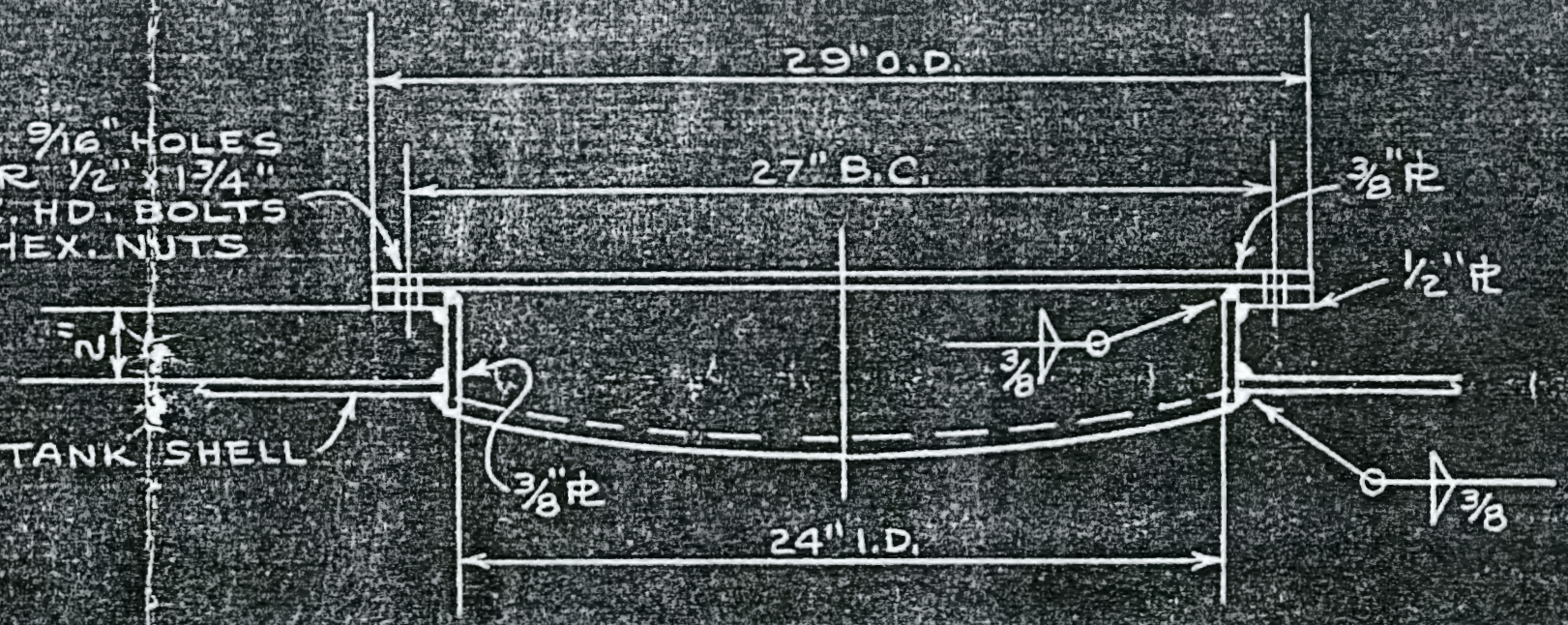
NO.	DESCRIPTION	BY	DATE	APPV'D	DATE	APPV'D
5	Revised Per Bulletin R-2041			MH		
4	Wood Sleeve & Union To Air Tube					
3	Waste Lines Were 3/4" Pipe					
1	Revised Header Per Unofficial Proposal & New Note. Use Flanged Joints Where Req'd. Revised Valve Tag Numbers Per Revised Flow Diagram. Revised Sample Header Per Revised Sketch. Revised Per Revised Drawing	D.S.	11-1-56			

	BY	DATE	APPV'D	DATE	APPV'D
Drawn By					
Checked By					
Engr.					
Eng. Rep. No.					
Project No. C-187-D					

9312886906 58

9 3 1 2 8 9 0 6 5 9

Figure 2B-5. Hexone Storage and Treatment Facility Underground Tank Plans. (Drawing No. 952)



MANHOLE

DETAIL "B"

SCALE - 3/16" = 1"

HYDRAULIC SUPPLY MFG. CO.

METAL FABRICATORS

7300-8TH AVENUE SOUTH — SEATTLE 8, WASHINGTON

276-S ORGANIC-SOLVENT MAKE-UP UNDERGROUND STORAGE TANKS

SCALE AS NOTED	DRAWN SKOLD	JOB NO. 20032	DWG. NO. 952
DATE 8-17-'50	APPROVED	ALT. NO. 1 2/25/50	

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NOTES

1- TANKS TO BE BUILT IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL BOARD OF FIRE UNDERWRITERS STANDARDS FOR THE STORAGE OF FLAMMABLE LIQUIDS UNDERGROUND. (N.B.F.U. PAMPHLET 30)

2- THE OUTSIDE OF THE TANKS SHALL BE COVERED WITH ONE COAT OF COAL TAR PITCH PRIMER, ASTM DESIGNATION D43, "CREOSOTE FOR PRIMING COAT WITH COAL-TAR PITCH IN DAMPROOFING & WATERPROOFING," & ONE FINAL COAT OF COAL-TAR PITCH IN ACCORDANCE WITH ASTM DESIGNATION D450, "COAL TAR PITCH FOR ROOFING, DAMPROOFING, & WATERPROOFING." THE PRIMER & FINAL COAT SHALL BE APPLIED AFTER COMPLETION OF HYDROSTATIC TEST & SHALL BE APPLIED IN A MANNER AS RECOMMENDED BY THE PAINT MANUFACTURER.

3- HYDROSTATIC TEST - 15 P.S.I.

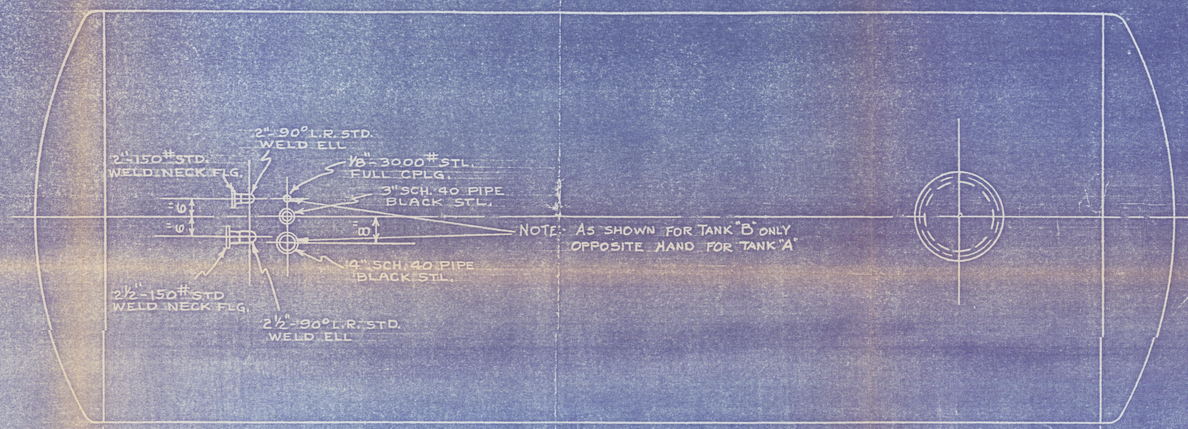
4- AIR TEST - 10 P.S.I. - APPLY LIQUID SOAP TO ALL WELDS.

