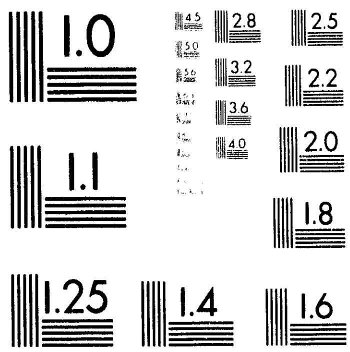
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1 of 2

STATE ENVIRONMENTAL POLICY ACT
ENVIRONMENTAL CHECKLIST FORMS

FOR

105-DR LARGE SODIUM FIRE FACILITY CLOSURE

REVISION 1

May, 1993

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

A. BACKGROUND

1. Name of proposed project, if applicable:

Closure of the 105-DR Large Sodium Fire Facility (LSFF). Information contained in this State Environmental Policy Act (SEPA) Checklist pertains only to the portion of the Hanford Site 100-D area which contains the 105-DR LSFF. In the context of the document, "site" refers only to the area covered by the physical structure of the 105-DR LSFF and associated facilities discussed in the answer to Checklist Question A.11, whereas "Site" refers to the Hanford Site.

2. Name of applicants:

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

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

Contact:

J. E. Rasmussen, Acting Program Manager
Office of Environmental Assurance,
Permits, and Policy
(509) 376-2247

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

4. Date checklist prepared:

May 10, 1993

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):

Final closure activities will be completed and certified in accordance with the closure plan. Soil and sediment sampling will be conducted during closure activities. If the sampling results indicate that clean closure is not possible, closure (decontamination) will be coordinated with decontamination of the 105-DR Reactor, which is located in the Resource conservation and Recovery Act (RCRA) Practice Operable Unit 100-DR-2. Decommissioning activities will be conducted in accordance with the records of decision for the 100-DR-2 Operable Unit and for the Environmental Impact Statement (EIS), Decommissioning of Eight Surplus Production Reactors at the Hanford Site.

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

The LSFF is located within Operable Units 100-DR-2 (source) and 100-HR-3 (groundwater), as designated in the Hanford federal Facility Agreement and Consent Order (HFFACO). Clean closure is proposed, and once any dangerous waste associated with the LSFF is removed, the entire reactor will remain for future decontamination and decommissioning as discussed in the final surplus production reactor decommissioning EIS (DOE 1992; pp 1.7 - 1.13). Any remedial action with respect to either contaminants not associated with the LSFF, or associated with the LSFF not yet cleaned to action levels under this closure plan, will be deferred to the reactor decommissioning EIS record of decision or the RCRA facility Investigation/Corrective Measures Study (RFI/CMS) process.

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

This SEPA Checklist is being submitted to the Washington state Department of Ecology (Ecology) and the U.S. Environmental Protection agency (EPA) concurrently with the RCRA closure Plan for the 105-DR LSFF. The RCRA Part A and Part B permit applications were submitted to Ecology in November 1985. A revised Part A permit application was submitted to ecology in November 1987.

Final Environmental Impact Statement - *Decommissioning of Eight Surplus Production Reactors at the Hanford Site*, Richland, Washington DOE/EIS-0119D, U.S. Department of Energy, 1992, Washington, D.C.

General information concerning the Hanford Facility environment can be found in the *Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Revision 5, December 1992. This document is updated annually by Pacific Northwest Laboratory, and provides current information concerning climate and meteorology; ecology; history and archeology; socioeconomic; land use and noise levels; and geology and hydrology. This baseline data for the Hanford Site and its past activities are useful for evaluating proposed activities and their potential environmental impacts.

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.

Ecology is the lead regulatory agency authorized to approve the closure plan for the 105-DR LSFF pursuant to the requirements of the Washington Administrative Code, (WAC) 173-303-610. The closure plan must also receive approval from the EPA. No other permits are known to be required at this time.

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 project is the final closure of the 105-DR Large Sodium Fire Facility. Clean closure is proposed as the condition for final closure of the facility. Clean closure is contingent on verification that all wastes and contaminants are removed to accepted action levels and that all equipment, structures, liners, soils and/or other materials containing dangerous wastes or residues associated with the LSFF are removed from the site.

The facility consists of three fire rooms, a Sodium Handling Room, the Supply fan room, an exhaust gravel scrubber, and office space directly connected to the 105-DR Reactor.

All equipment and fixtures will be decontaminated, removed, and appropriately disposed of. The buildings and floors will be decontaminated to appropriate action levels with one or more of the following methods:

- Damp wipe downs
- Vacuum assisted mechanical removal
- Sandblasting
- High-pressure steam/water and suction

The buildings, floors, soil and gravel will be sampled to determine the levels of remaining contamination and the requirements for additional decontamination. Clean closure will be achieved when sampling shows that the remaining contamination is below acceptable action levels as defined in the closure plan. Eventually the concrete will be disposed of with the rest of the 105-DR reactor under the decommissioning program.

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 105-DR LSFF is located in the northwest portion of the Hanford Site 100-D Area approximately 35 miles northwest of the city of Richland. The

105-DR LSFF is connected to the 105-DR Reactor. It is in the W 1/2, NW 1/4, section T14N, R26E. A location map and site plans are included in the closure plan.

TO BE COMPLETED BY APPLICANT — **EVALUATIONS FOR AGENCY USE ONLY**

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 approximate slope of the land is less than 2 percent.

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.

Soil types consist mainly of eolian and fluvial sands and gravel. More detailed information concerning specific soil classifications can be found in the *Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Revision 5, December 1992. Farming is not permitted on the Hanford Facility.

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

No.

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

No filling or grading is required.

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

No.

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

Not applicable. No construction would occur.

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

Not applicable. Earth would not be disturbed.

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.**

Minor amounts of exhaust would be generated by vehicles used to gain access to the site. Small quantities of dust could be generated by decontamination and sampling activities.

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

No.

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

Good engineering practices would be followed, and actions would comply with onsite procedures designed to protect the environment and worker safety and 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.**

There is no surface water body on or in the immediate vicinity of the 105-DR LSFF. However, the Columbia River is approximately 0.75 mile (1.2 kilometer) away. No perennial streams originate within the Columbia Plateau.

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.

The work would not require any activity in or near the described waters.

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.

None. There would be no dredging or filling.

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

The water supply for the 100-D Area is pumped from the Columbia River. The 105-DR LSFF closure activities would use insignificant amounts of this overall withdrawal.

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

The 105-DR LSFF is not within the 100 year floodplain (*Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Revision 5, December 1992).

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 groundwater would be withdrawn in support of this project, and water would not be discharged to the aquifer.

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.

Sanitary waste from the 105-DR LSFF is discharged to the 105-D Area sanitary trench. Closure of the 105-DR LSFF will not impact the existing sanitary waste sewer system.

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 Facility receives only 6 to 7 inches (15.2 to 17.8 centimeters) of annual precipitation. Precipitation runs off the existing buildings and seeps into the soil on and near the buildings. This precipitation does not reach the groundwater or surface waters.

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

Waste materials would not enter ground or surface waters. All waste materials would be contained.

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

No surface, ground, or run-off water impacts are expected.

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
- _X_ 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

The most common vegetation community in the 100-D Area is the sagebrush/cheatgrass or Sandberg's bluegrass. Native vegetation in the immediate vicinity of the 105-DR LSFF has been eradicated.

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

No native vegetation alteration would occur.

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

The 105-DR LSFF is located within a previously disturbed area that has been heavily industrialized since the mid 1940's, and biological survey personnel indicate that no sensitive species occur in the general vicinity.

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

Not applicable.

5. Animals

a. Indicate (by underlining) 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 rarely seen in the 100-D Area Area. Small passerines (sparrows, finches) are present in the general vicinity of the 105-DR LSFF. Rabbits and coyotes occasionally are seen in the general area.

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

Two federal and state listed threatened or endangered species have been identified on the Hanford Site along the Columbia River; the bald eagle and peregrine falcon. In addition, the state listed white pelican, sandhill crane, and ferruginous hawk also occur on or migrate through the Hanford Site. Of these five species, none is likely to use the shrub-steppe habitat of the 100-D Area.

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

The Hanford Site is a part of the broad Pacific Flyway.

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

This project contains no specific measures to preserve or enhance wildlife.

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 is used at the 105-DR LSFF for heating, lighting, and other power needs.

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 easily applicable to the 105-DR LSFF closure.

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.**

Possible environmental health hazards to workers could arise from activities at the 105-DR LSFF. The hazard could come from exposure to dangerous, radioactive, and/or mixed waste. Stringent administrative controls and engineered barriers are employed to minimize the probability of even a minor incident and/or accident. A chemical spill, release, fire, or explosion could occur only as a result of a simultaneous breakdown in multiple barriers or a catastrophic natural forces event.

1) **Describe special emergency services that might be required.**

Hanford Site security, fire response, and ambulance services are on call at all times in the event of an onsite emergency. 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:**

All personnel are trained to follow proper procedures during the storage and treatment operations to minimize potential exposure. The 105-DR LSFF has systems for ventilation, fire protection, and alarm capability.

Chemical safety hazards would be mitigated by preventing direct contact with the residual chemical constituents. Protective clothing, appropriate training, and respiratory protection would be used by 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)?

Equipment noise in the vicinity, it is not expected to affect personnel at the 105-DR LSFF.

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.

Noise from some operations (e.g., sand-blasting) is expected.

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 that have been used for the production of special nuclear materials. Other scientific and engineering programs are also carried out. Lands north and east of the Columbia River are public lands, including river lands, and wildlife preserves or are used for farming. Some lands contiguous to or surrounded by the Hanford Site are owned by the Bonneville Power Administration, or leased to the Washington

Public Power Supply System, or are owned by or leased to the state of Washington.

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

No portion of the 100-D Area Area has been used for agricultural purposes since 1943, if ever.

c. Describe any structures on the site.

The facility consists of three fire rooms, a Sodium Handling Room, the Supply fan room, the gravel scrubber, and the office space directly connected to the 105-DR Reactor.

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

No.

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 Hanford 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?

Does not apply.

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 100-D Area is fenced and is a previously disturbed industrial area with little or no environmental significance.

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

Approximately 10 people would work at the 105-DR LSFF closure.

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 construction would take place.

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?

Not applicable.

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

No.

c. What existing off-site 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.

The White Bluffs road is considered eligible for the National Register of Historic Places. This road is about 5 miles (8 kilometers) from the 105-DR LSFF. Additional information concerning Hanford Site cultural resources can be found in *Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Revision 5, December 1992.

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

There are no known landmarks or evidence of historic, archaeological, scientific, or cultural importance at the 105-DR LSFF.

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

Where appropriate, a cultural resource review would provide the vehicle for necessary approvals required under the *National Historic Preservation Act of 1966*.

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 105-DR LSFF 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.**

No.

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

Traffic and parking would not change from existing traffic patterns.

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, potable water, steam, refuse service, telephone, and a septic system are available in the 100-D Area.

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.

No new utilities proposed. No construction.

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 E. Rasmussen (signature) — 6/24/93

James E. Rasmussen, Acting Program Manager — Date
Office of Environmental Assurance,
Permits, and Policy
U.S. Department of Energy
Richland Operations Office
Richland, Washington
(509) 376-2247

Ronald E. Lerch (signature) — 6-22-93

R. E. Lerch, Deputy Director — Date
Restoration and Remediation
Westinghouse Hanford Company
Richland, Washington
(509) 376-5556

DOE/RL-90-25
Revision 1

105-DR Large Sodium Fire Facility Closure Plan

Date Published
June 1993

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

Approved for Public Release

105-DR LARGE SODIUM FIRE FACILITY CLOSURE PLAN

FOREWORD

The Hanford Site is owned by the U.S. Government and operated by the U.S. Department of Energy, Richland Operations Office. The Hanford Site produces and manages dangerous waste and mixed waste (containing both radioactive and dangerous components). 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 Site 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.

Westinghouse Hanford Company is a major contractor to the U.S. Department of Energy, Richland Operations Office and serves as co-operator of the 105-DR Large Sodium Fire 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 *105-DR Large Sodium Fire Facility Closure Plan* consists of a Part A Permit Application (Revision 2) and a closure plan. The closure plan consists of nine chapters and five appendices.

This submittal contains information current as of May 28, 1993.

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CONTENTS

APPENDICES

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ACRONYMS AND ABBREVIATIONS

DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy-Richland Operations Office
DW	dangerous waste
Ecology	Washington State Department of Ecology
EHW	extremely hazardous waste
EII	Environmental Investigations Instructions
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FY	fiscal year
HEPA	High-Efficiency Particulate Air (Filter)
LD_{50}	lethal dose
LMFBR	liquid metal fast breeder reactor
LOQ	limit of quantitation
LSFF	Large Sodium Fire Facility
MSDS	Material Safety Data Sheet
QA/QC	quality assurance/quality control
QAPI	Quality Assurance Program Index
QAPP	Quality Assurance Project Plan
QI	Quality Instructions
QR	Quality Requirements
RCRA	*Resource Conservation and Recovery Act of 1976*
RCRA/CERCLA	*Resource Conservation and Recovery Act/Comprehensive Environmental Response Compensation and Liability Act*
RI/FS	remedial investigation/feasibility study
RFI/CMS	RCRA Facility Investigation/Corrective Measures Study
ROD	Record of Decision
RPD	relative percent difference
TAL	target analyte list
TCLP	Toxicity Characteristic Leaching Procedure
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and/or disposal
WAC	Washington Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company

GLOSSARY

Accuracy: For the purposes of closure activities, accuracy is interpreted as the measure of the bias in a system. Analytical accuracy is normally assessed through the evaluation of matrix spiked samples and reference samples.

Audit: For the purposes of closure 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 may 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.

Blind Sample: A blind sample refers to any type of sample routed to the primary laboratory for purposes of auditing performance relative to a particular sample matrix and analytical method. Blind samples are not specifically identified as such to the laboratory; they may be made from traceable standards, or may consist of sample material spiked with a known concentration of a known compound. See the glossary entry for audit above.

Comparability: For the purposes of closure activities, comparability is an expression of the relative confidence with which one data set may be compared with another.

Completeness: For the purposes of closure activities, completeness may be interpreted as a qualitative parameter expressing the percentage of measurements judged to be valid.

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

Equipment Blanks: Equipment blanks consist of pure deionized, distilled water washed through decontaminated sampling equipment and placed in containers identical to those used for actual field samples; they are used to verify the adequacy of sampling equipment decontamination procedures, and are normally collected at the same frequency as field duplicate samples.

Facility: Dependent on context, the term 'facility', as used in this permit application portion, could refer to:

- The Hanford Facility. (refer to definition)

- 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., 616 Nonradioactive Dangerous Waste Storage Facility, Grout Treatment Facility).

Field Blanks: Field blanks consist of pure deionized, distilled water, transferred to a sample container at the site and preserved with the reagent specified for the analytes of interest; they are used to check for possible contamination originating with the reagent or the sampling environment, and are normally collected at the same frequency as field duplicate samples.

Field Duplicate Sample: Field duplicate samples are samples retrieved from the same sampling location using the same equipment and sampling technique, placed in separate identically prepared and preserved containers, and analyzed independently. Field duplicate samples are generally used to verify the repeatability or reproducibility of analytical data, and are normally analyzed with each analytical batch or every 20 samples, whichever is greater.

Hanford Facility: A single RCRA facility identified by the EPA/State Identification Number WA7890008967 that consists of over 60 TSD units conducting dangerous waste management activities. These TSD units are 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 by the U.S. Government and operated by the U.S. Department of Energy, Richland Operations Office (excluding lands north and east of the Columbia River, river islands, lands owned or used 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). The physical description of the property (including structures, appurtenances, and improvements) is set forth in Appendix 2A. The legal description of the Hanford Facility is set forth in Appendix 2B.

Matrix Spiked Samples: Matrix spiked samples are a type of laboratory quality control sample; they are prepared by splitting a sample received from the field into two homogenous aliquots (i.e., replicate samples), and adding a known quantity of a representative analyte of interest to one aliquot in order to calculate percentage of recovery.

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, it 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.

<u>Precision</u>: Precision is a measure of the repeatability or reproducibility of specific measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is normally expressed in terms of standard deviation, but may also 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/replicate sample analysis.

<u>Quality Assurance</u>: For the purposes of closure activities, QA 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 meets all end user requirements and/or the intended end use of the data.

<u>Quality Assurance Project Plan</u>: The QAPP 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.

<u>Quality Control</u>: For the purposes of closure activities, QC refers to the routine application of procedures and defined methods to the performance of sampling, measurement, and analytical processes.

<u>Reference Samples</u>: Reference samples are a type of laboratory quality control sample prepared from an independent, traceable standard at a concentration other than that used for analytical equipment calibration, but within the calibration range. Such reference samples are required for every analytical batch or every 20 samples, whichever is greater.

<u>Replicate Sample</u>: Replicate samples are two aliquots removed from the same sample container in the laboratory and analyzed independently.

<u>Representativeness</u>: For the purposes of closure activities, representativeness may be interpreted as 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 which is most concerned with the proper design of a sampling program.

<u>Split Sample</u>: A split sample is produced through homogenizing a field sample and separating the sample material into two equal aliquots. Field split samples are usually routed to separate laboratories for independent analysis, generally for purposes of auditing the performance of the primary laboratory relative to a particular sample matrix and analytical method. See the glossary entry for audit above. In the laboratory, samples are generally split to create matrix spiked samples; see the glossary entry above.

<u>Validation</u>: For the purposes of closure 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. Validation methods may include review of verification activities, editing, screening, cross-checking, or technical review.

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

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PART A

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

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/STATE I.D. NUMBER

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

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (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. 72 — 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 DESIGN 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
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

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

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

LINE NUMBER	A. PROCESS CODE (from list above)	B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	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)	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				
1	S 0 1	20,000	L		7				
2	T 0 4	100	V		8				
3		*Information concerning the month of initial operation of this unit is			9				
4		not available			10				

Continued from the front

III. PROCESSES (continued)

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

S01, T04

The 105-DR Large Sodium Fire Facility is a research laboratory located in the 105-DR building in the 100-D Area of the Hanford Site. The facility is used to conduct experiments for studying the behavior of molten alkali metals and alkali metal fires. This facility is also used for the treatment of alkali metal dangerous wastes. Treatment consists of heating the waste to the point of oxidation. Up to 100 liters per day of dangerous wastes can be treated in the facility in a system equipped with an off-gas syste The 105-DR facility is also used to store up to 20,000 liters of dangerous wastes.

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER — Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handl 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 basi 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 whic 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 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 de sity 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 th 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 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 It 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 Was 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 t 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 abov 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 sha ings 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 estimat 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 a disposal will be in a landfill.

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

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

I.D. NUMBER (enter from page 1)

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

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D003	20,000	K	S01 T04	Thermal treatment
2					
3					
4					
5					
6					
7					
8					
9					
0					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Continued from the front

IV. DESCRIPTION OF DANGEROUS WASTES *(continued)*

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

The 105-DR Large Sodium Fire Facility is used for the treatment and storage of alkali metal wastes. These wastes consists of sodium, lithium, and sodium-potassium alloy. Approximately 20,000 kilograms are managed at this facility each year. These wastes are not radioactive.

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 appears on the attached drawing and photograph

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

VIII. FACILITY OWNER

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

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

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

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

IX. OWNER CERTIFICATION

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

NAME (print or type)	SIGNATURE	DATE SIGNED
Michael J. Lawrence Manager, Richland Operations United States Department of Energy	Michael J. Lawrence	November 16, 1987

X. OPERATOR CERTIFICATION

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

NAME (print or type)	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

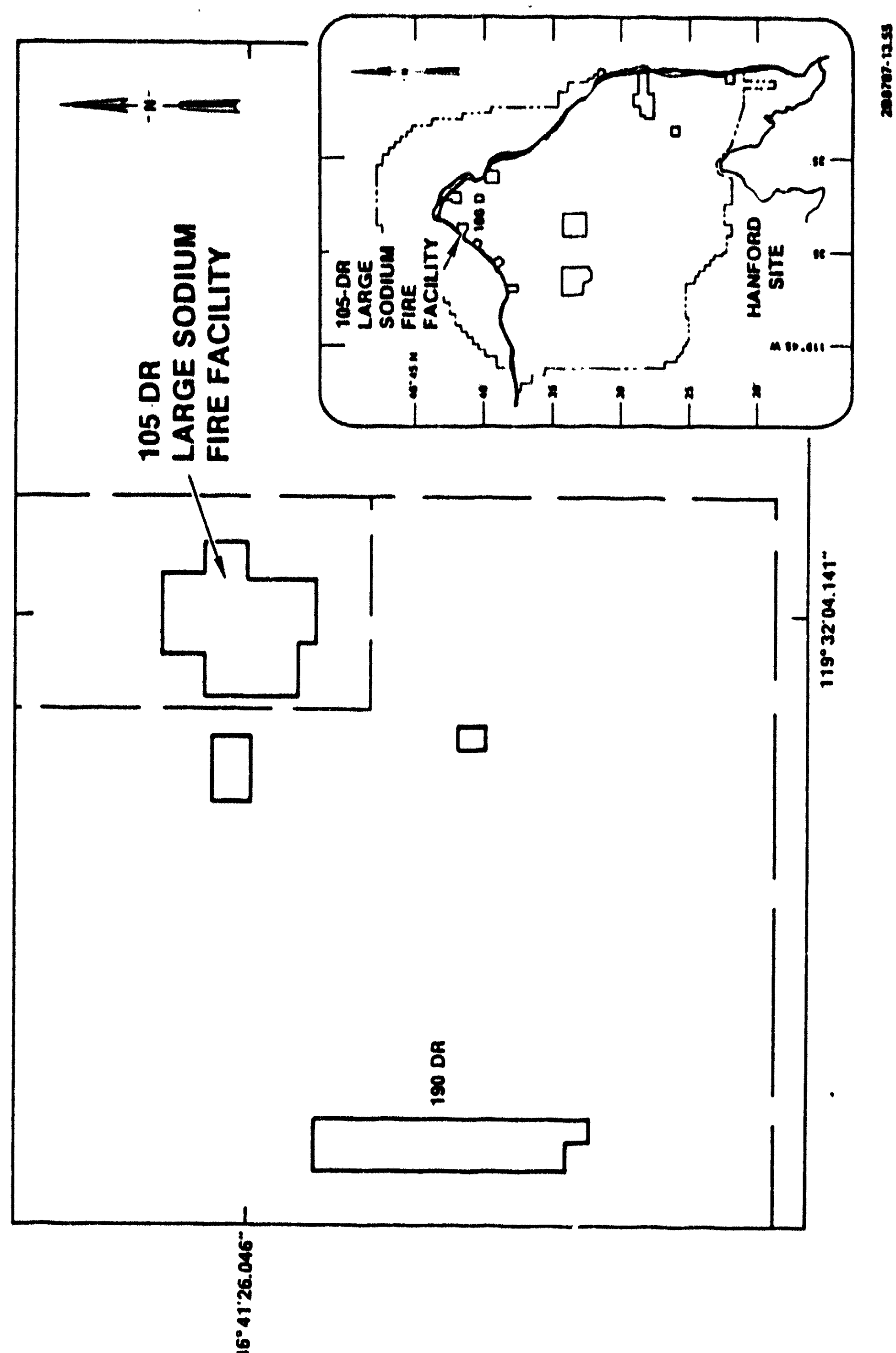
X. OPERATOR CERTIFICATION

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

Michael J. Lawrence — Date 11-16-87
Manager, Richland Operations
United States Department of Energy

William M. Jacobi — Date 11/16/87
President
Westinghouse Hanford Company

105-DR/100-D AREA LARGE SODIUM FIRE FACILITY



LARGE SODIUM FIRE FACILITY
105-DR/100-DR AREA

46°41'26.046"
119°32'04.141"

8S00045-820CN

(PHOTO TAKEN 1985)

CONTENTS

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1.0 INTRODUCTION

The Hanford Site, located northwest of the city of Richland, Washington, houses reactors, chemical-separation systems, and related facilities used for the production of special nuclear materials, and activities associated with nuclear energy development. The 105-DR Large Sodium Fire Facility (LSFF), which was in operation from about 1972 to 1986, was a research laboratory that occupied the former ventilation supply room on the southwest side of the 105-DR Reactor facility. The LSFF was established to provide a means of investigating fire and safety aspects associated with large sodium or other metal alkali fires in the liquid metal fast breeder reactor (LMFBR) facilities. The 105-DR Reactor facility was designed and built in the 1950's and is located in the 100-D Area of the Hanford Site. The building housed the 105-DR defense reactor, which was shut down in 1964.