5- SHELL & HEADS OF TANK SHALL BE CONSTRUCTED OF OPEN HEARTH STEEL IN STRICT ACCORDANCE WITH THE LATEST ISSUE OF ASTM DESIGNATION A-285 "LOW & INTERMEDIATE TENSILE STRENGTH CARBON-STEEL PLATES OF FLANGE & FIREBOX QUALITIES", FIREBOX TYPE, GRADE B.

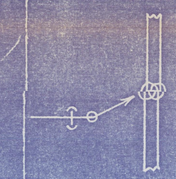
6- H.S.MFG. Co. SHALL CERTIFY THAT OPEN HEARTH STEEL IS USED.

7- MARK WITH ELECTRIC QUILL - PC. NO. 276 S-TK 306 A-HWC 9040 AJ-1
PC. NO. 276 S-TK 306 B-HWC 9040 AJ-1

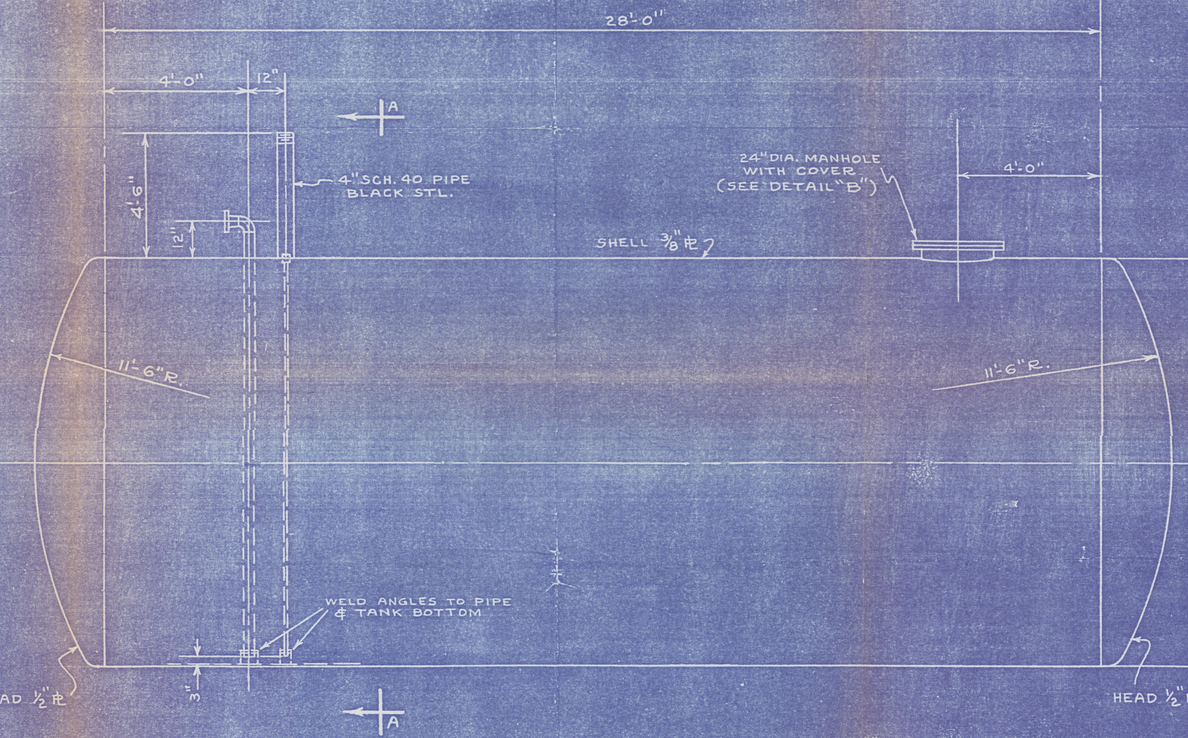
8- ALL NOZZLE BOLT HOLES STRADDLE TANK CENTERLINES.



PLAN

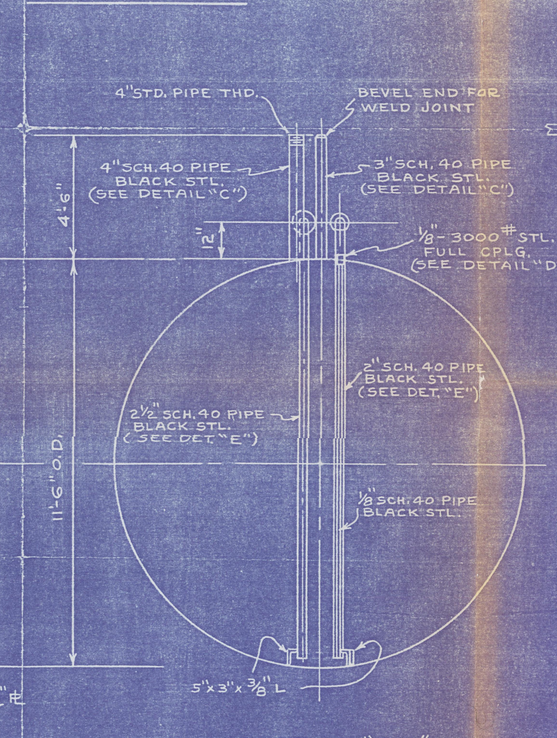


TYPICAL WELD-ALL GIRTH & LONGITUDINAL SEAMS - SHELL & HEADS

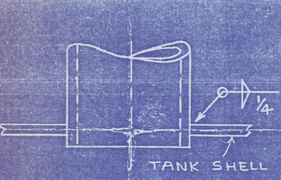


ELEVATION

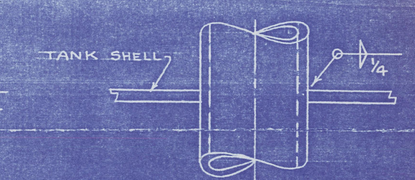
SCALE 1/2" = 1'-0"



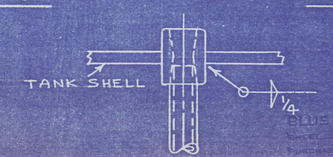
SECTION "A-A"



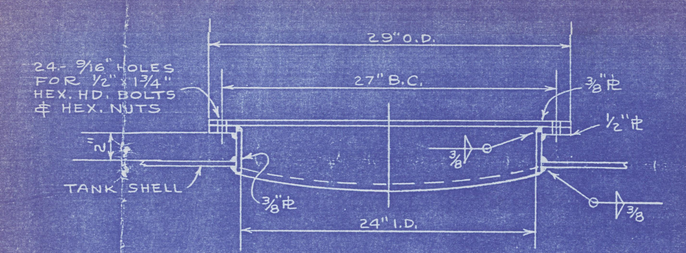
DETAIL "C"



DETAIL "E"



DETAIL "D"



MANHOLE

DETAIL "B"

SCALE - 3/16" = 1"

NOTE

ONE TANK AS SHOWN (TANK "A", SEE NOTE 7)

ONE TANK SIMILAR EXCEPT LOCATION OF 2 1/2" SUCTION PIPE & 2" FILL PIPE ARE INTERCHANGED (TANK "B", SEE NOTE 7)

HYDRAULIC SUPPLY MFG. CO.
METAL FABRICATORS
7500-8TH AVENUE SOUTH — SEATTLE 8, WASHINGTON

276-S ORGANIC-SOLVENT MAKE-UP UNDERGROUND STORAGE TANKS

SCALE AS NOTED	DRAWN SKOLD	JOB NO. 20032	DWG. NO. 952
DATE 8-17-'50	APPROVED	ALT. NO. 1 8/25/50	

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APPENDIX 7A

QUALITY ASSURANCE PROJECT PLAN FOR SOIL SAMPLING AND ANALYSIS FOR THE HEXONE STORAGE AND TREATMENT FACILITY

CONTENTS

7A.0 QUALITY ASSURANCE PROJECT PLAN FOR SOIL SAMPLING AND ANALYSIS FOR THE HEXONE STORAGE AND TREATMENT FACILITY . . . . . APP 7A-1

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7A.1.2 Applicability and Relationship to the Onsite Contractor's Quality Assurance Program . . . . . APP 7A-1
7A.1.3 Sampling and Testing Activities . . . . . APP 7A-1

7A.2 PROJECT ORGANIZATION AND RESPONSIBILITIES . . . . . APP 7A-2
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FIGURE

7A-1. Project Organization for Sampling at the Hexone Storage and Treatment Facility . . . . . APP 7A-F1

TABLE

7A-1. Analytical Levels, Methods, and Detection Limits for Hexone Storage and Treatment Facility Soil Sample Analysis . . . . . APP 7A-T1

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9 3 1 2 2 9 1 6 6 4

7A.0 QUALITY ASSURANCE PROJECT PLAN FOR SOIL SAMPLING AND ANALYSIS FOR THE HEXONE STORAGE AND TREATMENT FACILITY

This appendix provides the quality assurance and quality control information for assuring that the HSTF closure activities (Chapter 7.0) will provide suitable closure data.

7A.1 PROJECT DESCRIPTION

This quality assurance project plan (QAPjP) has been prepared for regulatory review with the HSTF closure plan in support of proposed sampling and analysis activities.

7A.1.1 Project Objectives

The principal objective of the HSTF sampling and analysis plan will be to verify that a dangerous waste release to the environment from the tanks or any of the ancillary equipment did or did not occur during operation, and to assist in the evaluation of disposal actions for the underground storage tanks. Tank sample results will assist decisions concerning decontamination activities and serve as a basis for selection of a disposal/recycling unit.

7A.1.2 Applicability and Relationship to the Onsite Contractor's Quality Assurance Program

This QAPjP applies specifically to field activities and laboratory analyses to be performed in support of closure of HSTF. This QAPjP has been prepared in compliance with the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). This QAPjP describes the means selected to implement quality assurance program requirements, defined in the *Quality Assurance Manual* (WHC 1988b), as the requirements apply to environmental investigations, while accommodating the specific requirements for project plan format and content agreed upon in the Tri-Party Agreement. The project plan contains a matrix of procedural resources from *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a) and *Environmental Investigations and Site Characterization Manual* (WHC 1988a). This QAPjP is subject to mandatory review and revision in advance of initiation of field sampling activities. Distribution and revision control of this plan will be carried out in compliance with QR 6.0, "Document Control," and QI 6.1, "Quality Assurance Document Control" (WHC 1988b). All plans and procedures referenced in this QAPjP are available for regulatory review.

7A.1.3 Sampling and Testing Activities

Sampling activities will include collection of soil samples as required by Ecology guidelines for the assessment of underground storage tank sites.

A complete description of these activities is provided in Chapter 7.0 of the closure plan.

7A.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

Organization responsibilities are discussed in the following sections.

7A.2.1 Project Management Responsibilities

The operations contractor's Regulatory Support organization and the Environmental Restoration Engineering Function have primary responsibilities for conducting closure activities. An organizational chart is included as Figure 7A-1. The responsibilities of key test personnel and organizations are described in the following.

- **Dangerous Waste Closure Plan Lead (Regulatory Support organization)**--The Dangerous Waste Closure Plan Lead is responsible for the overall organization of the closure plan and will interface with the regulatory agencies and the U.S. Department of Energy.

- **Technical Lead**--The Technical Lead is responsible for overall direction of sampling and testing activities; responsibilities include the planning and authorization of all work and management of any subcontracted activities, as well as overall technical schedule and budgetary performance.

- **Quality Assurance Officer**--The Quality Assurance Officer is responsible for coordination and/or oversight of performance to the QAPjP requirements by means of internal auditing and surveillance techniques. The Quality Assurance Officer retains the necessary organizational independence and authority to identify conditions adverse to quality and to inform the Technical Lead of needs for corrective action.

- **Health and Safety Officer (Environmental Division/Environmental Field Services)**--The Health and Safety Officer is responsible for determining potential health and safety hazards from volatile and/or toxic compounds during sample handling and sampling decontamination activities. The Health and Safety Officer has the responsibility and authority to halt field activities because of unacceptable health and safety concerns.

- **Health Physics Technician**--The health physics technician is responsible for ensuring that all monitoring and protection procedures are being followed as required in the dangerous waste operations plan. The health physics technician has the authority to take whatever steps might be necessary to carry out this function.

- **Field Team Leader**--The Field Team Leader is responsible for onsite direction of sampling technicians in compliance with the requirements

of the sampling plan (Chapter 7.0, Section 7.2), this QAPjP, and implementing all EIIs.