The LSFF was initially used only for engineering-scale alkali metal reaction studies. In addition, the Fusion Safety Support Studies program sponsored intermediate-size safety reaction tests in the LSFF with lithium and lithium lead compounds. The facility has also been used to store and treat alkali metal waste, therefore the LSFF is subject to the regulatory requirements for the storage and treatment of dangerous waste. Closure will be conducted pursuant to the requirements of the Washington Administrative Code (WAC) 173-303-610.

This closure plan presents a description of the facility, the history of waste managed, and the procedures that will be followed to close the LSFF as an Alkali Metal Treatment Facility. No future use of the LSFF is expected. The LSFF is located within the 100-DR-2 (source) and 100-HR-3 (groundwater) operable units as designated in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1992) referred to as the Tri-Party Agreement. These operable units will be addressed through the *Resource Conservation and Recovery Act of 1976* (RCRA) facility investigation/corrective measures study (RFI/CMS) process. The 100-DR-2 operable unit is expected to begin Geophysical work in fiscal year (FY) 1993; characterization work at 100-HR-3 began in FY 1991 and is expected to continue through FY 1993.

Consistent with the Tri-Party Agreement (Ecology et al. 1992, p. 6-4), once any dangerous waste associated with the LSFF is removed, the entire reactor will remain for future decontamination and decommissioning as discussed in the *Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington*, Environmental Impact Statement (EIS) (DOE 1992, pp 1.7 through 1.13).

Any remedial action with respect to contaminants either not associated with the LSFF or associated with the LSFF but not cleaned to action levels under this closure plan will be deferred to the reactor decommissioning EIS record of decision (ROD) or the RFI/CMS process.

1.1 PERMITTING HISTORY

As a result of storage and treatment of dangerous waste, RCRA Part A and Part B (Alkali Metal Treatment and Storage Facilities) permit applications were submitted to the Washington State Department of Ecology (Ecology) in November 1985. Revision 2 of the Part A permit application was submitted in November 1987. The Part A permit application was submitted under the single Dangerous Waste Permit Identification Number, WA7890008967, issued to the Hanford Facility by the U.S. Environmental Protection Agency (EPA) and Ecology. The Part A permit application designates the LSFF as a thermal treatment facility, subject to RCRA regulations for treatment, storage, and/or disposal (TSD) units. This initial closure plan is being submitted to provide site characterization information and a closure strategy for the LSFF.

1.2 105-DR LARGE SODIUM FIRE FACILITY CLOSURE PLAN CONTENTS

The LSFF closure plan consists of 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 LSFF. Information on Hanford Site security also is provided.

1.2.2 Process Information (Chapter 3.0)

This chapter describes how the LSFF processed material 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 LSFF.

1.2.4 Groundwater Monitoring (Chapter 5.0)

This chapter indicates groundwater will not be included in this closure plan.

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 H6-08
Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

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CONTENTS

FIGURES

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2.0 FACILITY DESCRIPTION

2.1 GENERAL HANFORD SITE DESCRIPTION

In early 1943, the U.S. Army Corps of Engineers selected the Hanford Site as the location for reactor and chemical-separation facilities for the production and purification of plutonium. The Hanford Site (Figure 2-1) is a 560-square miles tract of semiarid land that is owned by the U.S. Government and operated by the U.S. Department of Energy (DOE).

2.2 FACILITY DESCRIPTION AND OPERATIONS

The 105-DR Reactor facility was designed and built in the 1950's and is located in the 100-D Area of the Hanford Site, as shown in Figures 2-1 and 2-2. A schematic of the 105-DR Reactor building (including the LSFF) is shown in Figure 2-3. The 105-DR Reactor building is a nonairtight industrial structure built of reinforced concrete in the lower portions and concrete block in the upper portions. The roof is constructed of reinforced concrete or precast concrete roof tile, depending on the specific roof area. The LSFF occupies the former supply fan room of the reactor, and covers approximately 15,000 square feet (1,400 square meters) of floor space.

Alkali metal tests were conducted in three different rooms: the large fire room, the small fire room, and the exhaust fan room (Figure 2-3). Each room is 20.5 feet (6.2 meters) wide, 27 feet (8.2 meters) long, and 21 feet (6.4 meters) high. The large fire room houses the Large Test Cell, which is a steel cubicle 3,743 square feet (106 square meters) in area. There are two 10-inch (25-centimeter) square, 1/4-inch (0.6-centimeter) thick Pyrex* glass observation windows located in the large fire room doors. These windows are protected by the use of safety glass.

The small fire room contains one steel cylindrical pressure vessel with a dished top. This vessel has a volume of approximately 498 square feet (14 square meters), and is pressure rated at 138 pounds per square inch (9.70 kilograms per square centimeters), absolute. Both the Large Test Cell and the pressure vessel in the small fire room could be purged with nitrogen or argon to maintain a controlled atmosphere.

In the exhaust fan room, alkali metal reactions were conducted at atmospheric pressure. Waste alkali metals from various sources, including residuals from tests, failed equipment and drum heals, were reacted in the exhaust fan room. The burn pans and equipment were cleaned periodically, using water as the cleaning solution. The rinsate from cleaning was collected in the sump. The liquid effluent from the cleaning operations was drained to the sump, which is a 22-inch (56-centimeter) deep catch basin with an 18 inch by 18 inch (46 centimeter by 46 centimeter) opening fed by a trough 10 feet (3 meters) long, 7 inches (18 centimeters) deep, and 9 inches (23 centimeters)

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*Pyrex is a trademark of Corning Glass Works.

wide (see lower right portion of Appendix D, Figure D-2). During unit operations, a sump pump was placed in the sump and the wash water was pumped through a hose into the sloped tunnel area that drains directly to the seal pit. The pH of the rinsate was monitored and neutralized to a pH of less than 12.5 before it was discharged to the 116-DR-8 Crib (Figure 2-3). The collected liquid was neutralized with acetic acid in the 1970's; in the 1980's the pH of the liquid rarely, if ever, exceeded 12 and, therefore, neutralization was usually not necessary.

Adjacent to the large fire room is the sodium handling room that serviced the large fire room with a 3,400-liter (900-gallon) Type-304 stainless-steel sodium batch tank and drum melters. The tank was resupplied from sodium drums that were heated to liquify the sodium, which was then discharged into the batch tank with inert gas. Other rooms provided space for office work and storage of nondangerous material. Storage areas contained primarily new materials including stainless steel tubing, small-diameter piping made of stainless and carbon steel, electrical supplies (wiring, extension cords, heaters, etc.), new process equipment, fans, blowers, metal sheeting, new light bulbs, lighting equipment, portable lights, new containers, various fire extinguishing materials, lubricating grease, and lubricating oil. The office area contained only papers, operating records, a few tools, and some small portable monitoring instruments.

The LSFF was equipped with an offgas treatment system that served the test vessels and the exhaust fan room. The overall exhaust system is shown in Figure 2-3. The exhaust route travels from the lower tunnel through the upper tunnel to underground concrete tunnels via a 10-inch (25-centimeter) duct with a 10,000-cubic feet per minute blower and test filters. Steel barricades at the north end of the tunnels block air flow to and from the reactor. The system consists of a 100,000-cubic feet (2,800 cubic meters) per minute capacity filter building, a gravel bed exhaust scrubber (120-gallon per minute), high-efficiency particulate air (HEPA) filters, and a 200-foot (60-meter) stack [9-foot, 6-inch (2.7-meter) internal diameter] located next to the 105-DR Building (Figures 2-3 through 2-5). Test room ventilation rates were 0 to 10,000-cubic feet (280-cubic meters) per minute. Only the submerged gravel bed exhaust scrubber and the ducts connecting the LSFF and the scrubber were constructed for the LSFF.

The 117-DR Filter Building (Figure 2-5) houses the exhaust air filters, while the exhaust air tunnel just upstream from the filter building contains the smoke scrubber. The building is about 59 feet (18 meters) long, 39 feet (12 meters) wide, and 35 feet (11 meters) high. The scrubber circulating pump and the waste discharge pump are located in the filter building. The 117-DR Filter Building is below-grade and constructed from reinforced concrete. The Filter Building is located about 100 feet (30 meters) from the 105-DR exhaust duct system and the 116-DR exhaust stack and is connected by underground concrete ductwork. The filter building contains the HEPA filters, which are installed in four filter frames (24 filters per frame) with two frames in Cell A and two frames in Cell B.

In 1972, the original HEPA filters were replaced before LSFF operations began. From 1972 to 1982, the exhaust traveled from the LSFF through

930617.0932

underground 7-foot by 7-foot (2-meter by 2-meter) concrete tunnels (Figure 2-5) to a spray scrubber and the HEPA filters before exiting through the stack. As part of a filter development program in 1982, a submerged gravel scrubber was added (instead of the underground HEPA filters) to vent the exhaust. As a result of the new gravel scrubber construction, at the completion of tests or waste burning, the 117-DR HEPA filter building can be bypassed. The scrubber water effluent pH level was confirmed to be between 2.0 and 12.5 before discharge to the 116-DR-8 Crib. The exhaust system now allows the use of either the HEPA filter system and ventilation scrubber or the submerged water scrubber, but not both.

About 5,000 gallons (19,000 liters) of sodium, weighing 39,000 pounds (18,000 kilograms), that was procured for testing construction materials is stored in a tank housed in a locked metal building (1720-DR) near the LSFF. The sodium and sodium tank have never been used in the LSFF. This sodium will be removed through a project separate from the closure plan.

Miscellaneous alkali metal handling equipment used to facilitate the testing program included sodium test spill tanks with capacities of 900 gallons (3,400 liters) at a maximum holding temperature of 1200 °F (650 °C), 10 gallons (38 liters) at a maximum holding temperature of 1600 °F (870 °C), and 55 gallons (210 liters) at a maximum holding temperature of 400 °F (200 °C). The early spill tanks were made from thick carbon steel piping, and the later tanks from stainless steel. These tanks were completely airtight, so there was no possibility for alkali metal to escape into the work rooms. Sodium test spill rates are up to 300 gallons (1,100 liters) per minute, while lithium test spill rates are up to 5 gallons (20 liters) per minute.

Testing area capabilities for the LSFF included the following:

- Alkali metal spills up to 5,000 pounds (2,000 kilograms) at 1600 °F (870 °C) and up to 300 square foot (28 square meters) of pool surface
- Demonstration of various fire extinguishing concepts
- Study of small- and large-scale effects of chemical reactivity of alkali metals under accidental spill conditions
- Sodium-concrete reaction tests
- Cell liner test design
- Post-accident cleanup development
- Lithium fire and reaction testing.

The Part A permit application allowed for the treatment and storage of up to 5,300 gallons (20,000 liters) of nonradioactive sodium, lithium, and sodium-potassium metal waste each year. The Part A permit described the treatment of up to 26 gallons (100 liters) per day of alkali metal dangerous waste. Treatment consisted of heating the waste to the point of oxidation in the exhaust fan room. Emissions were then routed to an off-gas treatment system. The facility was used to treat alkali metal waste as needed during the operation of the testing program from 1972 to 1986.

2.3 SECURITY INFORMATION

The following sections describe the 24-hour surveillance system, warning signs, and barriers used to provide security and controlled access to the Hanford Facility.

The entire Hanford Facility is a controlled access area. The Hanford Facility maintains around-the-clock surveillance for protection of government property, classified information, and special nuclear materials. The Hanford Patrol maintains a continuous presence of armed guards to provide additional security.

Manned barricades are maintained around the clock at checkpoints on vehicular access roads leading to these areas (Yakima and Wye Barricades, Figure 2-1). All personnel accessing the Hanford Site areas must have a U.S. Department of Energy-issued security identification badge indicating the appropriate authorization. Personnel also might be subject to a random search of items carried into or out of the Hanford Site.

Signs are, or will be, posted at area boundaries within the Hanford Site stating "NO TRESPASSING. SECURITY BADGES REQUIRED BEYOND THIS POINT. VEHICLES ONLY. PUBLIC ACCESS PROHIBITED" (or an equivalent legend).

In addition, warning signs stating "DANGER--UNAUTHORIZED PERSONNEL KEEP OUT" (or an equivalent legend) are, or will be, posed at TSD units within the Hanford Facility. These signs are, or will be, written in English, legible from a distance of 25 feet (7.6 meters), and visible from all angles of approach.

LSFF is locked around the clock and only authorized plant operations personnel have access. A 30-inch (76-centimeter)-thick concrete wall separates the front face work area of the 105-DR Reactor from the nearest portion of the LSFF and sodium handling room. A 5-foot (1.5-meter)-wide by 8-foot (2.4-meter)-high doorway through this wall is closed by an existing locked steel door and a new wall of 8-inch (20-centimeter) concrete blocks. Two other entries to the reactor portion of 105-DR have been sealed by concrete blocks. One entry area through steel panels is sealed by a steel plate welded over the opening.

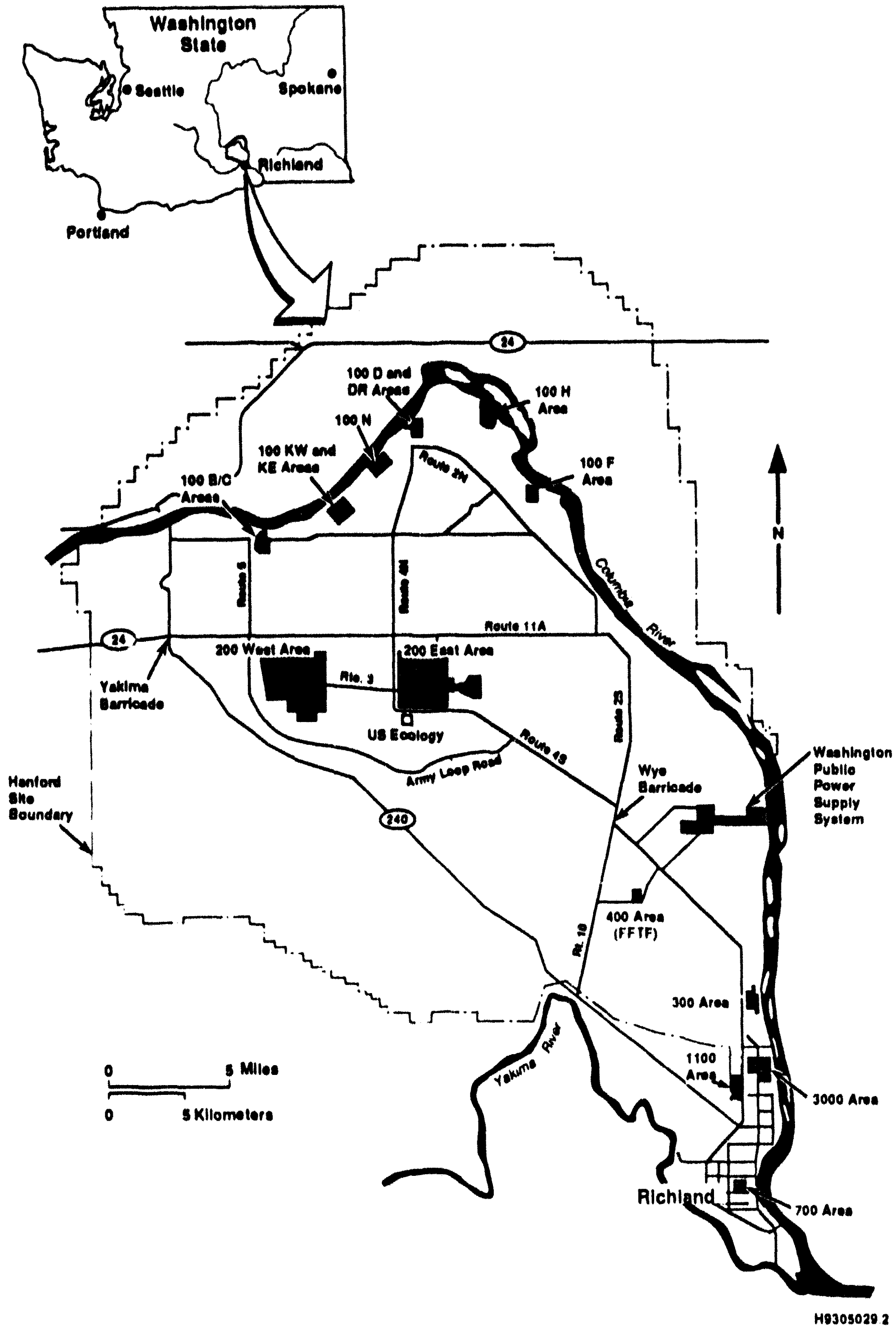

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Figure 2-1. Hanford Site.

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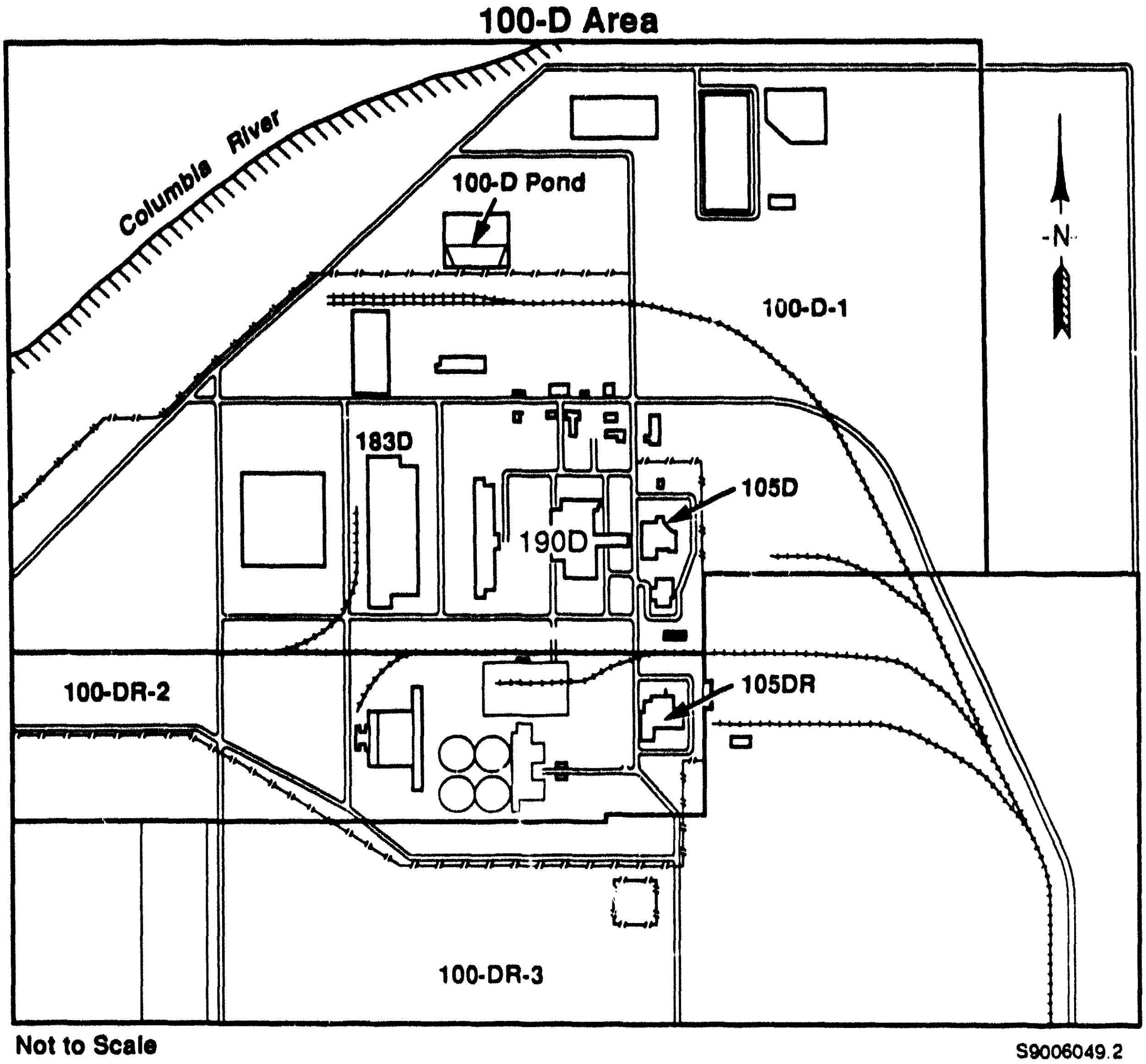

1 Figure 2-2. The 100-D Area of the Hanford Site.

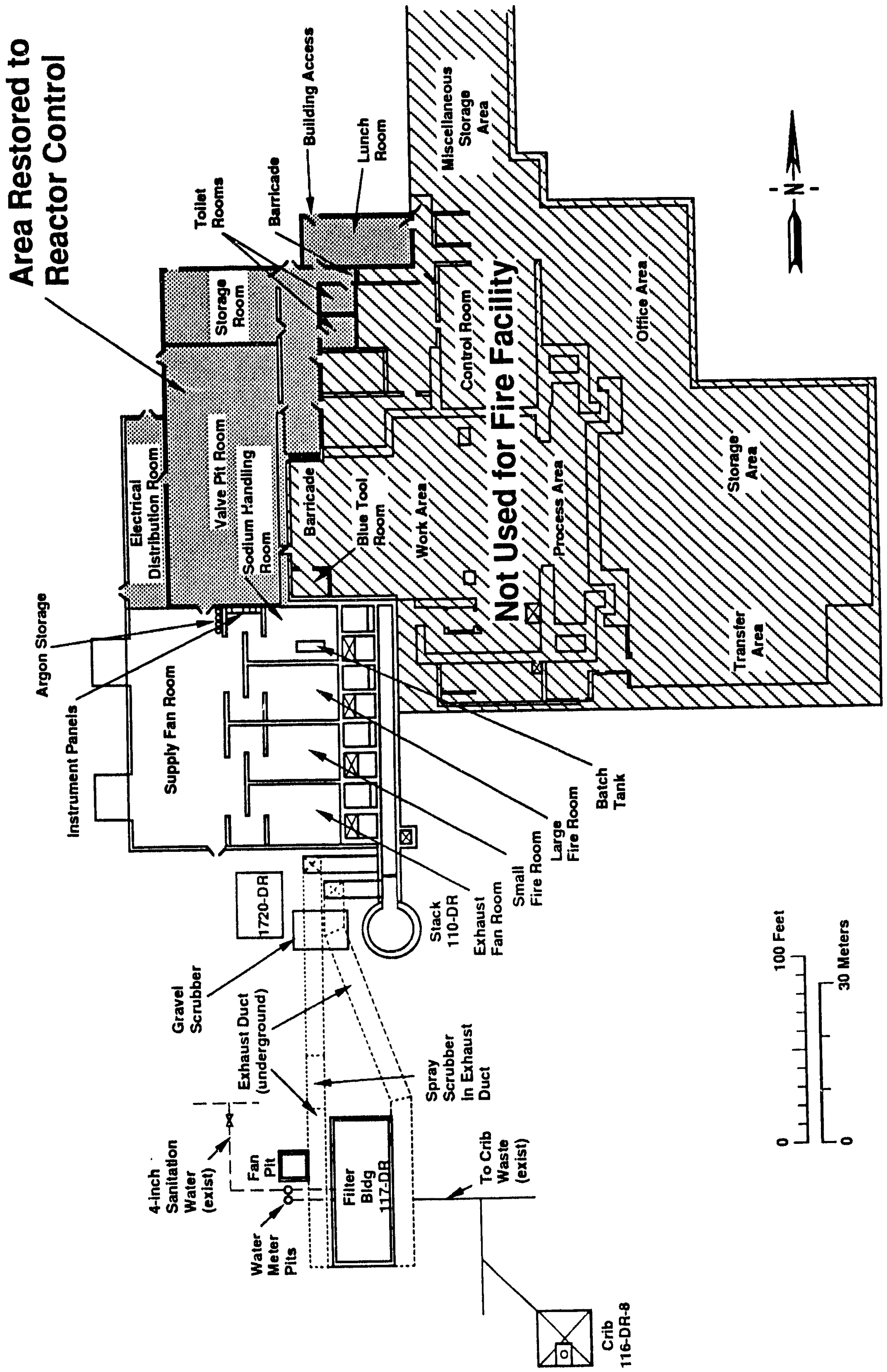

Figure 2-3. A Schematic of 105-DR Reactor Building Including the Large Sodium Fire Facility.

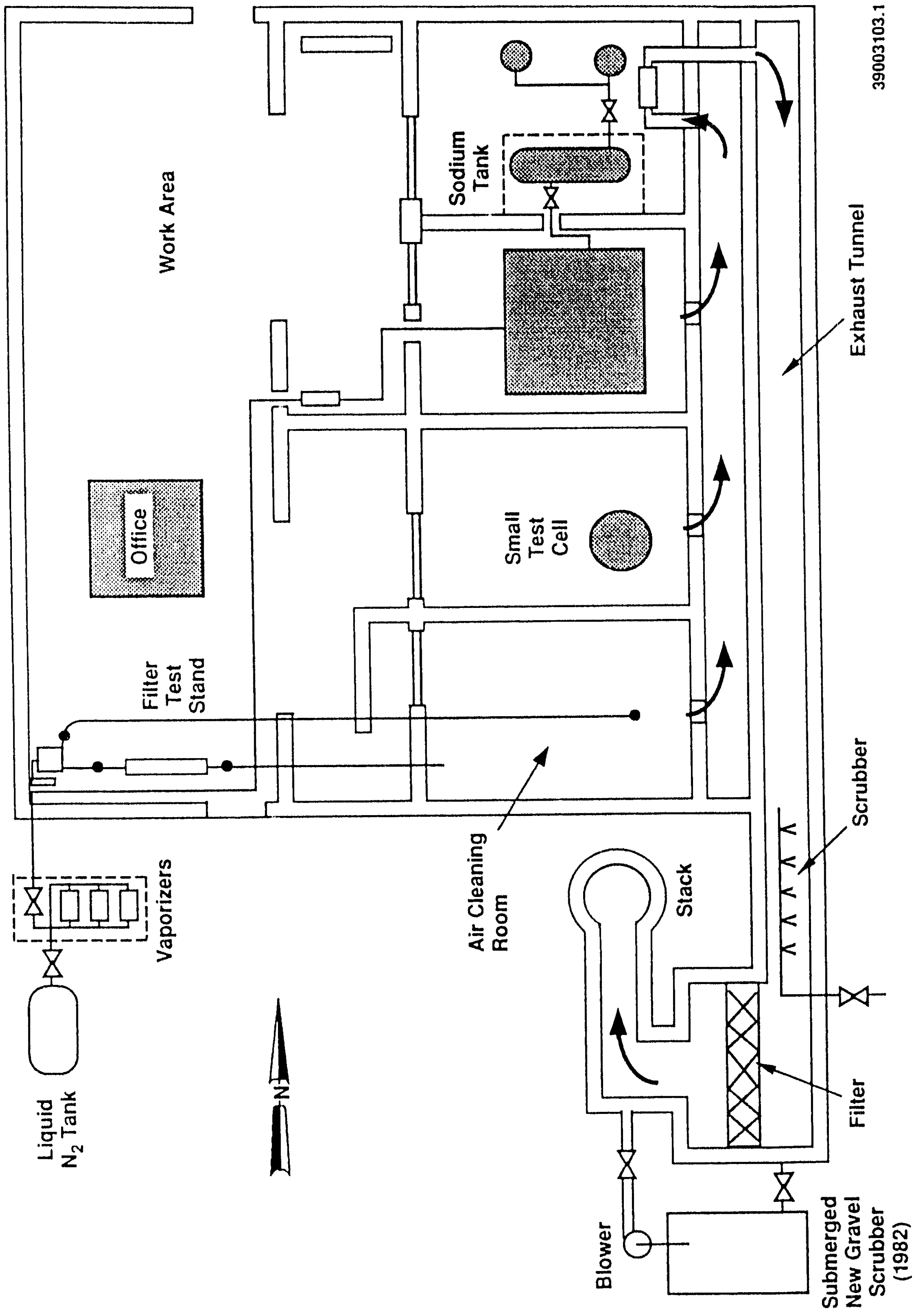

Figure 2-4. A Schematic of the Overall Large Sodium Fire Facility Exhaust System.

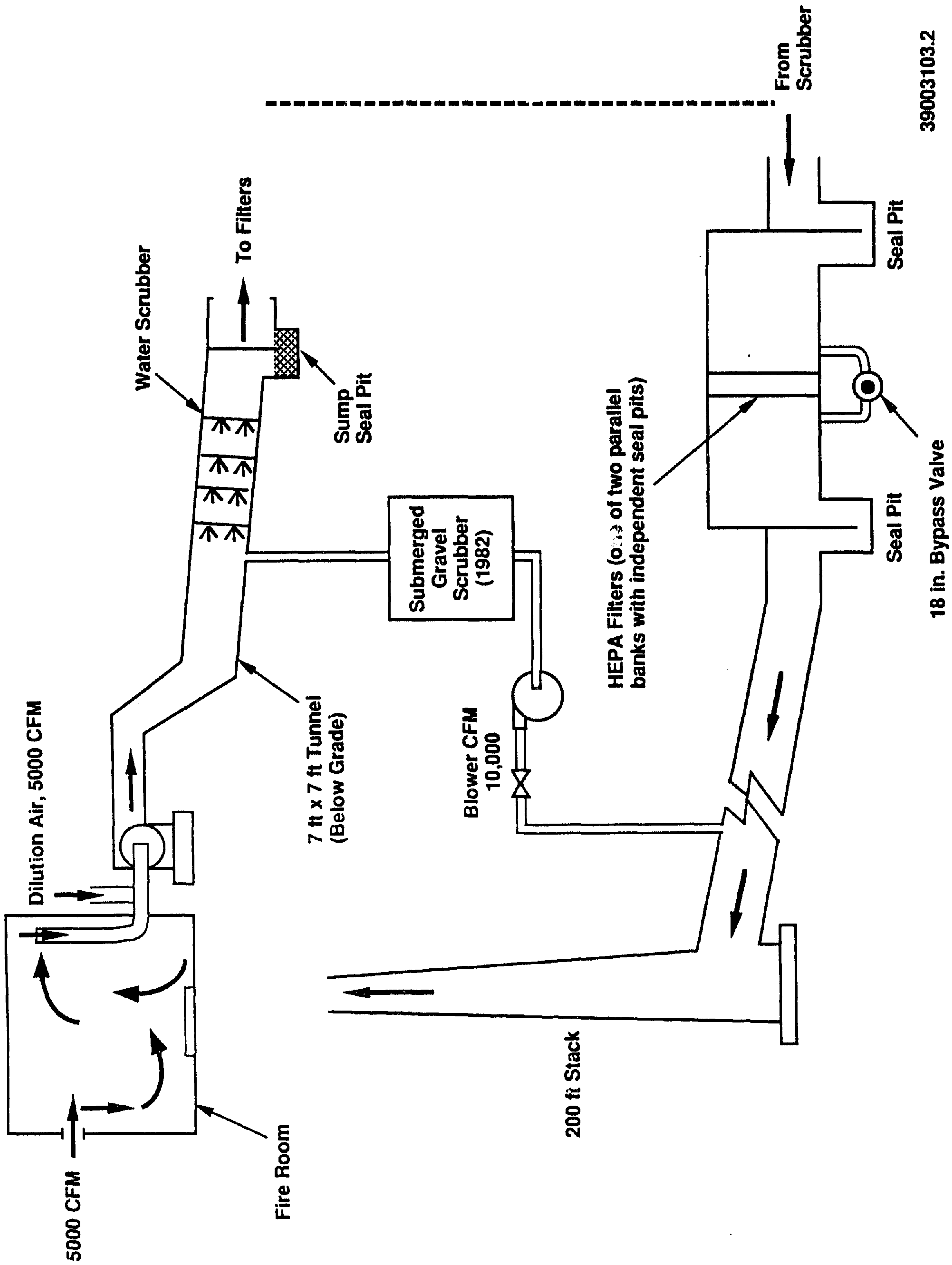

Figure 2-5. A Schematic of the 117-DR Filter Building Exhaust System.

CONTENTS

TABLE

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3.0 PROCESS INFORMATION

The LSFF has been used primarily to conduct experiments for studying the behavior of molten alkali metals, sodium and lithium, and alkali metal fires. The waste generated at the facility includes alkali metal oxides, hydroxides, silicates, and carbonates, and residual alkali metal waste [*RCRA Part B Permit Application, Alkali Metal Treatment and Storage Facilities*, D-2, 1985 (DOE 1985)] associated with the tests. The sodium carbonate was formed from the reaction of the oxides and hydroxides with air. Similarly, both purchased and waste lithium also were burned at the site, producing lithium carbonate, oxide, hydroxide, and silicate as aerosol by-products.

The laboratory tests conducted at the LSFF can be grouped into the following general types by the test purpose as follows:

- Formation of alkali metal aerosols in air, steam, nitrogen, or carbon dioxide atmospheres for the purpose of determining aerosol properties and release ratios, using both pool and spray fires
- Reaction of an alkali metal with concrete and insulation (Kaylo* heat insulation and Super-X block** insulation, both fiberglass) to study corrosion rates and to determine the reaction products formed
- Generation of aerosols to be used for testing and measurement of air-cleaning filter and scrubber performance and for evaluating hydrogen ignition characteristics
- Production of fire and smoke to test alkali metal fire extinguishing methods and equipment, testing of protective equipment, and for training in equipment use
- Testing of purchased lithium-lead alloy reaction rates and aerosol formation in various atmospheres
- Development tests using cesium and zinc metal to demonstrate aerosol generation techniques
- Thermal treatment of sodium residue (sodium waste) generated in other facilities.

The lithium-lead alloy was tested by its reaction with air and steam (not by burning) in the small fire room (Jeppson 1978). In these tests, the surface lithium converted to a gray coating of lithium carbonate (air reaction) and lithium hydroxide (water reaction). The reactions were limited because less than stoichiometric amounts of steam were used in the tests. The dangerous waste shipment records indicate that the lithium-lead alloy was

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*Kaylo is a trademark of Owens Corning.

**Super-X block is a trademark of John Mansfield.

disposed of in two 440 pound (200 kilogram) masses and placed in steel drums and sent for offsite disposal through the 340 Facility, which was the central waste accumulation area for the operating contractor. In 1986, the test equipment for the lithium-lead test was relocated to the 221-T Facility, where the testing program continued.

A secondary mission of the LSFF was to burn alkali metal waste generated at the LSFF, the 221-T Containment Systems Test Facility, and 300 Area sodium and lithium facilities. When the LSFF was being used to treat alkali metal waste, the waste was burned until the reaction was not sustainable. The residues were then reacted with water. The waste products from this process were also alkali metal oxides, hydroxides, and carbonates. None of the waste treated in the facility was radioactive.

Only the exhaust fan room was used to burn waste sodium and lithium. The exhaust fan room and small fire room were both used for the metal reaction tests. The sodium handling room was used for mixing and transferring sodium for the tests. The large fire room was used for burning sodium associated with the testing program.

While burning, waste metal was stirred to ensure a complete burn, and the scrubber system controls were monitored. At the completion of a burn, the equipment was checked for unburned metal, washed down, and inspected again to ensure that no residual unreacted metal remained (DOE 1985, pp D-20 and F-11). Wash water from the cleanup was monitored for corrosivity (kept below a pH level of 12.5) and collected in the sump. The sump was pumped via a sump pump and hose to the tunnel bed which drains directly to the seal pit. The water was collected in the seal pit, monitored for pH, neutralized if needed, and then pumped from the seal pit to the 116-DR-8 Crib.

In 1987, samples of the residues were collected from the lower exhaust tunnel wall and analyzed. Locations of the sampling points are shown in Appendix A. While the sample results for lithium and carbonates were expected, the lead content in some of the samples was high (the highest, from a concrete scraping, was 1,300 parts per million). The lithium-lead alloy was reacted in the small fire room; inside a closed containment pressure vessel. The lead content in the samples from different locations [low content in the small fire room; higher content in the exhaust fan room upwind of the tests; very low content in the tunnel immediately downwind of the tests; and the highest content in scrapings near the wall constructed between the tunnel and rest of the reactor (see Appendix A)] indicates that the lead may be from a lead-based primer used to paint the tunnel rather than associated with the testing. The analysis performed also reflects total lead content and not the results of an extraction procedure toxicity test. According to information from former reactor workers currently employed in the surplus facilities decommissioning program, the tunnels had been painted to minimize the possibility of radioactivity penetrating into the porous concrete. Paints used during that era (1947 to 1964) commonly contained lead. Thus, it can be assumed that the high level of lead found in the concrete scrape sample is from the lead-based paints used during reactor operations. No radioactivity is expected in the work areas of the LSFF because there was no exchange of air with the reactor. However, contaminated air was previously carried from the reactor, through the exhaust tunnels, through the underground 117-DR HEPA filter building, and to the stack. When the reactor first began operations, reactor exhaust went directly from the tunnels to the stack. The extent of decontamination activity performed in the mid-1970's to support the establishment of the LSFF is not known.

In 1987, four of the seven samples from the lower tunnel in the 105-DR Reactor tested for reaction by-products were also tested for radioactivity (see Appendix A). Only one sample showed radioactivity above detectable levels (Table 3-1).

The upper exhaust tunnel was not sampled in 1987 because of inaccessibility.

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Table 3-1. Radioactivity in Waste Samples.

disintegrations per minute per gram (d/min/g)					
Sample	Alpha	Beta	Gamma		
			^{137}Cs	^{60}Co	^{152}Eu
2	< 6	330	70	50	48
4	<13	<30	<14		
6	<19	<47	<18		
7	<14	<35	<10		

CONTENTS

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4.0 WASTE CHARACTERISTICS

4.1 ESTIMATE OF MAXIMUM INVENTORY OF WASTE

The estimated maximum inventory (based on facility operating information) of sodium and lithium wastes stored at the 105-DR LSFF was approximately 1,000 pounds (450 kilograms) stored during December 1982 and January 1983.

4.2 WASTE STORED AT THE FACILITY

Sodium has been designated as a dangerous waste because of its ignitable and reactive characteristics. The sodium handled in the LSFF was either purchased for the tests or was waste from other Hanford Site operations. At least 95 percent of all the waste materials are residues of sodium, which is now sodium carbonate (see Appendix A for a partial analysis of waste). Approximately 4 percent of the waste is other alkali metal carbonates, including lithium carbonate, residual lithium nitride, and cesium carbonate. Approximately 1 percent or less are sodium and lithium silicates and miscellaneous materials described elsewhere in this chapter.

The material was treated by burning, which produces sodium oxide (Na_2O), sodium hydroxide ($NaOH$), and sodium carbonate (Na_2CO_3). Sodium oxide and hydroxide are strong alkalis, but readily absorb carbon dioxide from the atmosphere and convert to sodium carbonate. Sodium carbonate is typically called soda ash and is found naturally. Similarly, both purchased and waste lithium were also burned at the site, with lithium carbonate as the main final product. Lithium nitride was also produced, however, and records show that it was drummed and sent to the 340 Building (300 Area) for eventual disposal.

Two cesium and zinc aerosol tests were conducted at the LSFF in the Small Fire Room steel vessel. During these tests, a total of approximately 2 pounds (1 kilogram) of cesium metal and about 0.25 pounds (110 grams) of zinc metal were used; about half of the metal was consumed during the tests. Most of the test residues were collected and disposed of at that time. There have been two small cesium burns in the Exhaust Fan Room, but no zinc was involved in those tests. Compared with the other materials burned, the quantity of cesium released is very small, much less than 1 percent. Cesium is readily oxidized and any unreacted cesium is now an oxide and/or complexed with other materials, such as hydroxides and silicates, which would be codeposited with the sodium carbonate matrix. In the unlikely event that any zinc was released, it would also be codeposited within the sodium carbonate matrix.

Because the sodium and lithium burn tests were conducted on concrete (conventional and magnetite concrete), reaction by-products of the concrete constituents were also produced. The by-products of the reaction were silicon dioxide, sodium and lithium silicates, aluminum oxide, magnesium oxide, and iron oxides. Other trace inorganic compounds may also have been produced because of impurities in the concrete.

The lithium-lead alloy test was conducted only once. This test was performed in the Small Fire Room inside the steel burn vessel. The waste has been cleaned and removed.

The overwhelming majority of the residues, both sodium and lithium carbonate, is characteristic category D (least toxic) dangerous waste. The lethal dose (LD_{50}) for oral exposure to rats of sodium carbonate is 4,090 parts per million (see MSDS); for lithium carbonate, the same LD_{50} is 525 parts per million. Compounds with LD_{50}s at concentrations of from 500 to 5,000 parts per million are category D dangerous waste as established by WAC 173-303-101. Levels of lead in waste extract greater than 500 milligrams per liter are considered to be an extremely hazardous waste (EHW); and levels of lead from 5 to 500 milligrams per liter are considered to be a dangerous waste (DW) (WAC 173-303-090). The MSDSs for lead, sodium carbonate, and lithium carbonate have been included in Appendix C.

The LSFF ventilation tunnels contain mostly deposits of sodium carbonate that formed from sodium oxides and hydroxides reacting with air. Other deposits include lithium carbonate, lithium nitride, and sodium and lithium silicates.

CONTENTS

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5.0 GROUNDWATER

Groundwater protection regulations established in WAC 173-303-645 only pertain to land treatment units (i.e., surface impoundments, waste piles, land treatment units, or landfills). Also, in accordance with the Tri-Party Agreement (Ecology et al. 1992), groundwater in the 100-D Area will be included in the 100-HR-3 operable unit and investigated under the RFI/CMS process. Therefore, groundwater is not included as part of the LSFF closure plan. The RFI/CMS draft work plan (DOE/RL 1989) is currently under review by Ecology.

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CONTENTS

FIGURE

TABLE

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6.0 CLOSURE STRATEGY AND PERFORMANCE STANDARDS

6.1 CLOSURE STRATEGY

The strategy of this closure activity is to provide clean closure of 105-DR LSFF. Clean closure of the LSFF is contingent on verification that constituents originating from the LSFF are not present in concentrations that represent a threat to human health or the environment. This contingency will be assessed using information obtained from implementation of sampling activities outlined in Chapter 7.0. No future use of the 105-DR reactor or LSFF is planned or expected.

Special conditions at the LSFF were important considerations in developing this closure plan. These considerations are past use as part of a nuclear production reactor, other near-future characterization and remediation programs (see Section 6.4), the low level of hazard associated with the residues from waste burned at the LSFF, and the inaccessibility of the residues to humans and the environment.

Clean closure will be achieved by removing surface deposits of sodium and lithium carbonates and determining if the equivalent concentrations of carbonates embedded in the concrete and soil are either: (1) below dangerous waste levels for mixtures, (2) not statistically greater than background levels for these media (background being defined as the concrete or soil used for, and possibly impacted by, reactor operations but unimpacted by the LSFF), or (3) at concentrations that require no further activities for the protection of human health and the environment. These performance standards are referred to as action levels in this plan.

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 (LOQ). Background will be Hanford Sitewide soil background concentrations as defined in *Hanford Site Soil Background* (DOE-RL 1992b). If concentrations exceed initial action levels, health-based action levels will be assessed. The LSFF action levels are intended to be consistent with CERCLA remedial action levels.

The health-based level will be based on equations and exposure assumptions presented in the *Hanford Site Baseline Risk Assessment Methodology* (DOE-RL 1992a). For noncarcinogenic substances, 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) (EPA 1991), a database that periodically is updated by the EPA. 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 LSFF dangerous waste will be decontaminated (Bracken 1991; or other appropriate procedure) or disposed of in compliance with applicable regulations.

6.1.2 Analytes of Concern

The principal analytes of concern for decisions of remediation are sodium carbonate, alkali metal carbonates including lithium carbonate, residual lithium nitride, and cesium carbonate. Approximately 1% or less are sodium and lithium silicates and miscellaneous materials described later in this section.

The test burns produced sodium oxide (Na_2O), sodium hydroxide (NaOH), and sodium carbonate (Na_2CO_3). Lithium carbonate reaction by-products of the concrete constituents were produced, including silicone dioxide, sodium and lithium silicates, aluminum oxide, magnesium oxide, and iron oxides.

Analysis of lead, lithium, and sodium will be performed. Other Target Analyte List (TAL) inorganics are listed in Table 6-1:

These analysis are discussed in Chapter 7.0, Section 7.3.

6.2 CLOSURE PERFORMANCE STANDARDS

Washington State Department of Ecology closure performance standards [WAC 173-303-610 (2)(a)] require that the owner/operator close a facility in a manner that does the following:

- Minimizes the need for further maintenance

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

- 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.

However, Federal Regulations in 40 CFR 265.381 ("Thermal Treatment Facility Closure," p. 685) state the following:

> "At closure, the owner or operator must remove all hazardous waste and hazardous waste residues (including, but not limited to, ash) from the thermal treatment process or equipment."

6.2.1 Minimizing 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. Closure of the LSFF by removing or decontaminating equipment (to proposed action levels) and, as necessary, the surrounding soils, will eliminate the need for further maintenance. Regardless of closure actions associated with the LSFF, however, general maintenance of the 105-DR Reactor structure will continue until final decommissioning.

6.2.2 Protection of Human Health and the Environment

WAC 173-303-610(2)(a)(ii) requires a closure plan to provide for the protection of human health and the environment. As discussed previously, the LSFF will be closed by removing or decontaminating, to proposed action levels, all dangerous waste and waste residues and any contaminated soils to protect human health and the environment.

6.2.3 Return of the 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. Following clean closure, the 105-DR Reactor will have been restored to the condition of the other closed production reactors of the same age (e.g., 105-H, 105-F, 105-C).

6.2.4 Waste Alkali Metals

No waste sodium or lithium remains at the site.

6.2.5 Remaining Sodium

About 5,000 gallons (19,000 liters) of sodium weiging 39,000 pounds (18,000 kilograms) procured for tests of construction materials are stored in a tank that is located in a locked metal building (1720-D) near the LSFF. This sodium will be removed for other use or excessed for sale through a project separate from this closure plan.

6.2.6 Other Materials

Other materials associated with the LSFF and remaining on the site are electrical equipment (mostly wires and conduit, but no transformers or polychlorinated biphenyls), burn pans from sodium fires, metal burn cells, and an empty liquid nitrogen tank (vendor owned). These materials will be cleaned as appropriate (see Chapter 7.0, Section 7.4.5) and disposed of as surplus property or placed in the appropriate landfill.

6.3 CLOSURE ACTIVITIES

The LSFF will be closed in a manner consistent with Washington State guidelines and regulations. The general closure procedures are shown in Figure 6-1 and listed below (see Chapter 7.0 for complete explanation of procedures).

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 100-DR Area, including the LSFF as follows:

- Sample the areas of the facility to:
  - Determine reaction by-product deposit composition
  - Determine if the source of previously detected lead contamination is from paint used to seal the reactor tunnel walls and not from LSFF waste treatment-related activities
  - Determine if all contamination has been removed (for soils, see Chapter 7.0, Section 7.3.1).
- Decontaminate the structures as specified.
- Verify cleanup and certify that all closure activities were completed in accordance with the approved plan.

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.

Two official copies of this closure plan will be located at the following office: U.S. Department of Energy, Richland Operations Office, Federal Building, 825 Jadwin Avenue, P.O. Box 550, Richland, Washington 99352. The DOE-RL will be responsible for amending this plan as amendments become necessary, according to the amendment procedure identified in WAC 173-303-610. The plan will be kept at DOE-RL until closure is completed and certified.