- **Sample Management Organization**--The sample management organization is responsible for procurement and coordination of analytical support services, sample tracking through the laboratories, and receipt and validation of analytical data as discussed in Section 7A.8.

7A.2.2 Analytical Laboratories

The appropriate field sampling team and analytical laboratories will be responsible for screening all samples for gross alpha and beta/gamma radioactivity and for separating samples for any necessary further analysis. If samples with activity greater than or equal to 200 cycles per minute are encountered, the samples will be routed to participant contractor laboratory equipped and qualified to handle analysis of radioactive samples. Samples with activity below 200 cycles per minute will be routed in accordance with the procedures identified below for chemical samples. These samples will be routed to an approved participant contractor or subcontractor laboratory, who will be responsible for performing the analyses identified in this plan in compliance with work orders or contractual requirements and approved procedures (Section 7A4.1.2). At the direction of the Technical Lead, services of alternate qualified laboratories could be procured for the performance of split-sample analyses for performance audit purposes. If such an option is selected, the quality assurance plan and applicable analytical procedures from the alternate laboratory also will be approved before their use in compliance with Section 7A.4.1.2 requirements.

7A.2.3 Other Support Contractors

Support contractors could be assigned project responsibilities at the direction of the Technical Lead. Such services will be in compliance with standard Hanford Site procurement procedure requirements as discussed in Section 7A.4.1.2. All work will be performed in compliance with approved quality assurance plans and/or procedures, subject to controls of QI 7.3, "Source Surveillance and Inspection" (WHC 1988b).

7A.3 DATA QUALITY OBJECTIVES FOR MEASUREMENTS

The purpose of this investigation is to establish whether or not waste from the HSTF has leaked to the environment, and if so, to what extent, and to evaluate underground tank contamination. The analytes of interest include volatile and semivolatile organic compounds and metals.

The samples also will undergo radiation monitoring during tank removal and soil sampling activities to screen for the presence of radiological constituents. All soil samples also will undergo screening for total activity before final preparation for shipping. Samples exhibiting radioactivity above shipping limits for nonradioactive samples will be routed automatically to an

appropriately equipped and qualified onsite participant contractor laboratory for analysis. Screening will be performed by qualified health physics personnel as specified in governing procedures.

Standard reference methods will be used as guidelines for all analyses of radionuclides, inorganics, and volatile, and semivolatile organic compounds. All such analyses will be performed onsite or offsite in a qualified laboratory. However, modification to these guidelines could be required because of potential radioactivity of the samples.

As noted in Section 4.6 of *Data Quality Objectives for Remedial Response Activities - Development Process* (EPA 1987), universal goals for precision, accuracy, representativeness, completeness, and comparability cannot be uniformly established for every site in the United States. However, data are available from previously negotiated analytical contracts for Hanford Site investigations, the data quality objectives guidance document cited previously (EPA 1987), and from typical capabilities currently expected for laboratories involved in environmental analyses that may be used as minimum guidelines for the selection of data quality objectives appropriate for this investigation. Table 7A-1 provides reference methods and preliminary target values for detection limits, precision, and accuracy.

Precision is calculated as either the range (for duplicate measurements) or the standard deviation(s). It also can be expressed as relative range (for duplicates) or relative standard deviation. When the precision for a method is not constant over the concentration range of interest, the reported range or standard deviation will describe the concentration dependence. This could be in a form of a slope and intercept for a linear relationship, an indicated function for a nonlinear relationship, or simply as a table of values at various concentrations. Interlaboratory comparisons using field samples will be conducted to determine if the results obtained from the lead laboratory are comparable to the results from other laboratories. At least two different laboratories will be used for the comparison testing.

Accuracy is determined by analyzing a reference material of known pollutant concentration or by reanalyzing a sample to which a material of known concentration or amount of pollutant has been added. Accuracy is usually expressed as a percent recovery or as a percent bias. When a significant concentration dependence is observed, accuracy could be reported by a linear relationship, an alternative functional relationship, or a table.

The method detection limit is the minimum concentration that can be measured reliably. It is determined by measuring the variability of replicate measurements at zero or near-zero sample concentration. The method detection limit is reported in concentration units as the standard deviation of the replicate measurements multiplied by an appropriate Student's t-value for a one-tailed test at 99 percent level of confidence for the number of replicates taken. For example, $t = 6.965$ for three replicates as determined from the table of Student's t-values at 99 percent level.

If onsite radiation screening indicates that sample extraction and analysis must be performed in a hot cell or other unit suitably equipped for

analyses of radioactive samples, target values for precision and accuracy specified in Table 7A-1 might not be applicable due to expected matrix complications. In all cases, however, analytical precision and accuracy still must be calculated and reported as required by applicable analytical methods.

Goals for data representativeness are addressed qualitatively by the specification of sampling locations and intervals within the sampling and analysis plan. Objectives for completeness for this investigation require that contractually or procedurally established requirements for precision and accuracy be met for at least 90 percent of the total number of requested determinations. Failure to meet this criterion shall be documented in data summary reports as described in Section 7A.8.1, and shall be considered in the validation process discussed in Section 7A.8.2. Corrective action measures shall be initiated by the Technical Lead as appropriate, as noted in Section 7A.13.0. Approved analytical procedures shall require the use of the reporting techniques and units consistent with the EPA reference methods listed in Table 7A-1 to facilitate the comparability of data sets in terms of precision and accuracy.

7A.4 PROCEDURES

The following sections discuss sampling procedures to be used and the approvals and control of these procedures.

7A.4.1 Procedure Approvals and Controls

The following sections describe the procedures referenced to support soil sampling and analysis activities.

7A.4.1.1 Hanford Site Procedures. The procedures that will be used to support the sampling and analysis plan have been selected from the quality control program index included in *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). Selected procedures include EII from the *Environmental Investigations and Site Characterization Manual* (WHC 1988a), and quality requirements (QRs) and quality instructions (QIs) from the *Quality Assurance Manual* (WHC 1988b). Procedure approval, revision, and distribution control requirements applicable to EII are addressed in EII 1.2, Preparation and Revision of Environmental Investigation Instructions (WHC 1988a); requirements applicable to QIs and QRs are addressed in QR 5.0, Instructions, Procedures, and Drawings; QI 5.1, Preparation of Quality Assurance Documents; QR 6.0, Document Control; and QI 6.1, Quality Assurance Document Control (WHC 1988b). Other procedures applicable to the preparation, review, and revision of the sample management organization and other Hanford Site analytical laboratory procedures shall be defined in the various procedures and manuals identified in the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a) under criteria 5.00 and 6.00. All procedures are available for regulatory review on request at the direction of the DOE unit manager.