6.4 COORDINATION WITH OTHER PROJECTS

The LSFF is located within the 100-DR-2 (source) and 100-HR-3 (groundwater) operable units designated in the Tri-Party Agreement (Ecology et al. 1992). These operable units will be addressed through the RFI/CMS process. The 100-DR-2 operable unit is expected to begin geophysical characterization work in FY 1993; the 100-HR-3 operable unit began characterization work in FY 1991 and is expected to continue through FY 1993.

In addition, consistent with the Tri-Party Agreement (Ecology et al. 1992, page 6-4), once any dangerous waste associated with the LSFF is removed, the entire reactor will remain for future decontamination and decommissioning [also see the draft EIS for decommissioning eight surplus production reactors (DOE-RL 1989, pp 1.7 through 1.13)].

Thus, remedial action with respect to contaminants not associated with the LSFF, or associated with the LSFF and not covered under this closure plan, will be deferred to the reactor decommissioning EIS (the 105-DR Reactor building, stack, and 117-DR filter building) or the RCRA process (116-DR-8 Crib and soil).

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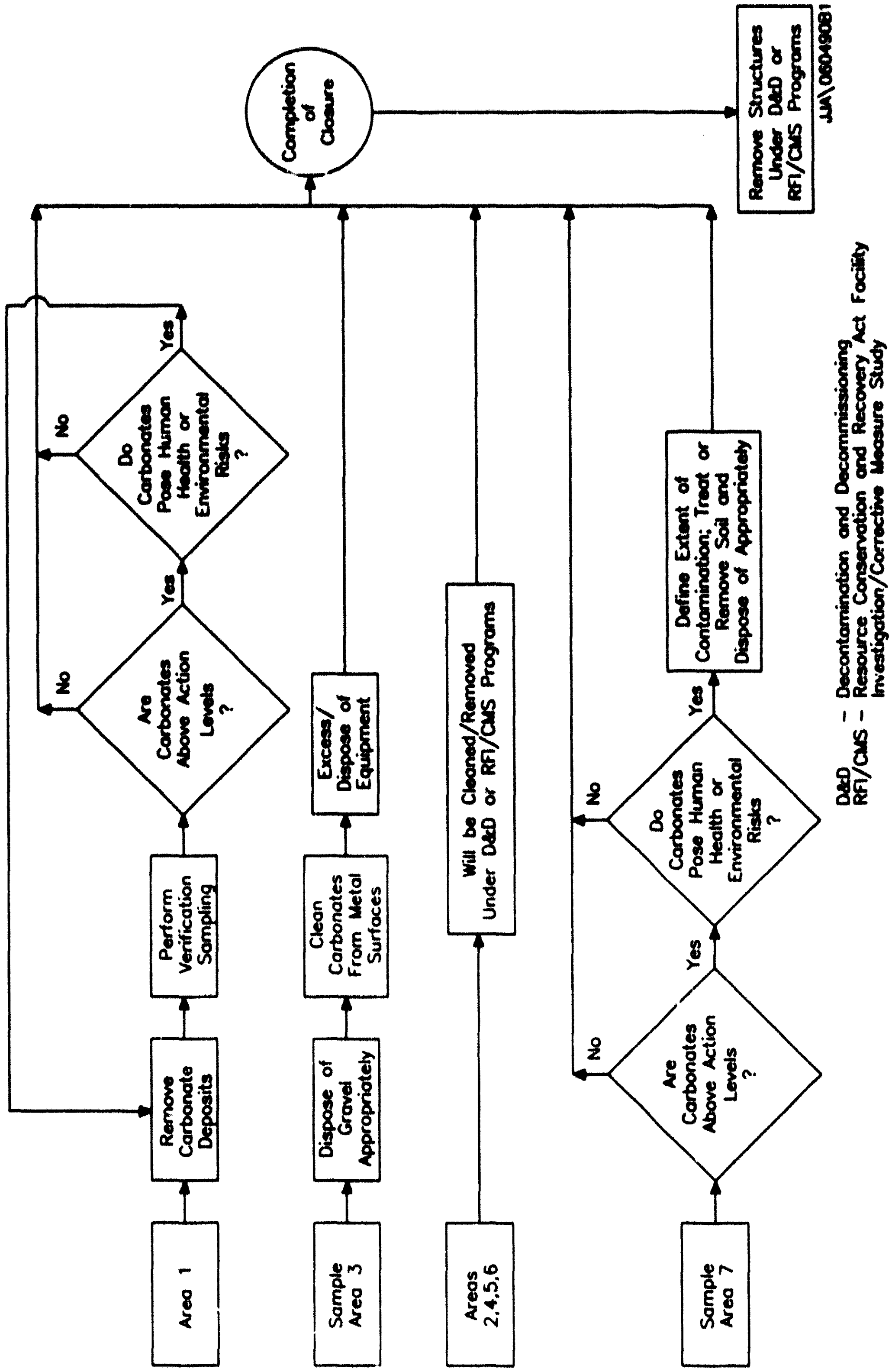
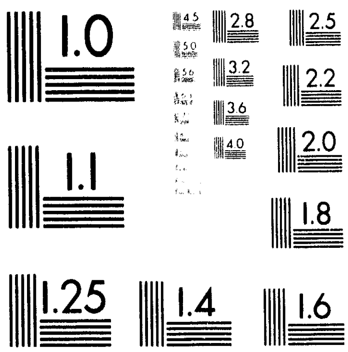


Figure 6-1. Closure Flowchart for the 105-DR Large Sodium Fire Facility, (see Section 7.3 for a Description of Areas 1 through 7).

Table 6-1. Other Target Analyte List Inorganics to be Reported.

Aluminum	Magnesium
Antimony	Manganese
Arsenic	Mercury
Barium	Nickel
Beryllium	Potassium
Cadmium	Selenium
Calcium	Silver
Cesium	Thallium
Chromium	Vanadium
Cobalt	Zinc
Copper	Cyanide
Iron	


1.0
2.8
2.5
3.2
2.2
3.6
2.0
4.0
1.1
1.8
1.25
1.4
1.6

STATE ENVIRONMENTAL POLICY ACT
ENVIRONMENTAL CHECKLIST FORMS

FOR

105-DR LARGE SODIUM FIRE FACILITY CLOSURE

REVISION 1

May, 1993

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

A. BACKGROUND

1. Name of proposed project, if applicable:

Closure of the 105-DR Large Sodium Fire Facility (LSFF). Information contained in this State Environmental Policy Act (SEPA) Checklist pertains only to the portion of the Hanford Site 100-D area which contains the 105-DR LSFF. In the context of the document, "site" refers only to the area covered by the physical structure of the 105-DR LSFF and associated facilities discussed in the answer to Checklist Question A.11, whereas "Site" refers to the Hanford Site.

2. Name of applicants:

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

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

Contact:

J. E. Rasmussen, Acting Program Manager
Office of Environmental Assurance, Permits, and Policy
(509) 376-2247

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

4. Date checklist prepared:

May 10, 1993

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):

Final closure activities will be completed and certified in accordance with the closure plan. Soil and sediment sampling will be conducted during closure activities. If the sampling results indicate that clean closure is not possible, closure (decontamination) will be coordinated with decontamination of the 105-DR Reactor, which is located in the Resource conservation and Recovery Act (RCRA) Practice Operable Unit 100-DR-2. Decommissioning activities will be conducted in accordance with the records of decision for the 100-DR-2 Operable Unit and for the Environmental Impact Statement (EIS), Decommissioning of Eight Surplus Production Reactors at the Hanford Site.

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

The LSFF is located within Operable Units 100-DR-2 (source) and 100-HR-3 (groundwater), as designated in the Hanford federal Facility Agreement and Consent Order (HFFACO). Clean closure is proposed, and once any dangerous waste associated with the LSFF is removed, the entire reactor will remain for future decontamination and decommissioning as discussed in the final surplus production reactor decommissioning EIS (DOE 1992; pp 1.7 - 1.13). Any remedial action with respect to either contaminants not associated with the LSFF, or associated with the LSFF not yet cleaned to action levels under this closure plan, will be deferred to the reactor decommissioning EIS record of decision or the RCRA facility Investigation/Corrective Measures Study (RFI/CMS) process.

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

This SEPA Checklist is being submitted to the Washington state Department of Ecology (Ecology) and the U.S. Environmental Protection agency (EPA) concurrently with the RCRA closure Plan for the 105-DR LSFF. The RCRA Part A and Part B permit applications were submitted to Ecology in November 1985. A revised Part A permit application was submitted to ecology in November 1987.

Final Environmental Impact Statement - *Decommissioning of Eight Surplus Production Reactors at the Hanford Site*, Richland, Washington DOE/EIS-0119D, U.S. Department of Energy, 1992, Washington, D.C.

General information concerning the Hanford Facility environment can be found in the *Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Revision 5, December 1992. This document is updated annually by Pacific Northwest Laboratory, and provides current information concerning climate and meteorology; ecology; history and archeology; socioeconomic; land use and noise levels; and geology and hydrology. This baseline data for the Hanford Site and its past activities are useful for evaluating proposed activities and their potential environmental impacts.

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.

Ecology is the lead regulatory agency authorized to approve the closure plan for the 105-DR LSFF pursuant to the requirements of the Washington Administrative Code, (WAC) 173-303-610. The closure plan must also receive approval from the EPA. No other permits are known to be required at this time.

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 project is the final closure of the 105-DR Large Sodium Fire Facility. Clean closure is proposed as the condition for final closure of the facility. Clean closure is contingent on verification that all wastes and contaminants are removed to accepted action levels and that all equipment, structures, liners, soils and/or other materials containing dangerous wastes or residues associated with the LSFF are removed from the site.

The facility consists of three fire rooms, a Sodium Handling Room, the Supply fan room, an exhaust gravel scrubber, and office space directly connected to the 105-DR Reactor.

All equipment and fixtures will be decontaminated, removed, and appropriately disposed of. The buildings and floors will be decontaminated to appropriate action levels with one or more of the following methods:

- Damp wipe downs
- Vacuum assisted mechanical removal
- Sandblasting
- High-pressure steam/water and suction

The buildings, floors, soil and gravel will be sampled to determine the levels of remaining contamination and the requirements for additional decontamination. Clean closure will be achieved when sampling shows that the remaining contamination is below acceptable action levels as defined in the closure plan. Eventually the concrete will be disposed of with the rest of the 105-DR reactor under the decommissioning program.

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 105-DR LSFF is located in the northwest portion of the Hanford Site 100-D Area approximately 35 miles northwest of the city of Richland. The

105-DR LSFF is connected to the 105-DR Reactor. It is in the W 1/2, NW 1/4, section T14N, R26E. A location map and site plans are included in the closure plan.

TO BE COMPLETED BY APPLICANT | **EVALUATIONS FOR AGENCY USE ONLY**

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 approximate slope of the land is less than 2 percent.

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.

Soil types consist mainly of eolian and fluvial sands and gravel. More detailed information concerning specific soil classifications can be found in the *Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Revision 5, December 1992. Farming is not permitted on the Hanford Facility.

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

No.

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

No filling or grading is required.

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

No.

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

Not applicable. No construction would occur.

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

Not applicable. Earth would not be disturbed.

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.

Minor amounts of exhaust would be generated by vehicles used to gain access to the site. Small quantities of dust could be generated by decontamination and sampling activities.

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

No.

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

Good engineering practices would be followed, and actions would comply with onsite procedures designed to protect the environment and worker safety and 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.

There is no surface water body on or in the immediate vicinity of the 105-DR LSFF. However, the Columbia River is approximately 0.75 mile (1.2 kilometer) away. No perennial streams originate within the Columbia Plateau.

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.

The work would not require any activity in or near the described waters.

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.

None. There would be no dredging or filling.

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

The water supply for the 100-D Area is pumped from the Columbia River. The 105-DR LSFF closure activities would use insignificant amounts of this overall withdrawal.

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

The 105-DR LSFF is not within the 100 year floodplain (*Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Revision 5, December 1992).

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 groundwater would be withdrawn in support of this project, and water would not be discharged to the aquifer.

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.

Sanitary waste from the 105-DR LSFF is discharged to the 105-D Area sanitary trench. Closure of the 105-DR LSFF will not impact the existing sanitary waste sewer system.

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 Facility receives only 6 to 7 inches (15.2 to 17.8 centimeters) of annual precipitation. Precipitation runs off the existing buildings and seeps into the soil on and near the buildings. This precipitation does not reach the groundwater or surface waters.

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

Waste materials would not enter ground or surface waters. All waste materials would be contained.

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

No surface, ground, or run-off water impacts are expected.

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
- _X_ 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

The most common vegetation community in the 100-D Area is the sagebrush/cheatgrass or Sandberg's bluegrass. Native vegetation in the immediate vicinity of the 105-DR LSFF has been eradicated.

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

No native vegetation alteration would occur.

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

The 105-DR LSFF is located within a previously disturbed area that has been heavily industrialized since the mid 1940's, and biological survey personnel indicate that no sensitive species occur in the general vicinity.

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

Not applicable.

5. Animals

a. Indicate (by underlining) 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 rarely seen in the 100-D Area Area. Small passerines (sparrows, finches) are present in the general vicinity of the 105-DR LSFF. Rabbits and coyotes occasionally are seen in the general area.

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

Two federal and state listed threatened or endangered species have been identified on the Hanford Site along the Columbia River; the bald eagle and peregrine falcon. In addition, the state listed white pelican, sandhill crane, and ferruginous hawk also occur on or migrate through the Hanford Site. Of these five species, none is likely to use the shrub-steppe habitat of the 100-D Area.

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

The Hanford Site is a part of the broad Pacific Flyway.

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

This project contains no specific measures to preserve or enhance wildlife.

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 is used at the 105-DR LSFF for heating, lighting, and other power needs.

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 easily applicable to the 105-DR LSFF closure.

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.**

Possible environmental health hazards to workers could arise from activities at the 105-DR LSFF. The hazard could come from exposure to dangerous, radioactive, and/or mixed waste. Stringent administrative controls and engineered barriers are employed to minimize the probability of even a minor incident and/or accident. A chemical spill, release, fire, or explosion could occur only as a result of a simultaneous breakdown in multiple barriers or a catastrophic natural forces event.

1) **Describe special emergency services that might be required.**

Hanford Site security, fire response, and ambulance services are on call at all times in the event of an onsite emergency. 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:**

All personnel are trained to follow proper procedures during the storage and treatment operations to minimize potential exposure. The 105-DR LSFF has systems for ventilation, fire protection, and alarm capability.

Chemical safety hazards would be mitigated by preventing direct contact with the residual chemical constituents. Protective clothing, appropriate training, and respiratory protection would be used by 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)?

Equipment noise in the vicinity, it is not expected to affect personnel at the 105-DR LSFF.

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.

Noise from some operations (e.g., sand-blasting) is expected.

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 that have been used for the production of special nuclear materials. Other scientific and engineering programs are also carried out. Lands north and east of the Columbia River are public lands, including river lands, and wildlife preserves or are used for farming. Some lands contiguous to or surrounded by the Hanford Site are owned by the Bonneville Power Administration, or leased to the Washington

Public Power Supply System, or are owned by or leased to the state of Washington.

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

No portion of the 100-D Area Area has been used for agricultural purposes since 1943, if ever.

c. Describe any structures on the site.

The facility consists of three fire rooms, a Sodium Handling Room, the Supply fan room, the gravel scrubber, and the office space directly connected to the 105-DR Reactor.

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

No.

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 Hanford 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?

Does not apply.

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 100-D Area is fenced and is a previously disturbed industrial area with little or no environmental significance.

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

Approximately 10 people would work at the 105-DR LSFF closure.

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 construction would take place.

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?

Not applicable.

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

No.

c. What existing off-site 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.**

The White Bluffs road is considered eligible for the National Register of Historic Places. This road is about 5 miles (8 kilometers) from the 105-DR LSFF. Additional information concerning Hanford Site cultural resources can be found in *Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Revision 5, December 1992.

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

There are no known landmarks or evidence of historic, archaeological, scientific, or cultural importance at the 105-DR LSFF.

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

Where appropriate, a cultural resource review would provide the vehicle for necessary approvals required under the *National Historic Preservation Act of 1966*.

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 105-DR LSFF 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.**

No.

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

Traffic and parking would not change from existing traffic patterns.

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, potable water, steam, refuse service, telephone, and a septic system are available in the 100-D Area.

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.

No new utilities proposed. No construction.

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 E. Rasmussen

6/24/93

James E. Rasmussen, Acting Program Manager   Date
Office of Environmental Assurance,
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U.S. Department of Energy
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6-22-93

R. E. Lerch, Deputy Director   Date
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DOE/RL-90-25
Revision 1

105-DR Large Sodium Fire Facility Closure Plan

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

Approved for Public Release

MASTER

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105-DR LARGE SODIUM FIRE FACILITY CLOSURE PLAN

FOREWORD

The Hanford Site is owned by the U.S. Government and operated by the U.S. Department of Energy, Richland Operations Office. The Hanford Site produces and manages dangerous waste and mixed waste (containing both radioactive and dangerous components). 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 Site 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.

Westinghouse Hanford Company is a major contractor to the U.S. Department of Energy, Richland Operations Office and serves as co-operator of the 105-DR Large Sodium Fire 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 *105-DR Large Sodium Fire Facility Closure Plan* consists of a Part A Permit Application (Revision 2) and a closure plan. The closure plan consists of nine chapters and five appendices.

This submittal contains information current as of May 28, 1993.

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CONTENTS

APPENDICES

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ACRONYMS AND ABBREVIATIONS

DOE	U.S. Department of Energy
DOE-RL	U.S. Department of Energy-Richland Operations Office
DW	dangerous waste
Ecology	Washington State Department of Ecology
EHW	extremely hazardous waste
EII	Environmental Investigations Instructions
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FY	fiscal year
HEPA	High-Efficiency Particulate Air (Filter)
LD_{50}	lethal dose
LMFBR	liquid metal fast breeder reactor
LOQ	limit of quantitation
LSFF	Large Sodium Fire Facility
MSDS	Material Safety Data Sheet
QA/QC	quality assurance/quality control
QAPI	Quality Assurance Program Index
QAPP	Quality Assurance Project Plan
QI	Quality Instructions
QR	Quality Requirements
RCRA	*Resource Conservation and Recovery Act of 1976*
RCRA/CERCLA	*Resource Conservation and Recovery Act/Comprehensive Environmental Response Compensation and Liability Act*
RI/FS	remedial investigation/feasibility study
RFI/CMS	RCRA Facility Investigation/Corrective Measures Study
ROD	Record of Decision
RPD	relative percent difference
TAL	target analyte list
TCLP	Toxicity Characteristic Leaching Procedure
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and/or disposal
WAC	Washington Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company

GLOSSARY

Accuracy: For the purposes of closure activities, accuracy is interpreted as the measure of the bias in a system. Analytical accuracy is normally assessed through the evaluation of matrix spiked samples and reference samples.

Audit: For the purposes of closure 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 may 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.

Blind Sample: A blind sample refers to any type of sample routed to the primary laboratory for purposes of auditing performance relative to a particular sample matrix and analytical method. Blind samples are not specifically identified as such to the laboratory; they may be made from traceable standards, or may consist of sample material spiked with a known concentration of a known compound. See the glossary entry for audit above.

Comparability: For the purposes of closure activities, comparability is an expression of the relative confidence with which one data set may be compared with another.

Completeness: For the purposes of closure activities, completeness may be interpreted as a qualitative parameter expressing the percentage of measurements judged to be valid.

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

Equipment Blanks: Equipment blanks consist of pure deionized, distilled water washed through decontaminated sampling equipment and placed in containers identical to those used for actual field samples; they are used to verify the adequacy of sampling equipment decontamination procedures, and are normally collected at the same frequency as field duplicate samples.

Facility: Dependent on context, the term 'facility', as used in this permit application portion, could refer to:

- The Hanford Facility. (refer to definition)

- 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., 616 Nonradioactive Dangerous Waste Storage Facility, Grout Treatment Facility).

<u>Field Blanks</u>: Field blanks consist of pure deionized, distilled water, transferred to a sample container at the site and preserved with the reagent specified for the analytes of interest; they are used to check for possible contamination originating with the reagent or the sampling environment, and are normally collected at the same frequency as field duplicate samples.

<u>Field Duplicate Sample</u>: Field duplicate samples are samples retrieved from the same sampling location using the same equipment and sampling technique, placed in separate identically prepared and preserved containers, and analyzed independently. Field duplicate samples are generally used to verify the repeatability or reproducibility of analytical data, and are normally analyzed with each analytical batch or every 20 samples, whichever is greater.

<u>Hanford Facility</u>: A single RCRA facility identified by the EPA/State Identification Number WA7890008967 that consists of over 60 TSD units conducting dangerous waste management activities. These TSD units are 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 by the U.S. Government and operated by the U.S. Department of Energy, Richland Operations Office (excluding lands north and east of the Columbia River, river islands, lands owned or used 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). The physical description of the property (including structures, appurtenances, and improvements) is set forth in Appendix 2A. The legal description of the Hanford Facility is set forth in Appendix 2B.

<u>Matrix Spiked Samples</u>: Matrix spiked samples are a type of laboratory quality control sample; they are prepared by splitting a sample received from the field into two homogenous aliquots (i.e., replicate samples), and adding a known quantity of a representative analyte of interest to one aliquot in order to calculate percentage of recovery.

<u>Nonconformance</u>: 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, it 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, it is a quantitative measure of the variability of a group of measurements compared to their average value. Precision is normally expressed in terms of standard deviation, but may also 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/replicate sample analysis.

Quality Assurance: For the purposes of closure activities, QA 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 meets all end user requirements and/or the intended end use of the data.

Quality Assurance Project Plan: The QAPP 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.

Quality Control: For the purposes of closure activities, QC refers to the routine application of procedures and defined methods to the performance of sampling, measurement, and analytical processes.

Reference Samples: Reference samples are a type of laboratory quality control sample prepared from an independent, traceable standard at a concentration other than that used for analytical equipment calibration, but within the calibration range. Such reference samples are required for every analytical batch or every 20 samples, whichever is greater.

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

Representativeness: For the purposes of closure activities, representativeness may be interpreted as 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 which is most concerned with the proper design of a sampling program.

Split Sample: A split sample is produced through homogenizing a field sample and separating the sample material into two equal aliquots. Field split samples are usually routed to separate laboratories for independent analysis, generally for purposes of auditing the performance of the primary laboratory relative to a particular sample matrix and analytical method. See the glossary entry for audit above. In the laboratory, samples are generally split to create matrix spiked samples; see the glossary entry above.

Validation: For the purposes of closure 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. Validation methods may include review of verification activities, editing, screening, cross-checking, or technical review.

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

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PART A

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FORM 3

DANGEROUS WASTE PERMIT APPLICATION

I. EPA/STATE I.D. NUMBER

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

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED (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.)

☐ 2. NEW FACILITY (Complete item below.)

* MO. __ DAY __ YR. 72 — FOR EXISTING FACILITIES, PROVIDE THE DATE (mo., day, & yr.) OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED (use the boxes to the left)

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 DESIGN 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	PRO-CESS 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
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)	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)	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				
1	S 0 1	20,000	L		7				
2	T 0 4	100	V		8				
3		*Information concerning the month of initial operation of this unit is			9				
4		not available			10				

Continued from the front

III. PROCESSES (continued)

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

S01, T04

The 105-DR Large Sodium Fire Facility is a research laboratory located in the 105-DR building in the 100-D Area of the Hanford Site. The facility is used to conduct experiments for studying the behavior of molten alkali metals and alkali metal fires. Thi facility is also used for the treatment of alkali metal dangerous wastes. Treatment consists of heating the waste to the point of oxidation. Up to 100 liters per day of dangerous wastes can be treated in the facility in a system equipped with an off-gas syste The 105-DR facility is also used to store up to 20,000 liters of dangerous wastes.

IV. DESCRIPTION OF DANGEROUS WASTES

A. **DANGEROUS WASTE NUMBER** — Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handl 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 cor taminants 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 basi 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 whic 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 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 de sity or specific gravity of the waste.

D. **PROCESSES**

1. **PROCESS CODES:**

For listed dangerous wastes: 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 t 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 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 It 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 Was 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 t 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 abov 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 sha ings 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 estima 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 a disposal will be in a landfill.

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

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

I.D. NUMBER (enter from page 1)

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

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D003	20,000	K	S01 T04	Thermal treatment
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					

Continued from the front

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

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

The 105-DR Large Sodium Fire Facility is used for the treatment and storage of alkali metal wastes. These wastes consists of sodium, lithium, and sodium-potassium alloy. Approximately 20,000 kilograms are managed at this facility each year. These wastes are not radioactive.

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 appears on the attached drawing and photograph

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

VIII. FACILITY OWNER

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

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

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

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

IX. OWNER CERTIFICATION

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

NAME (print or type)	SIGNATURE	DATE SIGNED
Michael J. Lawrence Manager, Richland Operations United States Department of Energy	Michael J. Lawrence	November 16, 1987

X. OPERATOR CERTIFICATION

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

NAME (print or type)	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

X. OPERATOR CERTIFICATION

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

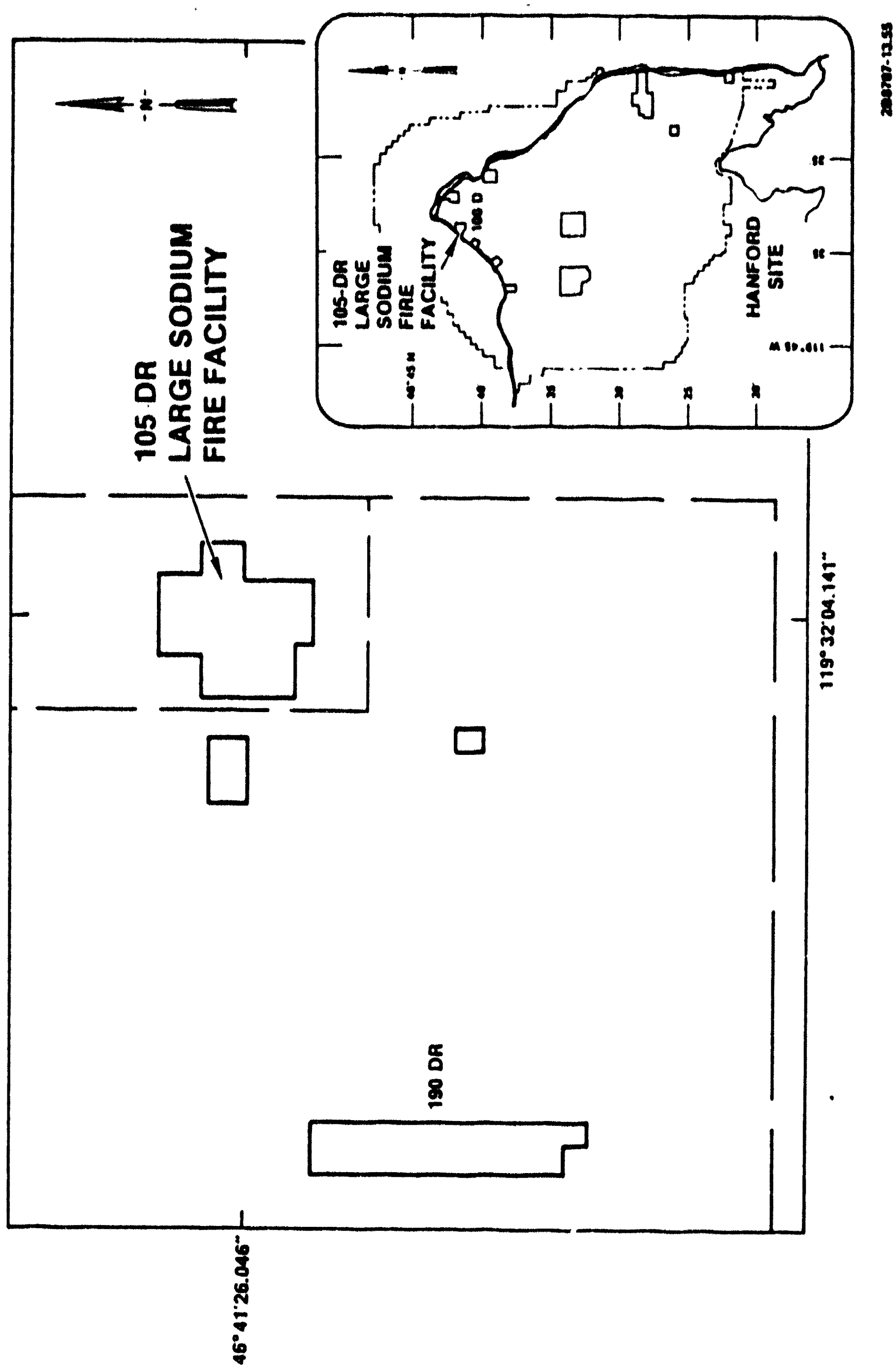
Michael J. Lawrence — 11-16-87
Michael J. Lawrence
Manager, Richland Operations
United States Department of Energy

Date

W. M. Jacobi — 11/16/87
William M. Jacobi
President
Westinghouse Hanford Company

Date

105-DR/100-D AREA LARGE SODIUM FIRE FACILITY



LARGE SODIUM FIRE FACILITY
105-DR/100-DR AREA

46°41'26.046"
119°32'04.141"

8500045-820CN

(PHOTO TAKEN 1985)

2B8707-13.37

CONTENTS

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1.0 INTRODUCTION

The Hanford Site, located northwest of the city of Richland, Washington, houses reactors, chemical-separation systems, and related facilities used for the production of special nuclear materials, and activities associated with nuclear energy development. The 105-DR Large Sodium Fire Facility (LSFF), which was in operation from about 1972 to 1986, was a research laboratory that occupied the former ventilation supply room on the southwest side of the 105-DR Reactor facility. The LSFF was established to provide a means of investigating fire and safety aspects associated with large sodium or other metal alkali fires in the liquid metal fast breeder reactor (LMFBR) facilities. The 105-DR Reactor facility was designed and built in the 1950's and is located in the 100-D Area of the Hanford Site. The building housed the 105-DR defense reactor, which was shut down in 1964.

The LSFF was initially used only for engineering-scale alkali metal reaction studies. In addition, the Fusion Safety Support Studies program sponsored intermediate-size safety reaction tests in the LSFF with lithium and lithium lead compounds. The facility has also been used to store and treat alkali metal waste, therefore the LSFF is subject to the regulatory requirements for the storage and treatment of dangerous waste. Closure will be conducted pursuant to the requirements of the Washington Administrative Code (WAC) 173-303-610.

This closure plan presents a description of the facility, the history of waste managed, and the procedures that will be followed to close the LSFF as an Alkali Metal Treatment Facility. No future use of the LSFF is expected. The LSFF is located within the 100-DR-2 (source) and 100-HR-3 (groundwater) operable units as designated in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1992) referred to as the Tri-Party Agreement. These operable units will be addressed through the *Resource Conservation and Recovery Act of 1976* (RCRA) facility investigation/corrective measures study (RFI/CMS) process. The 100-DR-2 operable unit is expected to begin Geophysical work in fiscal year (FY) 1993; characterization work at 100-HR-3 began in FY 1991 and is expected to continue through FY 1993.

Consistent with the Tri-Party Agreement (Ecology et al. 1992, p. 6-4), once any dangerous waste associated with the LSFF is removed, the entire reactor will remain for future decontamination and decommissioning as discussed in the *Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington*, Environmental Impact Statement (EIS) (DOE 1992, pp 1.7 through 1.13).

Any remedial action with respect to contaminants either not associated with the LSFF or associated with the LSFF but not cleaned to action levels under this closure plan will be deferred to the reactor decommissioning EIS record of decision (ROD) or the RFI/CMS process.

1.1 PERMITTING HISTORY

As a result of storage and treatment of dangerous waste, RCRA Part A and Part B (Alkali Metal Treatment and Storage Facilities) permit applications were submitted to the Washington State Department of Ecology (Ecology) in November 1985. Revision 2 of the Part A permit application was submitted in November 1987. The Part A permit application was submitted under the single Dangerous Waste Permit Identification Number, WA7890008967, issued to the Hanford Facility by the U.S. Environmental Protection Agency (EPA) and Ecology. The Part A permit application designates the LSFF as a thermal treatment facility, subject to RCRA regulations for treatment, storage, and/or disposal (TSD) units. This initial closure plan is being submitted to provide site characterization information and a closure strategy for the LSFF.

1.2 105-DR LARGE SODIUM FIRE FACILITY CLOSURE PLAN CONTENTS

The LSFF closure plan consists of 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 LSFF. Information on Hanford Site security also is provided.

1.2.2 Process Information (Chapter 3.0)

This chapter describes how the LSFF processed material 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 LSFF.

1.2.4 Groundwater Monitoring (Chapter 5.0)

This chapter indicates groundwater will not be included in this closure plan.

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 H6-08
Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

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CONTENTS

FIGURES

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2.0 FACILITY DESCRIPTION

2.1 GENERAL HANFORD SITE DESCRIPTION

In early 1943, the U.S. Army Corps of Engineers selected the Hanford Site as the location for reactor and chemical-separation facilities for the production and purification of plutonium. The Hanford Site (Figure 2-1) is a 560-square miles tract of semiarid land that is owned by the U.S. Government and operated by the U.S. Department of Energy (DOE).

2.2 FACILITY DESCRIPTION AND OPERATIONS

The 105-DR Reactor facility was designed and built in the 1950's and is located in the 100-D Area of the Hanford Site, as shown in Figures 2-1 and 2-2. A schematic of the 105-DR Reactor building (including the LSFF) is shown in Figure 2-3. The 105-DR Reactor building is a nonairtight industrial structure built of reinforced concrete in the lower portions and concrete block in the upper portions. The roof is constructed of reinforced concrete or precast concrete roof tile, depending on the specific roof area. The LSFF occupies the former supply fan room of the reactor, and covers approximately 15,000 square feet (1,400 square meters) of floor space.

Alkali metal tests were conducted in three different rooms: the large fire room, the small fire room, and the exhaust fan room (Figure 2-3). Each room is 20.5 feet (6.2 meters) wide, 27 feet (8.2 meters) long, and 21 feet (6.4 meters) high. The large fire room houses the Large Test Cell, which is a steel cubicle 3,743 square feet (106 square meters) in area. There are two 10-inch (25-centimeter) square, 1/4-inch (0.6-centimeter) thick Pyrex* glass observation windows located in the large fire room doors. These windows are protected by the use of safety glass.

The small fire room contains one steel cylindrical pressure vessel with a dished top. This vessel has a volume of approximately 498 square feet (14 square meters), and is pressure rated at 138 pounds per square inch (9.70 kilograms per square centimeters), absolute. Both the Large Test Cell and the pressure vessel in the small fire room could be purged with nitrogen or argon to maintain a controlled atmosphere.

In the exhaust fan room, alkali metal reactions were conducted at atmospheric pressure. Waste alkali metals from various sources, including residuals from tests, failed equipment and drum heals, were reacted in the exhaust fan room. The burn pans and equipment were cleaned periodically, using water as the cleaning solution. The rinsate from cleaning was collected in the sump. The liquid effluent from the cleaning operations was drained to the sump, which is a 22-inch (56-centimeter) deep catch basin with an 18 inch by 18 inch (46 centimeter by 46 centimeter) opening fed by a trough 10 feet (3 meters) long, 7 inches (18 centimeters) deep, and 9 inches (23 centimeters)

*Pyrex is a trademark of Corning Glass Works.

wide (see lower right portion of Appendix D, Figure D-2). During unit operations, a sump pump was placed in the sump and the wash water was pumped through a hose into the sloped tunnel area that drains directly to the seal pit. The pH of the rinsate was monitored and neutralized to a pH of less than 12.5 before it was discharged to the 116-DR-8 Crib (Figure 2-3). The collected liquid was neutralized with acetic acid in the 1970's; in the 1980's the pH of the liquid rarely, if ever, exceeded 12 and, therefore, neutralization was usually not necessary.

Adjacent to the large fire room is the sodium handling room that serviced the large fire room with a 3,400-liter (900-gallon) Type-304 stainless-steel sodium batch tank and drum melters. The tank was resupplied from sodium drums that were heated to liquify the sodium, which was then discharged into the batch tank with inert gas. Other rooms provided space for office work and storage of nondangerous material. Storage areas contained primarily new materials including stainless steel tubing, small-diameter piping made of stainless and carbon steel, electrical supplies (wiring, extension cords, heaters, etc.), new process equipment, fans, blowers, metal sheeting, new light bulbs, lighting equipment, portable lights, new containers, various fire extinguishing materials, lubricating grease, and lubricating oil. The office area contained only papers, operating records, a few tools, and some small portable monitoring instruments.

The LSFF was equipped with an offgas treatment system that served the test vessels and the exhaust fan room. The overall exhaust system is shown in Figure 2-3. The exhaust route travels from the lower tunnel through the upper tunnel to underground concrete tunnels via a 10-inch (25-centimeter) duct with a 10,000-cubic feet per minute blower and test filters. Steel barricades at the north end of the tunnels block air flow to and from the reactor. The system consists of a 100,000-cubic feet (2,800 cubic meters) per minute capacity filter building, a gravel bed exhaust scrubber (120-gallon per minute), high-efficiency particulate air (HEPA) filters, and a 200-foot (60-meter) stack [9-foot, 6-inch (2.7-meter) internal diameter] located next to the 105-DR Building (Figures 2-3 through 2-5). Test room ventilation rates were 0 to 10,000-cubic feet (280-cubic meters) per minute. Only the submerged gravel bed exhaust scrubber and the ducts connecting the LSFF and the scrubber were constructed for the LSFF.

The 117-DR Filter Building (Figure 2-5) houses the exhaust air filters, while the exhaust air tunnel just upstream from the filter building contains the smoke scrubber. The building is about 59 feet (18 meters) long, 39 feet (12 meters) wide, and 35 feet (11 meters) high. The scrubber circulating pump and the waste discharge pump are located in the filter building. The 117-DR Filter Building is below-grade and constructed from reinforced concrete. The Filter Building is located about 100 feet (30 meters) from the 105-DR exhaust duct system and the 116-DR exhaust stack and is connected by underground concrete ductwork. The filter building contains the HEPA filters, which are installed in four filter frames (24 filters per frame) with two frames in Cell A and two frames in Cell B.

In 1972, the original HEPA filters were replaced before LSFF operations began. From 1972 to 1982, the exhaust traveled from the LSFF through underground 7-foot by 7-foot (2-meter by 2-meter) concrete tunnels (Figure 2-5) to a spray scrubber and the HEPA filters before exiting through the stack. As part of a filter development program in 1982, a submerged gravel scrubber was added (instead of the underground HEPA filters) to vent the exhaust. As a result of the new gravel scrubber construction, at the completion of tests or waste burning, the 117-DR HEPA filter building can be bypassed. The scrubber water effluent pH level was confirmed to be between 2.0 and 12.5 before discharge to the 116-DR-8 Crib. The exhaust system now allows the use of either the HEPA filter system and ventilation scrubber or the submerged water scrubber, but not both.

About 5,000 gallons (19,000 liters) of sodium, weighing 39,000 pounds (18,000 kilograms), that was procured for testing construction materials is stored in a tank housed in a locked metal building (1720-DR) near the LSFF. The sodium and sodium tank have never been used in the LSFF. This sodium will be removed through a project separate from the closure plan.

Miscellaneous alkali metal handling equipment used to facilitate the testing program included sodium test spill tanks with capacities of 900 gallons (3,400 liters) at a maximum holding temperature of 1200 °F (650 °C), 10 gallons (38 liters) at a maximum holding temperature of 1600 °F (870 °C), and 55 gallons (210 liters) at a maximum holding temperature of 400 °F (200 °C). The early spill tanks were made from thick carbon steel piping, and the later tanks from stainless steel. These tanks were completely airtight, so there was no possibility for alkali metal to escape into the work rooms. Sodium test spill rates are up to 300 gallons (1,100 liters) per minute, while lithium test spill rates are up to 5 gallons (20 liters) per minute.

Testing area capabilities for the LSFF included the following:

- Alkali metal spills up to 5,000 pounds (2,000 kilograms) at 1600 °F (870 °C) and up to 300 square foot (28 square meters) of pool surface
- Demonstration of various fire extinguishing concepts
- Study of small- and large-scale effects of chemical reactivity of alkali metals under accidental spill conditions
- Sodium-concrete reaction tests
- Cell liner test design
- Post-accident cleanup development
- Lithium fire and reaction testing.

The Part A permit application allowed for the treatment and storage of up to 5,300 gallons (20,000 liters) of nonradioactive sodium, lithium, and sodium-potassium metal waste each year. The Part A permit described the treatment of up to 26 gallons (100 liters) per day of alkali metal dangerous waste. Treatment consisted of heating the waste to the point of oxidation in the exhaust fan room. Emissions were then routed to an off-gas treatment system. The facility was used to treat alkali metal waste as needed during the operation of the testing program from 1972 to 1986.

2.3 SECURITY INFORMATION

The following sections describe the 24-hour surveillance system, warning signs, and barriers used to provide security and controlled access to the Hanford Facility.

The entire Hanford Facility is a controlled access area. The Hanford Facility maintains around-the-clock surveillance for protection of government property, classified information, and special nuclear materials. The Hanford Patrol maintains a continuous presence of armed guards to provide additional security.

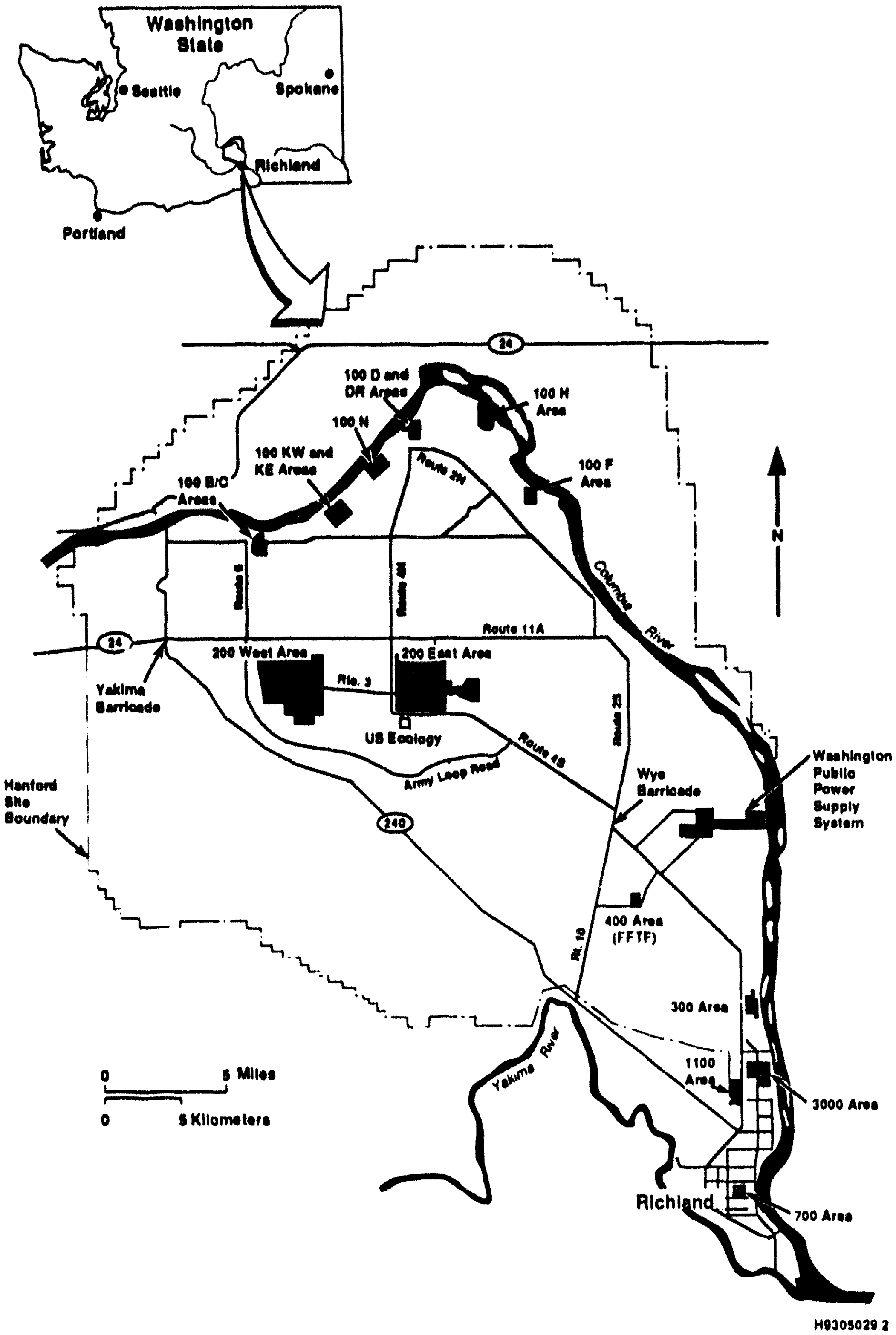
Manned barricades are maintained around the clock at checkpoints on vehicular access roads leading to these areas (Yakima and Wye Barricades, Figure 2-1). All personnel accessing the Hanford Site areas must have a U.S. Department of Energy-issued security identification badge indicating the appropriate authorization. Personnel also might be subject to a random search of items carried into or out of the Hanford Site.

Signs are, or will be, posted at area boundaries within the Hanford Site stating "NO TRESPASSING. SECURITY BADGES REQUIRED BEYOND THIS POINT. VEHICLES ONLY. PUBLIC ACCESS PROHIBITED" (or an equivalent legend).

In addition, warning signs stating "DANGER--UNAUTHORIZED PERSONNEL KEEP OUT" (or an equivalent legend) are, or will be, posed at TSD units within the Hanford Facility. These signs are, or will be, written in English, legible from a distance of 25 feet (7.6 meters), and visible from all angles of approach.

LSFF is locked around the clock and only authorized plant operations personnel have access. A 30-inch (76-centimeter)-thick concrete wall separates the front face work area of the 105-DR Reactor from the nearest portion of the LSFF and sodium handling room. A 5-foot (1.5-meter)-wide by 8-foot (2.4-meter)-high doorway through this wall is closed by an existing locked steel door and a new wall of 8-inch (20-centimeter) concrete blocks. Two other entries to the reactor portion of 105-DR have been sealed by concrete blocks. One entry area through steel panels is sealed by a steel plate welded over the opening.

930617.1050



1

Figure 2-1. Hanford Site.