7A.4.1.2 Participating Contractor and/or Subcontractor Procedures. As noted in Section 7A.2.1, participating contractor and/or subcontractor services may be procured at the direction of the Technical Lead. All such procurements will be subject to the applicable requirements of QR 4.0, "Procurement Document Control"; QI 4.1, "Procurement Document Control"; QI 4.2, "External Services Control"; QR 7.0, "Control of Purchased Items and Services"; QI 7.1, "Preprocurement Planning and Proposal Evaluation"; and/or QI 7.2, "Supplier Evaluation" (WHC 1988b). Whenever such services require procedural controls, conformance to onsite procedures, or submittal of contractor procedures for onsite review and approval before implementation, the requirement(s) will be identified in the procurement document or work order, as applicable. Analytical laboratories will be required to submit their analytical procedures as well as the current version of their internal quality assurance program plans for review and approval. The subject plans and procedures will be reviewed and approved by operations contractor's quality assurance, sample management, and analytical laboratories organization personnel, and/or other qualified personnel as determined by the Technical Lead. As necessary, all reviewers will be qualified per the requirements of EII 1.7, "Indoctrination, Training, and Qualification" (WHC 1988a). All approved participating contractor or subcontractor procedures, plans, and/or manuals will be retained as project quality records in compliance with the *Document Control and Records Management Manual*, Section 9 (WHC 1989a); QR 17.0, "Quality Assurance Records"; and QI 17.1, "Quality Assurance Records Control" (WHC 1988b). All such documents will be available on request for regulatory review.

7A.4.2 Sampling Procedures

All soil sampling activities shall be performed in compliance with EII 5.2, "Soil and Sediment Sampling" (WHC 1988a). Sample identification requirements, container type, preparation, and preservation requirements will be as specified in EII 5.11.

Procedures for field screening for both chemical and radiological constituents will follow the guidelines set forth in the sampling and analysis plan. Should an approved EII be in existence before the implementation of this QAPjP, all EII applicable to field screening will supersede those set forth in the sampling plan where necessary.

7A.4.3 Procedure Additions and Changes

Additional EIIs or modifications to existing EIIs that might be required as a consequence of sampling plan requirements will be developed in compliance with EII 1.2, "Preparation and Revision of Environmental Investigations Instructions" (WHC 1988a). Should deviations from established EIIs be required to accommodate unforeseen field situations, the Field Team Leader can authorize such deviations consistent with provisions and requirements in EII 1.4, "Deviation from Environmental Investigations Instructions" (WHC 1988a). Deviations are documented, reviewed, and dispositioned by means of instruction change authorization forms, as required by EII 1.4. Other

types of document change requests will be completed as required by the procedures governing their preparation and revision.

7A.5 SAMPLE CUSTODY

All samples obtained during the course of this investigation will be controlled from the point of origin to the analytical laboratory as stipulated in EII 5.1, "Chain of Custody" (WHC 1988a). Chain-of-custody documentation also will be maintained for the return of residual sample materials from the laboratory. Requirements and procedures will be defined in procurement documentation to subcontractor or participant contractor laboratories for the return of residual sample materials after completion of analysis. Laboratory chain-of-custody procedures will ensure that sample integrity and identification are maintained throughout the analytical process and will be reviewed and approved in advance as required by onsite procurement control procedures, as noted in Section 7A.4.1.2.

Results of analyses will be traceable to the original samples through a unique code or identifier, as specified in Section 7A.4. All analytical results will be controlled as permanent project quality records as required by QR 17.0, "Quality Assurance Records" (WHC 1988b) and EII 1.6, "Records Management" (WHC 1988a).

Sample and/or data flow will be coordinated by the sample management organization (Figure 7A-1). The sample management organization will be responsible for tracking, controlling, and verification of in-process samples and data per Section 1.0, "Sample Tracking"; Section 1.3, "Data Package Control", and Section 1.1, "Data Package Verification" (WHC 1990b).

All soil samples will be screened in the field for beta/gamma and gross alpha radioactivity in compliance with approved Hanford Site health physics procedures (WHC 1988c). Samples must be released for offsite shipment by health physics technicians before the samples can be transported to offsite laboratories for analysis of dangerous constituents.

7A.6 CALIBRATION PROCEDURES

Calibration of all measuring and test equipment, whether in existing inventory or purchased for this investigation will be controlled as required by QR 12.0, "Control of Measuring and Test Equipment"; QI 12.1, "Acquisition and Calibration of Portable Measuring and Test Equipment"; QI 12.2, "Measuring and Test Equipment Calibration by User" (WHC 1988b); and/or applicable EIIs (WHC 1988a). Routine operational checks for field equipment will be as defined within applicable EIIs or other field procedures. Similar information will be provided in operations contractor-approved participating contractor or subcontractor procedures.

Calibration of Hanford Site, participating contractor, and/or subcontractor laboratory analytical equipment will be performed per applicable standard methods, subject to review and approval.

7A.7 ANALYTICAL PROCEDURES

Specific analytical methods or procedures will be reviewed and approved before use in compliance with the procedures and procurement control requirements noted in Section 7A.4.1 of this QAPjP.

7A.8 DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction, validation of completed laboratory data packages, reporting requirements, and review and records management are discussed in the following sections.

7A.8.1 Data Reduction and Data Package Preparation

On completion of each group of analyses, the analytical laboratory will be responsible for preparing a report summarizing the analytical results. The analytical laboratory also will prepare a detailed data package that will include all information necessary to perform data validation to the extent indicated by the minimum applicable requirements of Section 7A.8.2. Data summary report format and data package content will be defined in procurement documentation subject to review and approval as noted in Section 7A.4.1. As a minimum, laboratory data packages will include the following:

- Sample receipt and tracking documentation (including identification of the organization and individuals performing the analysis, the names and signatures of the responsible analysts, sample holding time requirements, references to applicable chain-of-custody procedures, and the dates of sample receipt, extraction, and analysis)

- Instrument calibration documentation, including equipment type and model, with continuing calibration data for the time period in which the analyses were performed

- Quality control data, as appropriate for the methods used, including matrix-spike/matrix-spike duplicate data, recovery percentages, precision data, laboratory blank data, and identification of any nonconformances that might have affected the laboratory's measurement system during the time in which the analyses were performed

- The analytical results or data deliverables, including reduced data, reduction formulas or algorithms, and identification of data outliers and/or deficiencies.

Other supporting information, such as initial calibration data, reconstructed ion chromatographs, spectrograms, traffic reports, and raw data, need not be included in submittal of individual data packages unless specifically requested by the Technical Lead or the sample management office. All sample data, however, will be retained by the analytical laboratory and made available for systems or program audit purposes upon the request of the

operations contractor, DOE-RL, or regulatory agency representatives (Section 7A.10.0). Such data will be retained by the analytical laboratory through the duration of the contractual statement of work, at which time the data will be transmitted for archiving.