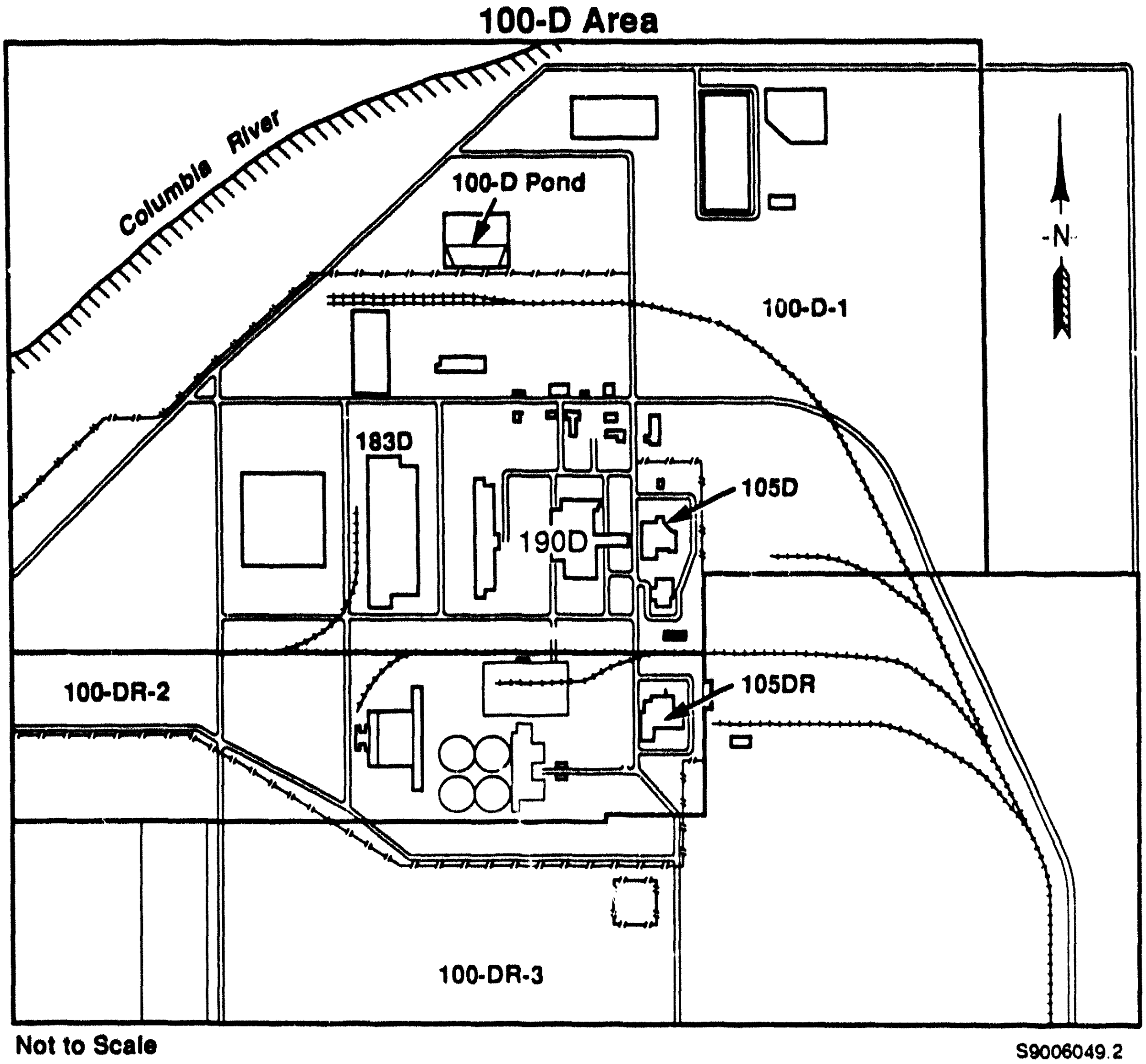
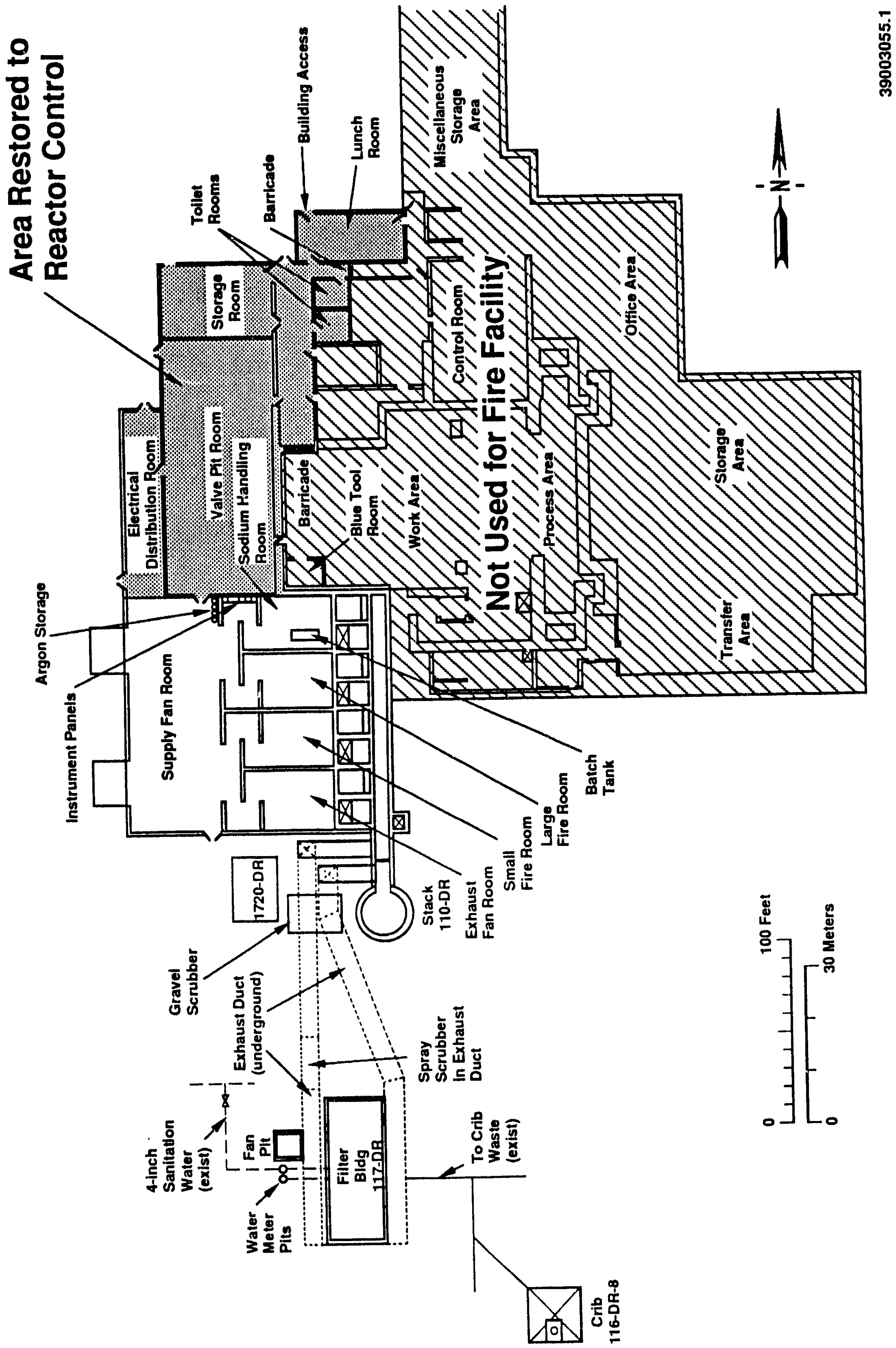


Figure 2-2. The 100-D Area of the Hanford Site.



1 Figure 2-3. A Schematic of 105-DR Reactor Building Including the
2 Large Sodium Fire Facility.

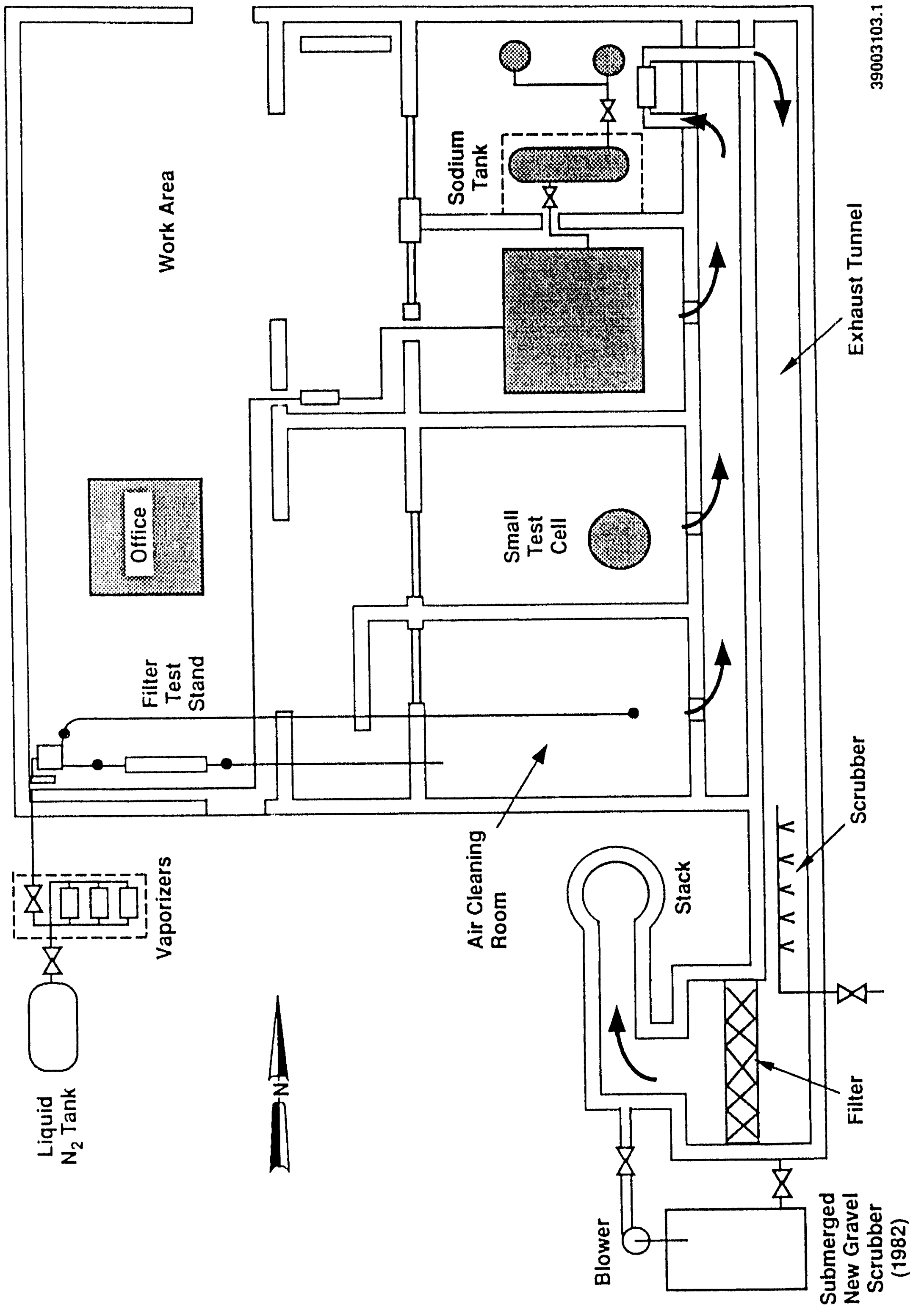
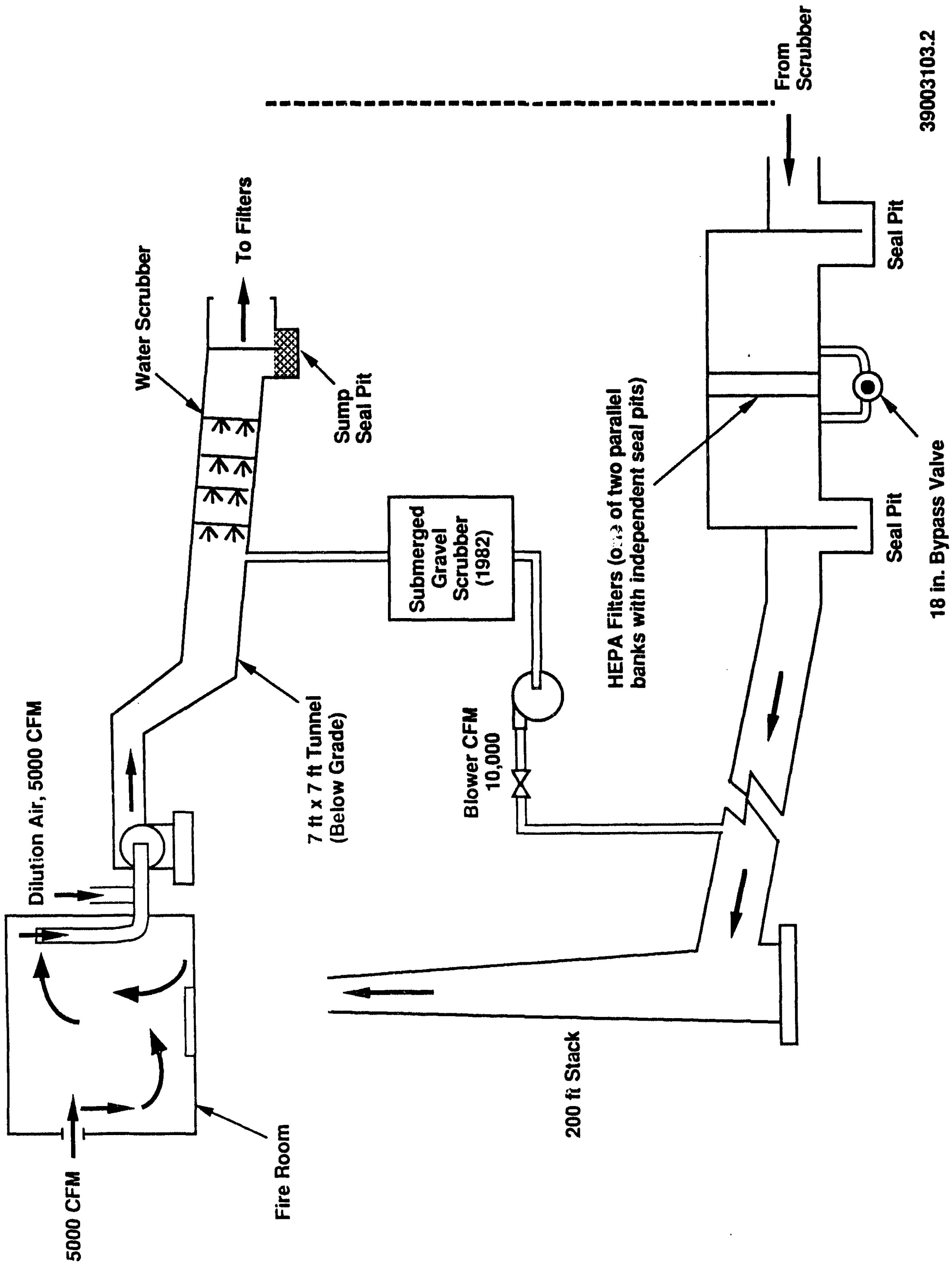


Figure 2-4. A Schematic of the Overall Large Sodium Fire Facility Exhaust System.



1 Figure 2-5. A Schematic of the 117-DR Filter Building Exhaust System.

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TABLE

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3.0 PROCESS INFORMATION

The LSFF has been used primarily to conduct experiments for studying the behavior of molten alkali metals, sodium and lithium, and alkali metal fires. The waste generated at the facility includes alkali metal oxides, hydroxides, silicates, and carbonates, and residual alkali metal waste [*RCRA Part B Permit Application, Alkali Metal Treatment and Storage Facilities*, D-2, 1985 (DOE 1985)] associated with the tests. The sodium carbonate was formed from the reaction of the oxides and hydroxides with air. Similarly, both purchased and waste lithium also were burned at the site, producing lithium carbonate, oxide, hydroxide, and silicate as aerosol by-products.

The laboratory tests conducted at the LSFF can be grouped into the following general types by the test purpose as follows:

- Formation of alkali metal aerosols in air, steam, nitrogen, or carbon dioxide atmospheres for the purpose of determining aerosol properties and release ratios, using both pool and spray fires

- Reaction of an alkali metal with concrete and insulation (Kaylo* heat insulation and Super-X block** insulation, both fiberglass) to study corrosion rates and to determine the reaction products formed

- Generation of aerosols to be used for testing and measurement of air-cleaning filter and scrubber performance and for evaluating hydrogen ignition characteristics

- Production of fire and smoke to test alkali metal fire extinguishing methods and equipment, testing of protective equipment, and for training in equipment use

- Testing of purchased lithium-lead alloy reaction rates and aerosol formation in various atmospheres

- Development tests using cesium and zinc metal to demonstrate aerosol generation techniques

- Thermal treatment of sodium residue (sodium waste) generated in other facilities.

The lithium-lead alloy was tested by its reaction with air and steam (not by burning) in the small fire room (Jeppson 1978). In these tests, the surface lithium converted to a gray coating of lithium carbonate (air reaction) and lithium hydroxide (water reaction). The reactions were limited because less than stoichiometric amounts of steam were used in the tests. The dangerous waste shipment records indicate that the lithium-lead alloy was

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*Kaylo is a trademark of Owens Corning.

**Super-X block is a trademark of John Mansfield.

disposed of in two 440 pound (200 kilogram) masses and placed in steel drums and sent for offsite disposal through the 340 Facility, which was the central waste accumulation area for the operating contractor. In 1986, the test equipment for the lithium-lead test was relocated to the 221-T Facility, where the testing program continued.

A secondary mission of the LSFF was to burn alkali metal waste generated at the LSFF, the 221-T Containment Systems Test Facility, and 300 Area sodium and lithium facilities. When the LSFF was being used to treat alkali metal waste, the waste was burned until the reaction was not sustainable. The residues were then reacted with water. The waste products from this process were also alkali metal oxides, hydroxides, and carbonates. None of the waste treated in the facility was radioactive.

Only the exhaust fan room was used to burn waste sodium and lithium. The exhaust fan room and small fire room were both used for the metal reaction tests. The sodium handling room was used for mixing and transferring sodium for the tests. The large fire room was used for burning sodium associated with the testing program.

While burning, waste metal was stirred to ensure a complete burn, and the scrubber system controls were monitored. At the completion of a burn, the equipment was checked for unburned metal, washed down, and inspected again to ensure that no residual unreacted metal remained (DOE 1985, pp D-20 and F-11). Wash water from the cleanup was monitored for corrosivity (kept below a pH level of 12.5) and collected in the sump. The sump was pumped via a sump pump and hose to the tunnel bed which drains directly to the seal pit. The water was collected in the seal pit, monitored for pH, neutralized if needed, and then pumped from the seal pit to the 116-DR-8 Crib.

In 1987, samples of the residues were collected from the lower exhaust tunnel wall and analyzed. Locations of the sampling points are shown in Appendix A. While the sample results for lithium and carbonates were expected, the lead content in some of the samples was high (the highest, from a concrete scraping, was 1,300 parts per million). The lithium-lead alloy was reacted in the small fire room; inside a closed containment pressure vessel. The lead content in the samples from different locations [low content in the small fire room; higher content in the exhaust fan room upwind of the tests; very low content in the tunnel immediately downwind of the tests; and the highest content in scrapings near the wall constructed between the tunnel and rest of the reactor (see Appendix A)] indicates that the lead may be from a lead-based primer used to paint the tunnel rather than associated with the testing. The analysis performed also reflects total lead content and not the results of an extraction procedure toxicity test. According to information from former reactor workers currently employed in the surplus facilities decommissioning program, the tunnels had been painted to minimize the possibility of radioactivity penetrating into the porous concrete. Paints used during that era (1947 to 1964) commonly contained lead. Thus, it can be assumed that the high level of lead found in the concrete scrape sample is from the lead-based paints used during reactor operations. No radioactivity is expected in the work areas of the LSFF because there was no exchange of air with the reactor. However, contaminated air was previously carried from the reactor, through the exhaust tunnels, through the underground 117-DR HEPA filter building, and to the stack. When the reactor first began operations, reactor exhaust went directly from the tunnels to the stack. The extent of decontamination activity performed in the mid-1970's to support the establishment of the LSFF is not known.

In 1987, four of the seven samples from the lower tunnel in the 105-DR Reactor tested for reaction by-products were also tested for radioactivity (see Appendix A). Only one sample showed radioactivity above detectable levels (Table 3-1).

The upper exhaust tunnel was not sampled in 1987 because of inaccessibility.

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Table 3-1. Radioactivity in Waste Samples.

disintegrations per minute per gram (d/min/g)					
Sample	Alpha	Beta	Gamma		
			^{137}Cs	^{60}Co	^{152}Eu
2	< 6	330	70	50	48
4	<13	<30	<14		
6	<19	<47	<18		
7	<14	<35	<10		

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4.0 WASTE CHARACTERISTICS

4.1 ESTIMATE OF MAXIMUM INVENTORY OF WASTE

The estimated maximum inventory (based on facility operating information) of sodium and lithium wastes stored at the 105-DR LSFF was approximately 1,000 pounds (450 kilograms) stored during December 1982 and January 1983.

4.2 WASTE STORED AT THE FACILITY

Sodium has been designated as a dangerous waste because of its ignitable and reactive characteristics. The sodium handled in the LSFF was either purchased for the tests or was waste from other Hanford Site operations. At least 95 percent of all the waste materials are residues of sodium, which is now sodium carbonate (see Appendix A for a partial analysis of waste). Approximately 4 percent of the waste is other alkali metal carbonates, including lithium carbonate, residual lithium nitride, and cesium carbonate. Approximately 1 percent or less are sodium and lithium silicates and miscellaneous materials described elsewhere in this chapter.

The material was treated by burning, which produces sodium oxide (Na_2O), sodium hydroxide (NaOH), and sodium carbonate (Na_2CO_3). Sodium oxide and hydroxide are strong alkalis, but readily absorb carbon dioxide from the atmosphere and convert to sodium carbonate. Sodium carbonate is typically called soda ash and is found naturally. Similarly, both purchased and waste lithium were also burned at the site, with lithium carbonate as the main final product. Lithium nitride was also produced, however, and records show that it was drummed and sent to the 340 Building (300 Area) for eventual disposal.

Two cesium and zinc aerosol tests were conducted at the LSFF in the Small Fire Room steel vessel. During these tests, a total of approximately 2 pounds (1 kilogram) of cesium metal and about 0.25 pounds (110 grams) of zinc metal were used; about half of the metal was consumed during the tests. Most of the test residues were collected and disposed of at that time. There have been two small cesium burns in the Exhaust Fan Room, but no zinc was involved in those tests. Compared with the other materials burned, the quantity of cesium released is very small, much less than 1 percent. Cesium is readily oxidized and any unreacted cesium is now an oxide and/or complexed with other materials, such as hydroxides and silicates, which would be codeposited with the sodium carbonate matrix. In the unlikely event that any zinc was released, it would also be codeposited within the sodium carbonate matrix.

Because the sodium and lithium burn tests were conducted on concrete (conventional and magnetite concrete), reaction by-products of the concrete constituents were also produced. The by-products of the reaction were silicon dioxide, sodium and lithium silicates, aluminum oxide, magnesium oxide, and iron oxides. Other trace inorganic compounds may also have been produced because of impurities in the concrete.

The lithium-lead alloy test was conducted only once. This test was performed in the Small Fire Room inside the steel burn vessel. The waste has been cleaned and removed.

The overwhelming majority of the residues, both sodium and lithium carbonate, is characteristic category D (least toxic) dangerous waste. The lethal dose (LD_{50}) for oral exposure to rats of sodium carbonate is 4,090 parts per million (see MSDS); for lithium carbonate, the same LD_{50} is 525 parts per million. Compounds with LD_{50}s at concentrations of from 500 to 5,000 parts per million are category D dangerous waste as established by WAC 173-303-101. Levels of lead in waste extract greater than 500 milligrams per liter are considered to be an extremely hazardous waste (EHW); and levels of lead from 5 to 500 milligrams per liter are considered to be a dangerous waste (DW) (WAC 173-303-090). The MSDSs for lead, sodium carbonate, and lithium carbonate have been included in Appendix C.

The LSFF ventilation tunnels contain mostly deposits of sodium carbonate that formed from sodium oxides and hydroxides reacting with air. Other deposits include lithium carbonate, lithium nitride, and sodium and lithium silicates.

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5.0 GROUNDWATER

Groundwater protection regulations established in WAC 173-303-645 only pertain to land treatment units (i.e., surface impoundments, waste piles, land treatment units, or landfills). Also, in accordance with the Tri-Party Agreement (Ecology et al. 1992), groundwater in the 100-D Area will be included in the 100-HR-3 operable unit and investigated under the RFI/CMS process. Therefore, groundwater is not included as part of the LSFF closure plan. The RFI/CMS draft work plan (DOE/RL 1989) is currently under review by Ecology.

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CONTENTS

FIGURE

TABLE

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6.0 CLOSURE STRATEGY AND PERFORMANCE STANDARDS

6.1 CLOSURE STRATEGY

The strategy of this closure activity is to provide clean closure of 105-DR LSFF. Clean closure of the LSFF is contingent on verification that constituents originating from the LSFF are not present in concentrations that represent a threat to human health or the environment. This contingency will be assessed using information obtained from implementation of sampling activities outlined in Chapter 7.0. No future use of the 105-DR reactor or LSFF is planned or expected.

Special conditions at the LSFF were important considerations in developing this closure plan. These considerations are past use as part of a nuclear production reactor, other near-future characterization and remediation programs (see Section 6.4), the low level of hazard associated with the residues from waste burned at the LSFF, and the inaccessibility of the residues to humans and the environment.

Clean closure will be achieved by removing surface deposits of sodium and lithium carbonates and determining if the equivalent concentrations of carbonates embedded in the concrete and soil are either: (1) below dangerous waste levels for mixtures, (2) not statistically greater than background levels for these media (background being defined as the concrete or soil used for, and possibly impacted by, reactor operations but unimpacted by the LSFF), or (3) at concentrations that require no further activities for the protection of human health and the environment. These performance standards are referred to as action levels in this plan.

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 (LOQ). Background will be Hanford Sitewide soil background concentrations as defined in *Hanford Site Soil Background* (DOE-RL 1992b). If concentrations exceed initial action levels, health-based action levels will be assessed. The LSFF action levels are intended to be consistent with CERCLA remedial action levels.

The health-based level will be based on equations and exposure assumptions presented in the *Hanford Site Baseline Risk Assessment Methodology* (DOE-RL 1992a). For noncarcinogenic substances, 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) (EPA 1991), a database that periodically is updated by the EPA. 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 LSFF dangerous waste will be decontaminated (Bracken 1991; or other appropriate procedure) or disposed of in compliance with applicable regulations.

6.1.2 Analytes of Concern

The principal analytes of concern for decisions of remediation are sodium carbonate, alkali metal carbonates including lithium carbonate, residual lithium nitride, and cesium carbonate. Approximately 1% or less are sodium and lithium silicates and miscellaneous materials described later in this section.

The test burns produced sodium oxide (Na_2O), sodium hydroxide (NaOH), and sodium carbonate (Na_2CO_3). Lithium carbonate reaction by-products of the concrete constituents were produced, including silicone dioxide, sodium and lithium silicates, aluminum oxide, magnesium oxide, and iron oxides.

Analysis of lead, lithium, and sodium will be performed. Other Target Analyte List (TAL) inorganics are listed in Table 6-1:

These analysis are discussed in Chapter 7.0, Section 7.3.

6.2 CLOSURE PERFORMANCE STANDARDS

Washington State Department of Ecology closure performance standards [WAC 173-303-610 (2)(a)] require that the owner/operator close a facility in a manner that does the following:

- Minimizes the need for further maintenance
- Controls, minimizes or eliminates, to the extent necessary to protect human health and the environment, postclosure escape of dangerous waste and dangerous constituents, leachate, contaminated run-off, or dangerous waste decomposition products to the ground, surface water, groundwater, or the atmosphere
- 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.

However, Federal Regulations in 40 CFR 265.381 ("Thermal Treatment Facility Closure," p. 685) state the following:

"At closure, the owner or operator must remove all hazardous waste and hazardous waste residues (including, but not limited to, ash) from the thermal treatment process or equipment."

6.2.1 Minimizing 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. Closure of the LSFF by removing or decontaminating equipment (to proposed action levels) and, as necessary, the surrounding soils, will eliminate the need for further maintenance. Regardless of closure actions associated with the LSFF, however, general maintenance of the 105-DR Reactor structure will continue until final decommissioning.

6.2.2 Protection of Human Health and the Environment

WAC 173-303-610(2)(a)(ii) requires a closure plan to provide for the protection of human health and the environment. As discussed previously, the LSFF will be closed by removing or decontaminating, to proposed action levels, all dangerous waste and waste residues and any contaminated soils to protect human health and the environment.

6.2.3 Return of the 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. Following clean closure, the 105-DR Reactor will have been restored to the condition of the other closed production reactors of the same age (e.g., 105-H, 105-F, 105-C).

6.2.4 Waste Alkali Metals

No waste sodium or lithium remains at the site.

6.2.5 Remaining Sodium

About 5,000 gallons (19,000 liters) of sodium weiging 39,000 pounds (18,000 kilograms) procured for tests of construction materials are stored in a tank that is located in a locked metal building (1720-D) near the LSFF. This sodium will be removed for other use or excessed for sale through a project separate from this closure plan.

6.2.6 Other Materials

Other materials associated with the LSFF and remaining on the site are electrical equipment (mostly wires and conduit, but no transformers or polychlorinated biphenyls), burn pans from sodium fires, metal burn cells, and an empty liquid nitrogen tank (vendor owned). These materials will be cleaned as appropriate (see Chapter 7.0, Section 7.4.5) and disposed of as surplus property or placed in the appropriate landfill.

6.3 CLOSURE ACTIVITIES

The LSFF will be closed in a manner consistent with Washington State guidelines and regulations. The general closure procedures are shown in Figure 6-1 and listed below (see Chapter 7.0 for complete explanation of procedures).

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 100-DR Area, including the LSFF as follows:

- Sample the areas of the facility to:
  - Determine reaction by-product deposit composition
  - Determine if the source of previously detected lead contamination is from paint used to seal the reactor tunnel walls and not from LSFF waste treatment-related activities
  - Determine if all contamination has been removed (for soils, see Chapter 7.0, Section 7.3.1).
- Decontaminate the structures as specified.
- Verify cleanup and certify that all closure activities were completed in accordance with the approved plan.

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.

Two official copies of this closure plan will be located at the following office: U.S. Department of Energy, Richland Operations Office, Federal Building, 825 Jadwin Avenue, P.O. Box 550, Richland, Washington 99352. The DOE-RL will be responsible for amending this plan as amendments become necessary, according to the amendment procedure identified in WAC 173-303-610. The plan will be kept at DOE-RL until closure is completed and certified.

6.4 COORDINATION WITH OTHER PROJECTS

The LSFF is located within the 100-DR-2 (source) and 100-HR-3 (groundwater) operable units designated in the Tri-Party Agreement (Ecology et al. 1992). These operable units will be addressed through the RFI/CMS process. The 100-DR-2 operable unit is expected to begin geophysical characterization work in FY 1993; the 100-HR-3 operable unit began characterization work in FY 1991 and is expected to continue through FY 1993.

In addition, consistent with the Tri-Party Agreement (Ecology et al. 1992, page 6-4), once any dangerous waste associated with the LSFF is removed, the entire reactor will remain for future decontamination and decommissioning [also see the draft EIS for decommissioning eight surplus production reactors (DOE-RL 1989, pp 1.7 through 1.13)].

Thus, remedial action with respect to contaminants not associated with the LSFF, or associated with the LSFF and not covered under this closure plan, will be deferred to the reactor decommissioning EIS (the 105-DR Reactor building, stack, and 117-DR filter building) or the RCRA process (116-DR-8 Crib and soil).

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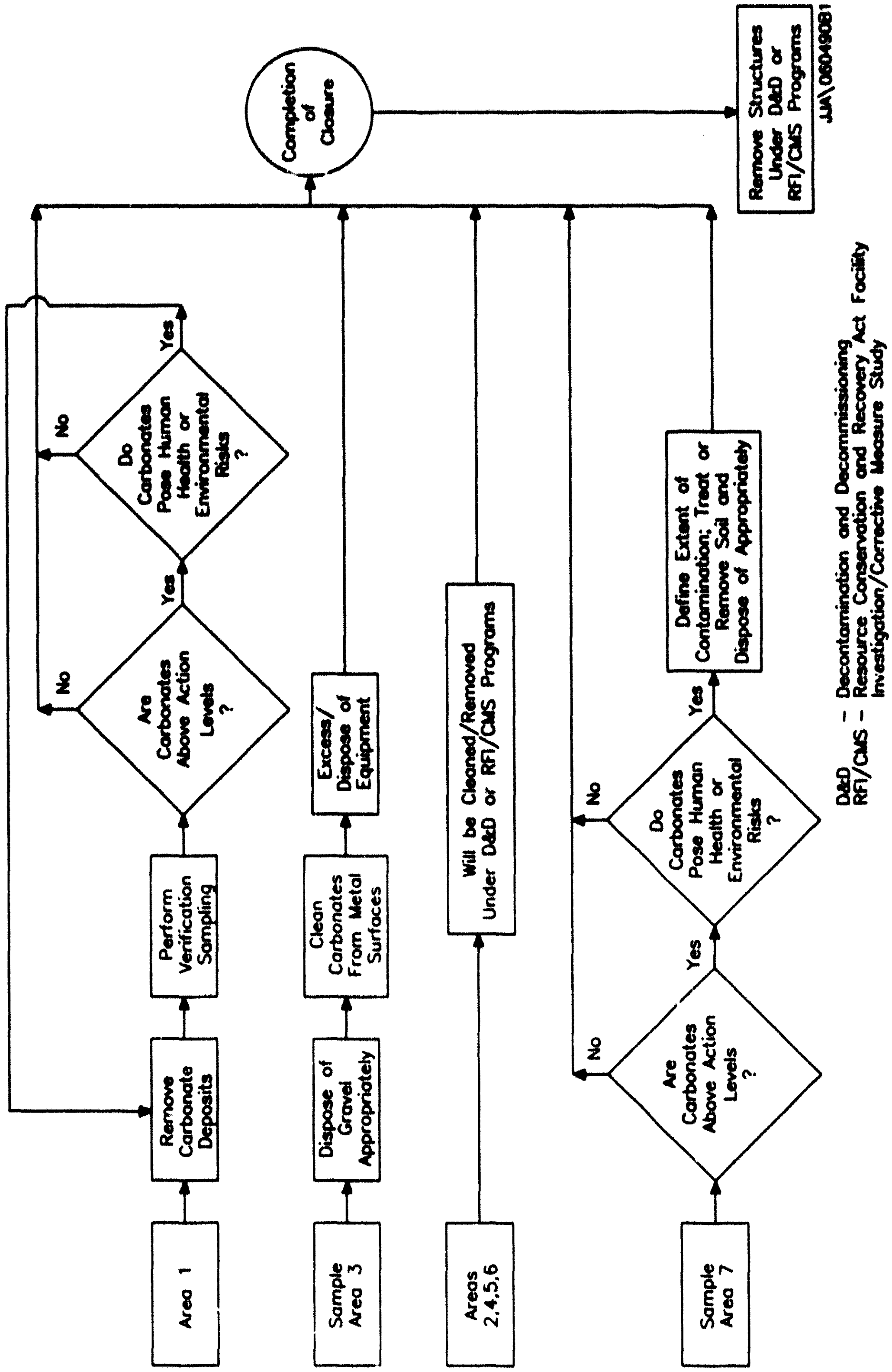

1 Figure 6-1. Closure Flowchart for the 105-DR Large Sodium Fire Facility,
2 (see Section 7.3 for a Description of Areas 1 through 7).

Table 6-1. Other Target Analyte List Inorganics to be Reported.

Aluminum	Magnesium
Antimony	Manganese
Arsenic	Mercury
Barium	Nickel
Beryllium	Potassium
Cadmium	Selenium
Calcium	Silver
Cesium	Thallium
Chromium	Vanadium
Cobalt	Zinc
Copper	Cyanide
Iron	

CONTENTS

FIGURES

TABLES

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7.0 CLOSURE ACTIVITIES

7.1 INTRODUCTION

The strategy for closure of the LSFF is clean closure. The following steps are needed to perform clean closure.

1. Clean or remove the structures and equipment as specified and dispose of residues in accordance with applicable regulations as determined by sampling.

2. Sample concrete walls to verify that the embedded carbonates are below dangerous waste levels.

3. Evaluate the data for QA/QC reliability and significant contamination levels in comparison with background data and/or action levels.

4. Conduct additional decontamination of LSFF, as required.

5. Certify that closure activities were completed in accordance with the approved closure plan.

7.2 REMOVAL OF DANGEROUS WASTE INVENTORY

No unreacted waste metals are now at the site. Removal of waste residues from the LSFF cleanup operations is described in Section 7.5.

7.3 FACILITY SAMPLING

This waste sampling and analysis plan has been prepared to evaluate contamination associated with the parts of the LSFF that treated (burned) waste sodium and lithium metals or that received residue from these burns. This plan is primarily based on the history of the processes associated with the LSFF (Chapters 2.0, 3.0, and 4.0).

The LSFF can be logically divided into seven areas according to use and deposition of reaction by-products; therefore, these areas will be considered separately. Separate sampling schemes will allow for more definitive data for determining what focused cleanup measures must be taken to ensure that the specific closure requirements are achieved in an efficient and cost-effective manner.

The seven areas of the LSFF are: the exhaust fan room, and two other fire rooms, sodium handling room, and offices (Area 1); the interior reactor exhaust tunnels (upper and lower), underground tunnel to the HEPA filter, a..d duct to gravel scrubber (Area 2); the gravel scrubber and downgradient duct

(Area 3); the HEPA filters and filter pit (Area 4); the reactor exhaust stack (Area 5); the 116-DR-8 Crib (Area 6); and the soil between the LSFF entrance and the filter pit (Area 7) (see Figure 2-4).

Areas 2, 4, and 5 are to be deferred to reactor decontamination and decommissioning activities of the 105-DR Reactor. The tunnels, ducts, and stack contained in these areas would be difficult to access in the safety equipment necessary to work in these areas. Cleaning activities in these areas would prevent a safety hazard and for these reasons will be deferred. Area 6, the 116-DR-8 Crib, is part of the 100-DR-2 operable unit and the 100-HR-3 groundwater operable unit and will be remediated separately from 105-DR LSFF.

Before sampling begins, all areas will be surveyed for radioactivity according to established procedures [Environmental Investigations Instructions (EII) 2.3 (WHC 1988)]. See Section 7.3.6 for specific equipment and procedures for dangerous waste sampling, and Table 7-2 for the location of sampling points.

Area 1: Area 1 consists of the exhaust fan room, two fire rooms, the sodium handling room, and an office area. The sump in the exhaust fan room contains about 1 gallon (4 liters) of crusty powder and reaction by-products from past burns. Old burn pans stored in this room still have residues. A composite sample of the deposits in the burn pans and a sample of the deposits in the sump will be taken and analyzed to determine the corrosivity of the deposits and the concentrations of lithium, sodium, and lead. Target analyte list inorganics will also be reported for use in determining residue disposal.

The exhaust fan room, the only room used to burn waste sodium and lithium, has visible, mostly thin layers [less than 1/16 inch (1.6 millimeters)] of reaction by-products in a few places. These deposits are evident as a white film on sections of the walls.

The sump in the exhaust fan room will be thoroughly cleaned and inspected for penetrative cracks. If cracks are found on or near the floor of the sump, a characterization sampling program will be carried out that will involve drilling through the cracked area and sampling of the soil underneath. At least one concrete core from the drilling effort will also be analyzed. After soil has been sampled, the hole in the sump will be filled with concrete to prevent any material from entering the exposed soil.

Samples will be obtained from several locations in Area 1. Two samples will be taken in the office area. One authoritative sample and one random sample on the floor outside the exhaust fan room will be taken. In the exhaust fan room itself, one random sample will be taken from the floor, one from the ceiling, and one from the walls. In each of the two fire rooms, two samples will be taken: one from above the tank position, and one below the tank. One sample will be obtained from below the tank in the sodium supply room.

Area 2: Area 2 consists of the upper and lower exhaust tunnel, the blower that moved LSFF exhaust from the lower to the upper tunnel, the exterior underground tunnel to the 117-DR HEPA filter building (south of the LSFF), and the ducts to the submerged gravel scrubber. This tunnel had low but measurable radioactivity when sampled in 1987 (Appendix A).

Area 3: Area 3 consists of the gravel scrubber and ducts, which were installed in 1982, 16 years after the 105-DR Reactor ceased operations; consequently, no radioactivity is expected. The scrubber and duct walls are metal; thus the carbonates will not have penetrated the wall surfaces. One random sample of the gravel in the 2-feet (60-centimeter)-thick gravel bed will be crushed and analyzed for the percent soluble alkalinity (as a measure of carbonates) and lead. If the gravel is found to be uncontaminated, it will be disposed of in the Hanford Solid Waste Landfill. If the gravel is designated as a dangerous waste, it will be shipped offsite to a RCRA-permitted landfill.

Area 4: Area 4 consists of the 117-DR HEPA filter building and the downstream tunnel to the reactor stack. The original HEPA filters from the DR Reactor were reportedly replaced for the LSFF. However, remnant radioactivity from the exhaust tunnels or filter holders has probably been picked up by the new filters.

Area 5: Area 5 consists of the reactor exhaust stack. Over the life of the LSFF facility, there were two routes for the exhaust to take before entering the reactor exhaust stack. Before 1982, the exhaust traveled from the LSFF through underground concrete tunnels to a spray scrubber and HEPA filters before exiting through the stack. The HEPA filters have a 99.95 percent efficiency rating; thus, no measurable amounts of reaction by-products are expected in the stack from this route. In 1982, a submerged gravel scrubber with an efficiency rating of approximately 99 percent was used to vent the exhaust instead of the underground HEPA filters. Similarly, no measurable deposits are expected from this route. The stack will be decontaminated and decommissioned under the surplus facilities decommissioning program.

Area 6: Area 6 consists of the 116-DR-8 Crib. The 116-DR-8 Crib was originally used from 1960 to 1964 to percolate low-level waste drainage from the 117-DR Building seal pits. When used for the LSFF, the 116-DR-8 Crib received only water reported not to have been corrosive (the pH level was less than 12.5). In these tests, it was the lithium that was depleted by the moisture; the lead had little participation in the reaction or loss to the crib. Because of this, and the treatment of the crib under the 100-HR-3 RFI/CMS (Ecology et al. 1992, p. C-7), it will not be sampled or treated under this closure plan.

Area 7: Area 7 consists of the area to the north and west of the 117-DR HEPA filter building. The burn pans used in the alkali metal fires were sometimes stored in this area. However, because of; (1) the passage of time, (2) low levels of carbonates that may have drained to the soil, (3) dissolving effects of rain, and (4) natural levels of carbonates in the soil, no significant concentrations levels above background are expected. One random soil sample will be taken from this area and analyzed for percent of soluble alkalinity. The soil will be sampled at a depth of 6 to 12 inches.

7.3.1 Verification Sampling

Verification sampling is used to determine that cleanup was completed to the required levels. In areas with metal surfaces, cleanup is the removal of all surface carbonates because carbonates will not have penetrated the metal surfaces. The only reliable information that could be obtained from wipe-sample verification of these metal surfaces is the presence or absence of a material and not the relative quantity with which to determine dangerous waste equivalent concentrations. Because these carbonates are dangerous only in large quantities and concentrations (see Chapter 4.0, Section 4.2 and the applicable MSDS in Appendix C), and the concentrations will be extremely small relative to the bulk and weight of the waste metal, removal of surface deposits will ensure safe decontamination of the surfaces.

Small pieces of equipment will be washed with water to remove surface contamination. The water will be analyzed to determine it's designation status. If it is found to be dangerous waste, it will be handled according to (WAC 173-303-084).

While the action level for the concrete walls is all surface carbonate deposits, unlike the metal walls, the possibility exists that the carbonates have penetrated and embedded in the concrete. Thus, verification is necessary to ensure that any carbonates remaining within the concrete are below the levels listed by the state for dangerous waste mixtures (WAC 173-303-084). Random cores of the concrete will be taken: 6 in the exhaust fan room (the only place waste metals were burned); and 3 baseline samples from outside the exhaust fan room. A concrete coring device will cut the core [approximately 3 inches (8 centimeters) wide] from the wall; the top 1-inch depth of this core will be crushed and analyzed for percent of soluble alkalinity and concentrations of sodium and lithium to determine the concentrations of sodium and lithium carbonates. If the concentrations of carbonates in the concrete are below or equal to dangerous waste levels for mixtures or background levels (whichever is greater), the facility will be considered to be clean.

7.3.2 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.

7.3.3 Quality Assurance/Quality Control Procedures

All procedures will be performed in accordance with the attached Quality Assurance Project Plan (Appendix E), *Environmental Investigations and Site Characterization Manual* (WHC 1988), *Quality Assurance Manual* (WHC 1989a), *Environmental Compliance Manual* (WHC 1989b), and pertinent EPA guidance [e.g., SW-846 (EPA 1990, p. 1-11)] and WAC 173-303-110(2).

7.3.4 Sample Quality Assurance and Quality Control

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

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 meet minimum QA/QC 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 QA/QC programs.

7.3.4.1 Field Quality Assurance and Quality Control. Field QA/QC will require the collection of at least one duplicate sample for every 20 samples collected. Duplicate samples will only 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-CM-7-7). 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.

7.3.4.2 Field Logbooks. All field activities will be recorded in a field logbook according to the protocols outlined in EII 1.5, "Field Logbooks" (WHC-CM-7-7). 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.

7.3.4.3 Chain of Custody. Chain-of-custody records will be kept to meet the requirements of EII 5.1, "Chain of Custody" (WHC-CM-7-7). The chain-of-custody form will establish the documentation necessary to ensure the traceability of the sample from time of collection to disposal.

7.3.4.4 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 (WHC-CM-7-7). Laboratory-specific forms could be used in lieu of the sample analysis request form and will be made available by the sample management organization.

7.3.5 Parameters and Analysis Methods

Because only one organic compound may have been used for waste treatment at the LSFF, and because of the heat of reaction [sodium and lithium burn greater than 1300 °F (700 °C)], no organics are reasonably expected to be in the facility. The one organic that may have been used is Saran (vinylidene chloride acrylonitrile copolymer), an ingredient (7 percent) in the Met-L-X* fire extinguisher, used to extinguish alkali fires. However, the waste burns in the fire facility were allowed to burn themselves to completion. The only MSDS-listed dangerous decomposition product of Met-L-X is "possibly traces of HCl." [The other ingredients in Met-L-X are sodium chloride (85 percent), magnesium aluminum silicate (greater than 10 percent) and magnesium stearate (greater than 1 percent).]

The samples to be collected from the structures will be analyzed for sodium and lithium carbonates.These compounds are the dangerous waste reaction by-products of sodium and lithium burns. Lead content will also be analyzed because of the effect it may have on residue disposal. Lead and sodium will be analyzed in these deposits and in the crushed gravel using atomic absorption and/or direct aspiration [SW-846, method 1310/6010, (EPA 1990)]. Levels of other TAL inorganics (see Table 7-1) will also be reported with the results for all samples analyzed per SW-846 methods (EPA 1990). These elements, however, are not by-products of waste burns at the LSFF and will not directly affect closure activities. The lithium will be analyzed in accordance with WAC-173-303-110.

The percent of soluble alkalinity (a measure of the carbonates) of the deposits, crushed gravel, and soil will be determined according to WAC 173-303-090 (6)(a)(iii). Equivalent weights of water and the media will be mixed and the pH of the solution will be tested. A pH of 12.5 or greater or 2 or less according to WAC 173-303-090(6)(a)(i) and (iii), will classify the deposits, gravel, or soil as corrosive and a dangerous waste for use in developing a health and safety plan and for determining proper disposal. The corrosivity of liquid cleanup residue will be analyzed using SW-846 method 9041 (EPA 1990).

Concrete cores will be crushed and analyzed for percent of soluble alkalinity and sodium and lithium concentrations to measure the equivalent concentrations of carbonates. The cores will be analyzed using the following methodology.

- Perform Total Metal Analysis (SW-846 Method 6010, EPA 1990) using Hot Acid Leach (SW-846 Method 3050, EPA 1990) to determine if dangerous waste species are present.

  If any species exceeds 20 times the Toxicity Characteristic Leaching Procedure (TCLP) detection limits, then a Total Metals Analysis using TCLP is required to demonstrate that the material is nondangerous.

---

*Met-L-X is a trademark of Ansul.

- Perform Total Metal Analysis (SW-846 Method 6010, EPA 1990) using TCLP (Title 40 Code of Federal Regulations Part 261, Appendix II) to determine if dangerous waste species are present.

  If any species exceeds the TCLP detection levels, then a bioassay is required to demonstrate that the material is nondangerous.

- Perform Rat Bioassay and Fish Bioassay to determine if the material is or is not a dangerous waste.