A completed data package will be reviewed and approved by the analytical laboratory quality assurance manager before the package is submitted to the sample management organization for validation.

The requirements of this section will be included in procurement documents and/or work orders, as appropriate, in compliance with the procurement control procedures identified in Section 7A.4.1.

7A.8.2 Validation

Validation of completed laboratory data packages will be performed by the sample management organization. Data validation and reporting will be performed in conformance with requirements and procedures identified in *Data Validation Procedures for Chemical Analyses* (WHC 1992).

In the case of data obtained by field screening methods, the results will not be submitted in the form of data packages or sample delivery groups, and data reduction and reporting will not be subject to validation.

Data validators will perform a number of tasks on each sample delivery group in response to general and specific requirements identified in the data validation procedures (WHC 1992). A sample delivery group is defined as a group of samples (usually 20 or fewer) reported within a single laboratory data package. These tasks are summarized as follows:

- Take delivery of the data package, stamp the receipt date on the package, and make duplicate copies of the sample concentration reports or report forms

- Organize and review the data package for completeness as described in the data validation procedures Section 3.0 through Section 9.0 (WHC 1992) and document the completeness review on the applicable data validation checklist

- Validate the data package and qualify sample results according to the procedures and criteria described in the data validation procedures Section 3.0 through Section 10.0 (WHC 1992). Data that are rejected at any point during validation will be eliminated from further review or consideration

- Check for calculation and transcription errors, applying the frequency guidelines identified below

- Resolve any discrepancies identified during the review of the data package, including any missing data, with the laboratory

- After the data have been validated, prepare a narrative summary of the acceptability of the data, and prepare a summary of the validated results in tabular and electronic formats

- Submit the data validation report, with the narrative summary, an electronic media copy of the data, checklists, summary forms, and the qualified laboratory concentration reports to the Technical Lead within 21 days after receipt of the data package from the laboratory.

For this sampling and analysis project, the following frequencies will be used to check for calculation and transcription errors.

- **Investigative samples and verification samples taken following soil removal**--All reported laboratory results for at least 20 percent of the samples contained in the sample delivery group and 100 percent of the reported quality control samples (duplicates, matrix spikes, field blanks and any performance audit samples) will be recalculated and verified against the instrument printouts and bench sheet records (raw data). If possible, at least one-half of the samples selected for recalculation should contain positive results for the compounds analyzed.

- **Confirmatory samples**--All reported laboratory results for 100 percent of the samples contained in the sample delivery group and 100 percent of the reported quality control samples (duplicates, matrix spikes, field blanks and any performance audit samples) will be calculated and verified against the raw data.

Reporting requirements for validation of data produced by routine and special analytical methods other than EPA reference methods (EPA 1990) will be established within applicable procedures for the individual methods, subject to review and approval as discussed in Section 7A.4.1. The reporting requirements will be in general compliance with the guidelines provided previously in this section.

7A.8.3 Final Review and Records Management Considerations

All validation reports and supporting analytical data packages will be subjected to a final technical review by a qualified reviewer at the direction of the Technical Lead before submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments will be retained as permanent project quality records in compliance with *Document Control and Records Management Manual*, Section 9 (WHC 1989a) and QR 17.0, "Quality Assurance Records" (WHC 1988b).

7A.9 INTERNAL QUALITY CONTROL

All analytical samples will be subject to in-process quality control measures both in the field and in the laboratory. The following types of

control samples are specified in the sampling and analysis plan for the purpose of maintaining internal quality control.

- Duplicate Samples--Field duplicate samples are samples retrieved from a single sampling location using the same equipment and sampling technique, but analyzed independently. Laboratory duplicate samples are samples taken successively from the same bulb. Duplicate samples generally are used to verify the repeatability or reproducibility of the analytical data.

- Split Samples--Field or field duplicate samples can be split in the field and sent to an alternative laboratory as a performance audit of the primary laboratory.

- Trip Blanks--A trip blank for soil sampling consists of a sample container of pure silica sand that is prepared in the laboratory, transported to the sampling site, and returned unopened for analysis with the actual soil samples. Analysis of the trip blank will eliminate false positive results for the actual samples arising from contamination during shipment.

- Field Blanks--A field blank for soil sampling consists of pure silica sand placed in a container identical to those used for the actual samples. The field blank is transported to the site, opened at the site, and submitted with the samples for analysis. A field blank is used to eliminate false positives arising from contamination of samples from the atmosphere at the sampling site in addition to the uses cited for trip blanks.

- Equipment Blanks--An equipment blank for soil sampling consists of pure silica sand that is drawn through decontaminated sampling equipment and placed in a container identical to those used for the actual field samples. Equipment blanks are used to verify the adequacy decontamination procedures for sampling equipment in addition to the uses cited for field blanks.

Additional quality control checks will be performed by the analytical laboratories as follows.

- Matrix-Spiked and Matrix-Spiked Duplicate Samples--A known quantity of a representative analyte of interest is added to an aliquot (or a replicate) of an actual sample as a measure of recovery percentage. Spike compound selection, quantities, and concentrations will be described in the laboratory's analytical procedures.

- Quality Control Reference Samples--A quality control reference sample is prepared from an independent standard at a concentration other than that used for calibration, but within the calibration range. Reference samples provide an independent check on analytical technique and methodology.

The numbers and/or frequencies of quality control samples to be submitted and analyzed with each group of soil samples are specified in the soil sampling and analysis plan presented in Section 7.0 of the closure plan. The numbers of quality control samples proposed in the sampling plan have been determined based on guidance presented in SW-846 (EPA 1990).

Other requirements specific to calibration of laboratory analytical equipment are included in Section 6.0 of this plan. Detailed descriptions of internal quality control requirements for participating contractor or subcontractor laboratories will be provided in procurement documents or work orders in compliance with standard procedures noted in Section 7A.4.1.

7A.10 PERFORMANCE AND SYSTEM AUDITS

Performance, system, and program audits will begin early in the execution of this sampling plan and continue through completion of activities. Collectively, the audits will address quality affecting activities that include, but are not limited to, measurement accuracy; intramural and extramural analytical laboratory services; field activities; and data collection, processing, validation, and management.

Performance audits of the analytical accuracy of field screening instrumentation will be facilitated by performing internal quality control checks (i.e., testing reference and calibration standards) at regular intervals specified by procedure.

Regarding offsite contractor laboratory analyses of confirmatory soil samples, performance audits of analytical accuracy will be implemented through the use of quality assurance and quality control samples.

System audit requirements will be implemented in accordance with QI 10.4, "Surveillance" (WHC 1988b). Surveillances will be performed regularly throughout the course of sampling activities. Additional performance and system 'surveillances' might be scheduled as a consequence of corrective action requirements or might be performed on request. All quality affecting activities will be subject to surveillance.

Sampling plan activities could be evaluated as part of environmental restoration program-wide quality assurance audits under procedural requirements (WHC 1988b). Program audits will be conducted in accordance with QR 18.0, "Audits"; QI 18.1, "Audit Programming and Scheduling"; and QI 18.2, "Planning, Performing, Reporting, and Follow-up of Quality Audits". Program audits will be performed by qualified auditors in compliance with QI 2.5, "Qualification of Quality Assurance Program Audit Personnel" (WHC 1988b).

7A.11 PREVENTIVE MAINTENANCE

All measurement and testing equipment used in the field and the laboratory that directly affect the quality of analytical data will be

subject to preventive maintenance measures that ensure minimization of measurement system downtime. Preventive maintenance instructions for field equipment will be as stipulated in approved operating procedures for the equipment. Laboratories will be responsible for performing or managing the maintenance of assigned analytical equipment. Maintenance requirements, spare parts lists, and preventive maintenance instructions will be included in individual laboratory procedures or in laboratory quality assurance plans, subject to review and approval. When samples are to be analyzed by a contractor or subcontractor laboratory, preventive maintenance requirements for laboratory analytical equipment will be as defined in the contractor laboratory's quality assurance plan(s).

7A.12 DATA ASSESSMENT

Analytical data will be compiled and summarized by the laboratory and forwarded to the sample management organization for validation as described in Section 7A.8.2 before the data can be used in any assessment activities. Assessments could include various statistical and probabilistic techniques to compare and/or analyze data. The statistical methodologies and assumptions that are to be used to evaluate data will be identified in written instructions that are to be signed, dated, and retained as project quality records in compliance with EII 1.6, "Records Management" (WHC 1988a) and QR 17.0, "Quality Assurance Records" (WHC 1988b). These instructions will be documented in the final report for each sampling and analysis project.

7A.13 CORRECTIVE ACTION

Corrective actions required as a result of surveillance reports, nonconformance reports, or audit activities will be documented and dispositioned as required by QR 16.0, "Corrective Action"; QI 16.1, "Trending/Trend Analysis"; and QI 16.2, "Corrective Action Reporting" (WHC 1988b). Primary responsibilities for corrective action resolution will be assigned to the Technical Lead and the quality assurance coordinator. Other needs for corrections to measurement systems, procedures, or plans that are identified as a result of routine review processes will be resolved as stipulated in applicable procedures or referred to the Technical Lead for resolution. Copies of all surveillance, nonconformance, audit, and corrective action documentation will be retained as project quality assurance records.

7A.14 QUALITY ASSURANCE REPORTS

As indicated in Sections 7A.10 and 7A.13, project activities will be assessed regularly by audit and surveillance processes. At the conclusion of a given sampling and analysis project, all related field and laboratory data, raw data, reports, surveillance reports, nonconformance reports, audit reports, and corrective action documentation will be transferred for archival to the Hanford Site Records Holding Area (if documentation has not been transmitted previously). In the event that original quality-affecting

documents are to be retained and/or controlled by others, legible copies will be transmitted to the Records Holding Area for inclusion in the project record file.

9 3 1 2 1 0 9 1 6 7 8

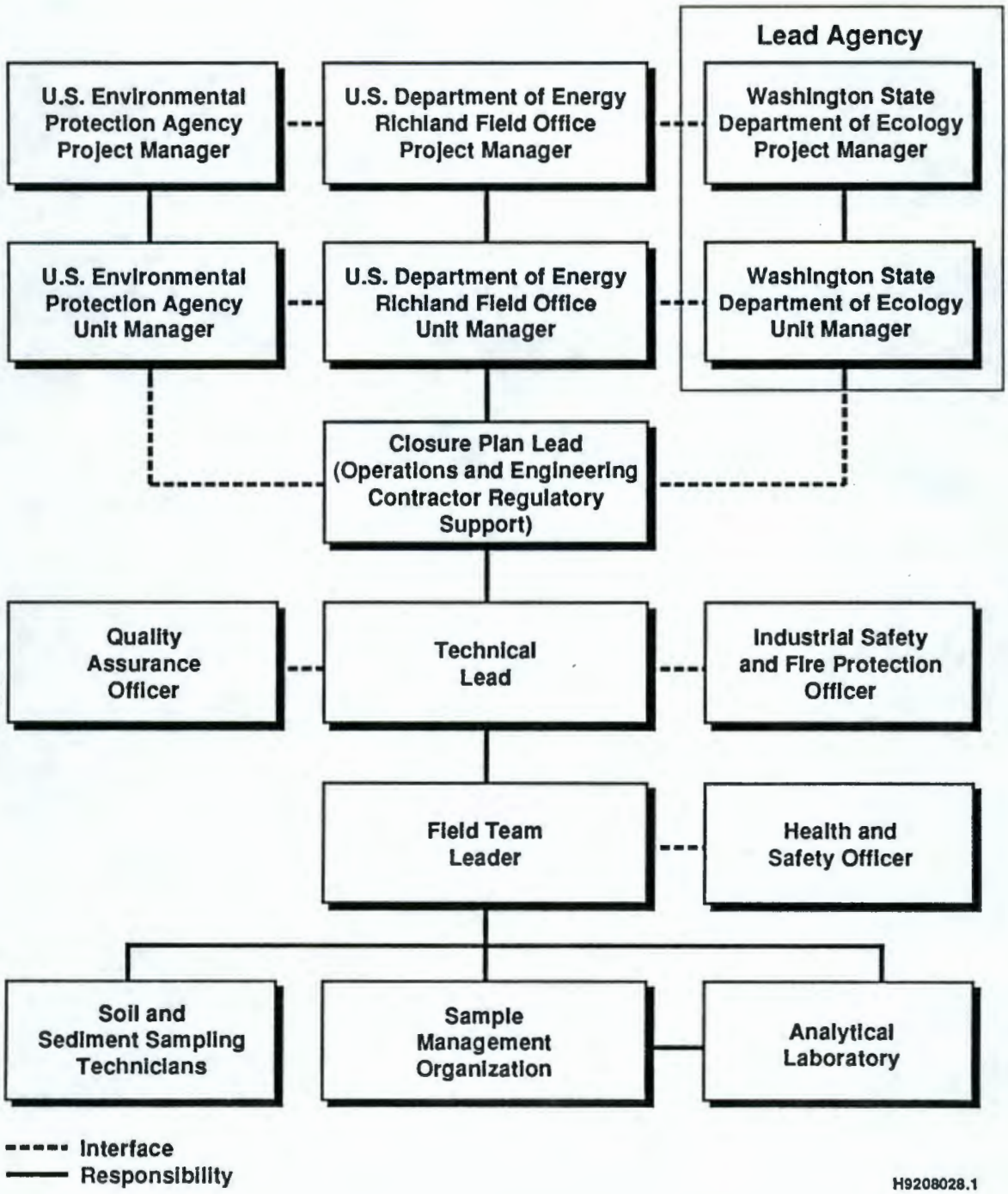

Figure 7A-1. Project Organization for Sampling at the Hexone Storage and Treatment Facility.

9 3 1 2 8 9 0 6 7 9

Table 7A-1. Analytical Levels, Methods, and Detection Limits for Hexone Storage and Treatment Facility Soil Sample Analysis.

Category of analysis	Analyte of interest	EPA analytical level[a]	Standard method[b]	MDC[c]
Radiation Screening	Gross alpha	I	N/A	N/A
	Gross beta/gamma	I	N/A	N/A
Organic Vapor Screening		I	N/A	N/A
Metals Analysis	Barium	III	6010A	0.6 μg/g
	Cadmium	III	6010A	0.2 μg/g
	Chromium	III	6010A	1 μg/g
	Lead	III	7421	0.5 μg/g
Volatile Organics Analysis	Methyl Isobutyl Ketone (hexone)	III	8040	0.05 μg/g
Semivolatile Organic Analysis	Tributhyl Phosphate	III	8070	TBD
Total Petroleum Hydrocarbons	Normal Paraffin Hydrocarbons	III	413.1	TBD

[a]Analytical levels as defined by EPA (1987, Section 4.3.1).
[b]Standard methods are from EPA (1990).
[c]Minimum detectable concentration refers to contractually defined minimum detectable concentration in soil. Certain minimum detectable concentration values are labeled TBD (to be determined) and will be provided in a revision to this table after review and approval of revisions to the statement of work.
[d]Minimum requirements for precision and accuracy will be method-specific, and will be negotiated and established in the procedure review and approval process. Target values are indicated where appropriate; precision is expressed in terms of relative percent different, and accuracy as percentage recovery.

APPENDIX 7B

TRAINING COURSE DESCRIPTIONS

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APPENDIX 7B

This appendix contains a training matrix and brief course descriptions.

Environmental and Hazardous Material Safety Training Matrix.

Employee category	Course title (length/frequency)														
	Hazardous Communication and Waste Orientation (1 hour)	Generator Hazards Safety Training (4 hours)	Hazardous Materials Waste Job-Specific Training (length varies with each TSD unit)	Radiation Worker Training (8 hours)	Waste Site Basic (16 hours)	Scott SKA-PAK* Training (2 hours)	Cardiopulmonary Resuscitation (4 hours)	Fire Extinguisher Safety (1 hour)	Waste Site Advanced (24 hours)	Waste Site Field Experience (24 hours)	Hazardous Waste Shipment Certification (24 hours)	Certification of Hazardous Material Shipments (8 hours)	Hazardous Waste Site Supervisor/Manager (8 hours)	Compliance Category**	Total hours
1. All employees	X														1
2. General worker		X	X											1	5 + unit-specific training
3. General supervisor/manager		X	X											1	5 + unit-specific training
4. General nonradiological shipper		X	X								X			1,2	29 + unit-specific training
5. General hazardous material shipper		X	X									X		1,2	13 + unit-specific training
6a. Hazardous waste worker (known hazards)		X	X	X	X									1,3	28 + unit-specific training + field experience
6b. Hazardous waste worker (unknown hazards)		X	X	X		X	X	X	X	X				1,4	44 + unit-specific training + field experience
7. Hazardous waste supervisor/manager		X	X	X		X	X	X	X	X			X	1,5	52 + unit-specific training + field experience
8. Hazardous waste shipper		X	X	X		X	X	X	X	X	X	X		1,2,4	76 + unit-specific training + field experience

* Scott SKA-PAK is a trademark of Figgie International, Incorporated.

** Compliance categories:

1 WAC 173-303, 29 CFR 1910.1200
2 49 CFR 173
3 29 CFR 1910.120 (24-hour requirement)
4 29 CFR 1910.120 (40-hour requirement)
5 29 CFR 1910.120 (40-hour plus 8-hour requirement).

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ENVIRONMENTAL AND HAZARDOUS MATERIAL SAFETY TRAINING		
	Course name	Description
1.	Hazard Communication and Waste Orientation	Course provides an overview of the federal and applicable hazard communication programs and hazardous and/or dangerous waste disposal programs.
2.	Generator Hazards Safety Training	Course provides the hazardous and/or dangerous material/waste worker with the fundamentals for use and disposal of hazardous and/or dangerous materials.
3.	Hazardous Materials/Waste Job-Specific Training	Course provides specific information on hazardous and/or dangerous chemicals and waste management at the employees' TSD unit.
4.	Initial Radiation Worker Training	Course provides radiation workers with the fundamentals of radiation protection and the proper procedures for maintaining exposures ALARA.
5.	Waste Site Basics	Course provides required information for the safe operation of hazardous and/or dangerous waste TSD units regulated under 40 CFR 264 and 265 pursuant to RCRA and WAC 173-303.
6.	Scott 'SKA-PAK'[1] Training-SKA	Course instructs employees in the proper use of the Scott 'SKA-PAK' for entry, exit, or work in conditions 'immediately dangerous to life and health' and instructs employees to recognize and handle emergencies.
7.	Cardiopulmonary Resuscitation	Course of the American Heart Association that provides certification in cardiopulmonary resuscitation for the single rescuer (Heartsaver Course).

[1]Scott SKA-PAK is a trademark of Figgie International, Incorporated.

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	Course name	Description
8.	Fire Extinguisher Safety	Course provides videocassette presentation that covers types of portable fire extinguishers and the proper usage for each.
9.	Waste Site-Advanced	Course provides environmental safety information for RCRA and/or CERCLA operations and sites. Topics include regulations and acronyms, occupational health and safety, chemical hazard information, toxicology, personal protective equipment and respirators, site safety, decontamination, and chemical monitoring instrumentation.
10.	Waste Site Field Experience	Course is a 3-day field experience under the direct supervision of a trained, experienced supervisor.
11.	Hazardous Waste Shipment Certification	Course provides an indepth look at federal, state, and Hanford Site requirements for nonradioactive hazardous and/or dangerous waste management and transportation.
12.	Certification of Hazardous Material Shipments	Course provides training in dangerous material regulation of the U.S. Department of Transportation, as required by law, to those who certify the compliance of Hanford Site hazardous and/or dangerous material shipments. The main focus is on the proper preparation and release of radioactive material shipments.
13.	Hazardous Waste Site Supervisor/Manager	Course provides specialized training to operations and site management in the following programs: safety and health, employee training, personal protective equipment, spill containment, and health hazard monitoring procedures and techniques.

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