Moving from one analysis to the next is optional. It is necessary only to prove that a material is a nondangerous waste. For example, if Total Metal Analysis/TCLP show a material is a dangerous waste, then performing bioassays is necessary only to prove that the material is nondangerous.

Background samples of concrete will not be taken due to potential variability in the background constituents due to aggregate composition and size, cement composition and additives.

Scans for radiation will be made according to established Westinghouse Hanford procedures [EII 2.3, "Administration of Radiation Surveys to Support Environmental Characterization Work on the Hanford Site," (WHC-CM-7-7)] in all areas for worker protection and facility characterization. In areas where scans show measurable radioactivity, the samples collected and residue removed will also be surveyed for radiation.

7.3.5.1 Data Reliability. Data reliability will be assessed by evaluating the sample handling and analysis quality control according to procedures in EII 1.11 "Control and Transmittal of Laboratory Analytical Data" (WHC-CM-7-7). Sample-handling quality control will be evaluated by reviewing field documentation and results of quality assurance samples to establish that sampling error was minimized. The review will be conducted to verify that decontaminated equipment was used, that cross-contamination was minimized, that samples were preserved properly, and that the chain of custody of the samples was not broken.

7.3.6 Sampling Equipment and Procedures

Sampling equipment will be appropriate to the media sampled, which are crusted powder (carbonates), concrete surfaces (wiped and scraped), concrete cores, and soils. All samples (except concrete cores) will be collected in 2.0 ounce (60-milliliter) precleaned bottles; reusable sampling equipment (stainless steel) will be decontaminated and wrapped to ensure cleanliness before each use. The following are examples of some of the other sampling equipment to be used to sample the media.

Powder	Wipe samples of concrete	Concrete scrapes	Soils
Stainless-steel spoon	Filter paper	Stainless-steel putty knife	Stainless-steel shovel and spoons

Wipe samples will be collected according to standard sampling techniques (EPA 1987a) using Whatman* No. 42 filter paper. The papers will be laboratory prepared with dilute (1:100) nitric acid solution. One filter paper will be used to wipe down the wall surface from a 6-inch by 6-inch (15-centimeter by 15-centimeter) section over the carbonate deposit. The 36-inch (230-centimeter) square area, covered with a disposable template, will be carefully wiped, using vertical strokes, starting at the top left corner and progressing to the bottom right corner. The filter paper will be held with clean gloves to prevent contamination. A new pair of gloves will be used for each wipe sample. Care will be taken to wipe the surface only once throughout the sampling effort. After the area is wiped, the filter paper will be folded with the exposed side in and folded again to form a 90-degree angle in the center of the paper.

Concrete cores will be collected with an approximately 3-inch (8-centimeter)-diameter diamond bit coring device, penetrating at least 2 inches (5 centimeters) into the concrete. Distilled water will be used as a cutting lubricant to minimize dust generation. The top 1 inch (2.5 centimeter) of the core will be removed with a concrete saw and placed in a decontaminated container for crushing and analysis.

To collect soil samples, a cleaned stainless-steel shovel will be used to remove the top 6 inches (15 centimeters) of soil; then a clean, stainless-steel sampling spoon will be used to fill a 2.0-ounce (60-milliliter) glass jar with soil from a depth of 6 to 12 inches (15 to 30 centimeters).

All equipment will be decontaminated between samples in accordance with procedures outlined in EII 5.5 "Decontamination of Equipment for *Resource Conservation and Recovery Act/Comprehensive Environmental Response Compensation and Liability Act* (RCRA/CERCLA) Sampling" (WHC 1988).

*Whatman is a trademark of Whatman Incorporated.

7.3.7 Summary of Sampling Effort

Table 7-2 shows the number of samples to be collected and analyzed for LSFF characterization and validation. QA/QC samples will be collected once each sampling day.

7.3.8 Modifications to the Sampling Plan

The optimal aspects of sample design are sometimes not achievable because of unanticipated situations or changing condition. Factors adversely influencing sampling efforts can include equipment malfunction or breakdown, physical barriers to accessing sampling locations, and an overly optimistic evaluation of other physical conditions at the site. When modifications to the sampling plan are necessary, they will be recorded in the field logbook along with the circumstances requiring the modification. The field logbook will be reviewed and signed by the project engineer daily. This will provide an accurate record of modifications and Westinghouse Hanford approval, while allowing sampling to proceed safely and maintaining efficient manpower and equipment usage. When modifications to an established procedure are needed, procedures outlined in EII 1.4 "Deviations from Environmental Investigations Instructions" (WHC-CM-7-7) will be followed. Copies of the field logbook will be made available to Ecology upon request.

7.4 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 LSFF. The site-specific Health and Safety Plan will be prepared in accordance with EII 2.1, "Preparation of Hazardous Waste Operations Permits" (WHC-CM-7-7).

7.5 REMOVAL OF REGULATED MATERIA. AND WASTE RESIDUE

The methods of residue removal will include high-pressure steam, water washes, and acid washes (5 percent acetic acid in water). The rinsate will be caught using durable plastic liners. All regulated materials packaged for shipment offsite will be in U.S. Department of Transportation-approved containers that are compatible with the waste contents [e.g., 55-gallon (210-liter) drums]. All containers will be labeled and shipped under manifest as necessary according to WAC 173-303-075 (Figure 7-1). All dangerous waste generated by the clean-up will be handled in accordance with WAC-173-303. Activities conducted within the Hanford Facility that only involve the management of radioactive waste are not regulated under RCRA or WAC-173-303 regulations. References to such activities are included for informational purposes only.

7.5.1 Buildings

The reaction by-product deposits will be removed from the walls, ceilings, and floors of the experiment rooms and tunnels. Cleaning methods may include acid and/or water washes or high-pressure steam. The residue will be drummed; sampled for corrosivity, lead, and radioactivity (as indicated by the initial surveys); and disposed of appropriately.

7.5.2 Soil

If sampling proves that the percent of soluble alkalinity in the soil is above background or the action level described in Chapter 6.0, Section 6.2, additional sampling will be used to determine the extent of contamination and levels (if any) of radioactivity. The affected soil will then be drummed and disposed of offsite in accordance with the site disposal contract that is in place at the time of removal if sampling proves it to be dangerous but uncontaminated by radioactivity. If the soil has low-level radioactivity, it will be held onsite until a permitted TSD facility is available.

7.5.3 Equipment

The equipment used for the LSFF and in contact with waste sodium or lithium burn exhaust gases, and equipment used during the closure activities, will be cleaned based on "Equipment Decontamination (Bracken 1989). The cleaning will be accomplished by high-pressure steam cleaning, water washing, or acid washing. The acid wash will use a 5 percent solution of acetic acid in water. The cleaning will be performed over a solid sheet of durable plastic either .008 inch (0.2 millimeter) or 0.012 inch (0.3 millimeter) thick, depending on the equipment and amount of potential abrasion resulting from cleaning activities. The rinsate will be collected in 55-gallon (210-liter) steel drums, sampled for corrosivity, and disposed of appropriately. After cleaning, all equipment and materials originating from the LSFF will be disposed of or surplused.

7.6 OTHER ACTIVITIES REQUIRED FOR CLOSURE

No other activities are required for clean closure.

7.7 SCHEDULE FOR CLOSURE

Closure activities will begin within 30 days after notification by Ecology that this closure plan has been approved. Closure will proceed according to the schedule in Figure 7-2.

7.8 AMENDMENT OF PLAN

The LSFF closure plan will be amended whenever changes in operating plans affect the closure or if, when conducting final closure activities, unexpected events require a modification of the closure plan. This plan may be amended any time before certification of final closure of the LSFF. If amendment to the approved plan is required, DOE-RL will submit a written request to Ecology to authorize the change.

7.9 CERTIFICATION OF CLOSURE AND SURVEY PLAT

Within 60 days of closure of the LSFF, 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 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.

The DOE-RL and the independent professional engineer will certify with a document similar to Figure 7-3.

If clean closure is not attained, the owner or operator will submit to the local zoning authority or to the authority with jurisdiction over local land use, a survey plat indicating the location and dimensions of the LSFF. The EPA will also be provided with a survey plat. The plat will show the facility location with respect to permanently surveyed benchmarks and will be prepared and certified by a professional land surveyor. The plat will also contain a note, prominently displayed, stating the owner's obligation to restrict disturbance of the surveyed area.

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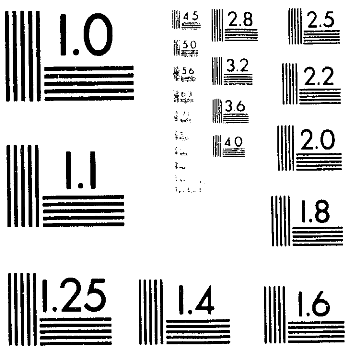

1.0
4.5
5.0
5.6
6.3
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.1
1.8
1.25
1.4
1.6

2 of 2

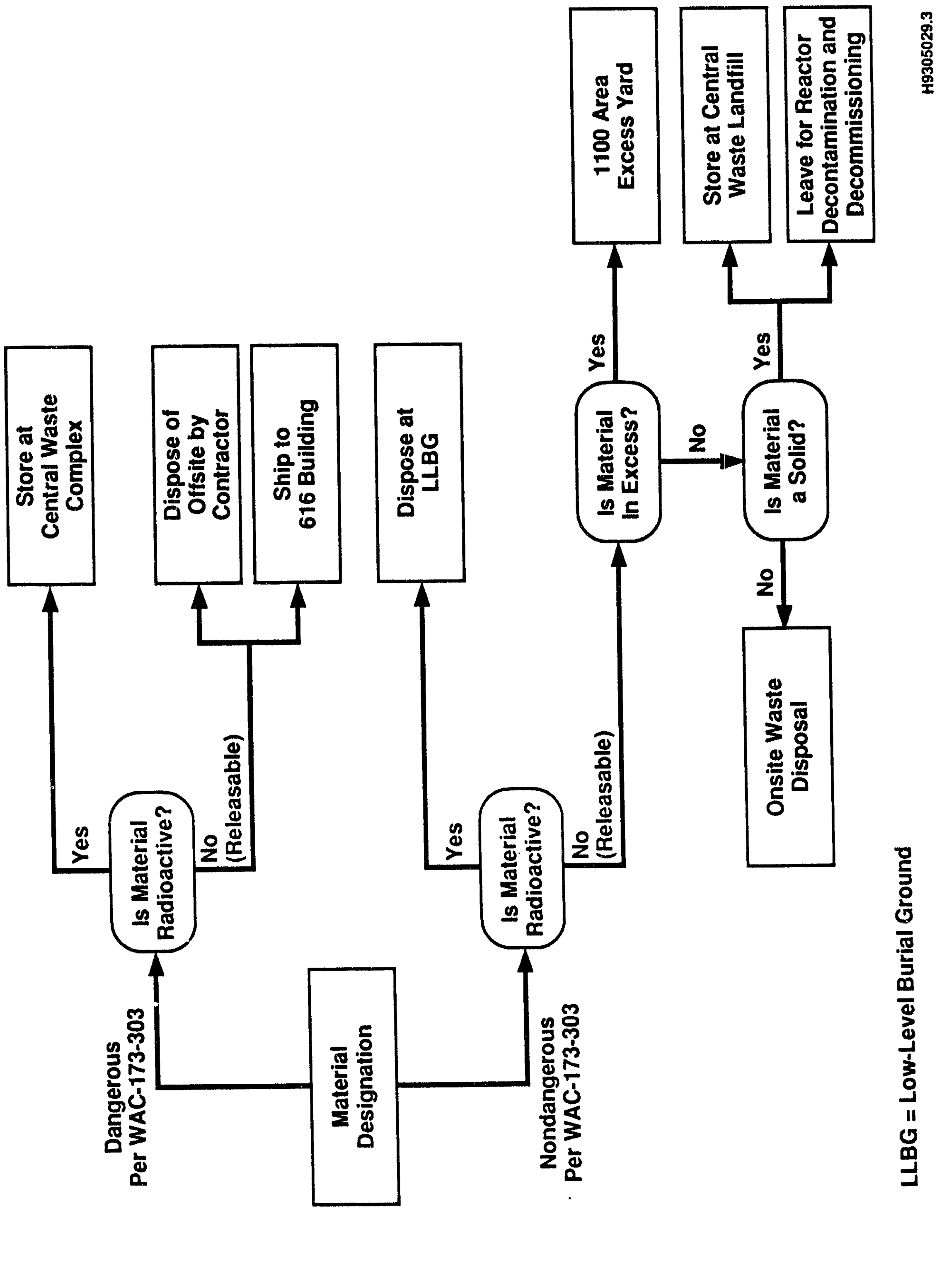
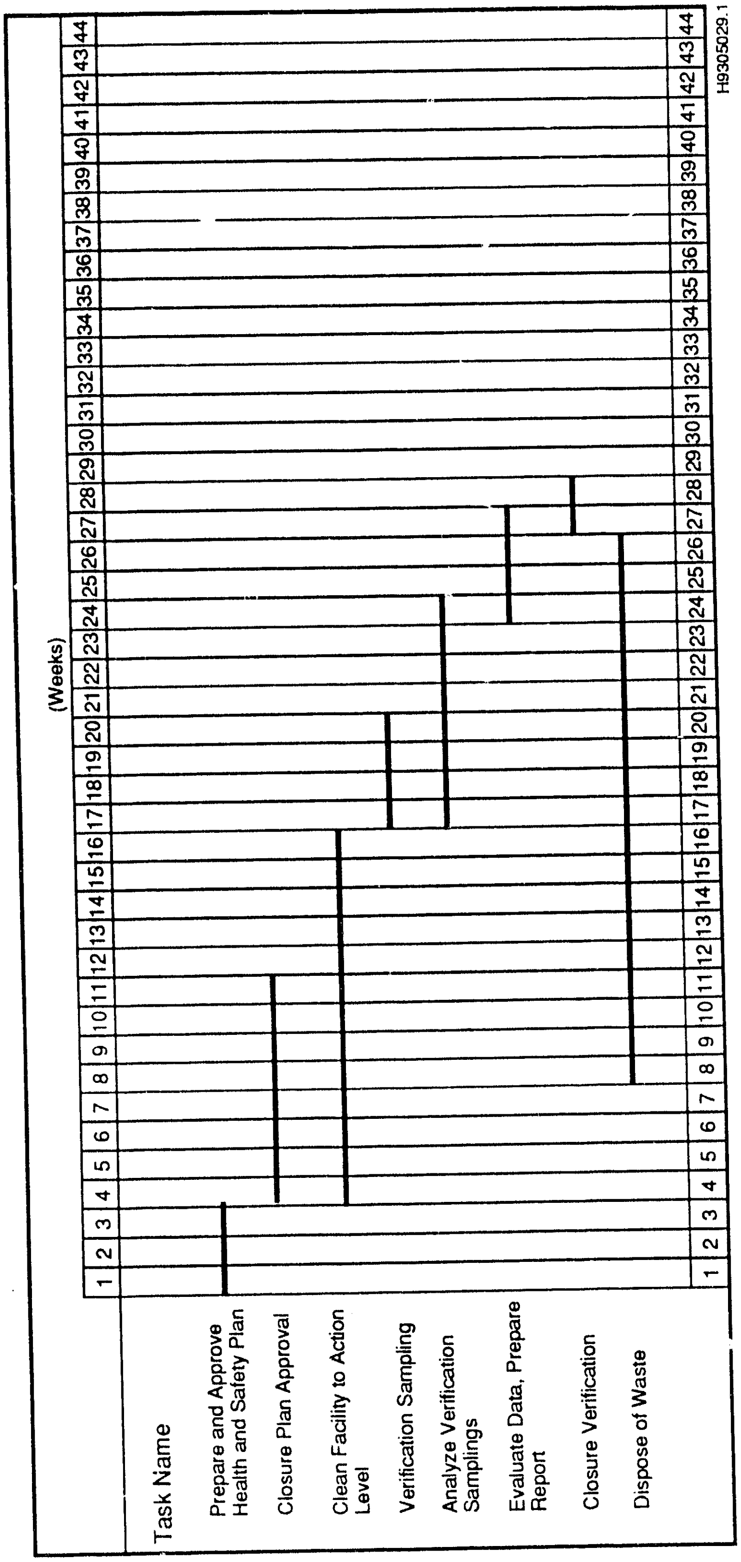


Figure 7-1. Flowchart for Removal of Contaminated Material and Waste Residue.

930603.1303



1 Figure 7-2. Large Sodium Fire Facility Closure Schedule.

CLOSURE CERTIFICATION
FOR

____

Hanford Site
U.S. Department of Energy, Richland Operations 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 7-3. Closure Certification for the Large Sodium Fire Facility.

Table 7-1. Other Target Analyte List Inorganics to be Reported.

Aluminum	Magnesium
Antimony	Manganese
Arsenic	Mercury
Barium	Nickel
Beryllium	Potassium
Cadmium	Selenium
Calcium	Silver
Cesium	Thallium
Chromium	Vanadium
Cobalt	Zinc
Copper	Cyanide
Iron	

Table 7-2. Minimum Number and Location of Samples.

General sample location	Minimum number of samples to be collected
Office Area	2
Floor Outside Exhaust Fan Room	2
Exhaust Fan Room Floor	1
Exhaust Fan Room Wall	1
Exhaust Fan Room Ceiling	1
Small Fire Room	2
Large Fire Room	2
Sodium Supply Room	1
Gravel Scrubber	1
Soil Outside LSFF	1
Quality assurance/quality control samples	1 per sampling day

CONTENTS

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8.0 POSTCLOSURE

8.1 NOTICE IN DEED BOOK

This closure plan is proposing clean closure of the 105-DR Large Sodium Fire Facility. However, if clean closure cannot be obtained, the following action will be taken in accordance with WAC 173-303-610 (1)(b). Within 60 days of the certification of closure, DOE-RL will sign, notarize, and file for recording the notice indicated below. The notice will be concurrently sent to Ecology and the Auditor of Benton County, P.O. Box 470, Prosser, Washington, with instructions to record this notice in the deed book.

TO WHOM IT MAY CONCERN

The United States Department of Energy-Richland Operations 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 105-DR Large Sodium Fire Facility).

(b) The United States Department of Energy-Richland Operations Office, by operation of the 105-DR Large Sodium Fire Facility, has disposed of hazardous and/or dangerous waste under the terms of regulations promulgated by the United States Environmental Protection Agency and Washington 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 waste disposed of on the above described property.

(e) The United States Department of Energy-Richland Operations 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 Department of Ecology (whichever are applicable) showing the location and dimensions of the 105-DR Large Sodium Fire Facility and a record of the type, location, and quantity of waste treated.

8.2 POSTCLOSURE CARE

Postclosure care is generally required when a waste management facility cannot attain a clean closure. If the LSFF cannot attain clean closure under this plan, closure may be deferred until the reactor building, underground tunnels, filter building, stack, and crib characterization and disposal are addressed under concurrent and future programs.

If it is determined that the LSFF cannot be remediated under these programs, a postclosure plan will be prepared for the facility at that time. The postclosure plan will include the following:

- Inspection plan
- Monitoring plan
- Maintenance plan
- Personnel training
- Postclosure contact
- Provisions to amend the postclosure plan
- Provisions to certify the postclosure plan.

CONTENTS

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9.0 REFERENCES

9.1 DOCUMENTS

APHA, 1989, *Standard Methods for the Examination of Water and Wastewater*, 17th Edition, Washington, D.C.

Bracken, E. A., 1991, "Equipment Decontamination," Letter to T. L. Nord, 9102456, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE, 1985, *RCRA Part B Permit Application, Alkali Metal Treatment and Storage Facilities*, D-2, DOE 150, U.S. Department of Energy-Richland Operations, Richland, Washington.

DOE, 1987, *Final Environmental Impact Statement - Disposal of Hanford Defense High-Level, Transuranic and Tank Waste, Hanford Site, Richland, Washington*, 5 vols, DOE/EIS, 0113, U.S. Department of Energy, Washington, D.C.

DOE, 1992, *Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington*, DOE/EIS-0119F, U.S. Department of Energy, Richland, Washington.

DOE-RL, 1989, *Draft Resource Conservation Recovery Act Facility Investigation/ Corrective Measures Study Work Plan for the 100-HR-3 Operable Unit Hanford Site, Richland, Washington*, Department of Energy-Hanford Operations, Richland, Washington.

DOE-RL, 1992a, *Hanford Site Baseline Risk Assessment Methodology*, DOE/RL-91-45, U.S. Department of Energy, Richland, Field Office, Richland, Washington.

DOE-RL, 1992b, *Hanford Site Soil Background*, DOE/RL-92-24, U.S. Department of Energy, Richland Field Office, Richland, Washington.

Dorian, J. J. and V. R. Richards, 1978, *Radiological Characterization of the Retired 100 Areas*, UNI-946, United Nuclear Industries, Inc., Richland, Washington.

Ecology, EPA, and DOE, 1992, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy.

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

EPA, 1983, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, QAMS-005/80, EPA-600/4-83/004, U.S. Environmental Protection Agency, Washington, D.C.

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

EPA, 1990, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846, 1990 Supplement, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

EPA, 1987a, *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1987b, *Data Quality Objectives for Remedial Response Activities-Development Process*, EPA/540/6-87/003, OSWER Directive 9335.301, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988a, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, Hazardous Site Evaluation Division, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, Hazardous Site Evaluation Division, U.S. Environmental Protection Agency, Washington, D.C.

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

Jeppson, D. W., 1978, *Test Plan 189a WH014/EDD*, Subtask B, Lithium-Atmosphere Reactions, Westinghouse Hanford Company, Richland, Washington.

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

WHC, 1989a, *Quality Assurance Manual*, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989b, *Environmental Compliance Manual*, WHC-CM-7-5, Westinghouse Hanford Company, Richland, Washington.

WHC, 1989c, *Industrial Safety Manual*, WHC-CM-4-3, Westinghouse Hanford Company, Richland, Washington.

9.2 CODE OF FEDERAL REGULATIONS AND FEDERAL REGISTER

40 CFR 261, "Identification and Listing of Hazardous Waste," *Code of Federal Regulations*, as amended, U.S. Environmental Protection Agency, Washington, D.C.

40 CFR 264, 1992, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, as amended.

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.

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

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

Resource Conservation 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.

WHC, 1991, *Hanford Environmental Information System (HEIS) User's Manual*, WHC-EP-0372, Vol. 1, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

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APPENDICIES

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APPENDIX A

1987 SAMPLING ACTIVITIES

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DOE/RL-90-25
Rev. 1

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509) 376-3564
Telex 15-2874

August 18, 1987

7 Seal Pit sludge
6 Tunnel. Dead end
5 Tunnel near Batch Tank Room
4 Batch Tank entry chamber floor
3 Water Pool in Mid Tunnel
2 Small [illegible] Room entry chamber ([illegible])
1 [illegible] Room " "

John Biglin
W/221T
Westinghouse Hanford Company
P. O. Box 1970
Richland, WA 99352

Dear Mr. Biglin:

ANALYSIS OF CLEANUP RESIDUES

All materials had been exposed to air long enough prior to sampling that any hydroxide had reacted with carbon dioxide of the air to form carbonate.

pH of 0.1% Solution:

1 = 10.1, 2 = 10.2, 3 = 9.5, 4 = 10.1, 5 = 10.1, 6 = 10.0, 7 = 9.4

Soluble Alkalinity (as sodium carbonate)

1 = 57%, 2 = 62%, 3 = 0.2%, 4 = 63%, 5 = 0.4%, 6 = 67%, 7 = 0.3%
scrape sludge

Total Lead (ppm)

1 = 125, 2 = 60, 3 = <0.5, 4 = 40, 5 = 1300, 6 = 35, 7 = 780
scrape

Total Lithium (ppm)

1 = 7500, 2 = 1600, 3 = 105, 4 = 11000, 5 = 2400, 6 = 10000, 7 = 2100

Very truly yours,

Bob Keough

R. F. Keough

RFK/tts

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509) 376-3564
Telex 15-2874

September 17, 1987

J. W. Biglin
221T/23/200W
Westinghouse Hanford Company
P. O. Box 1970
Richland, WA 99352

Dear Mr. Biglin:

RADIOACTIVITY IN WASTE SAMPLES

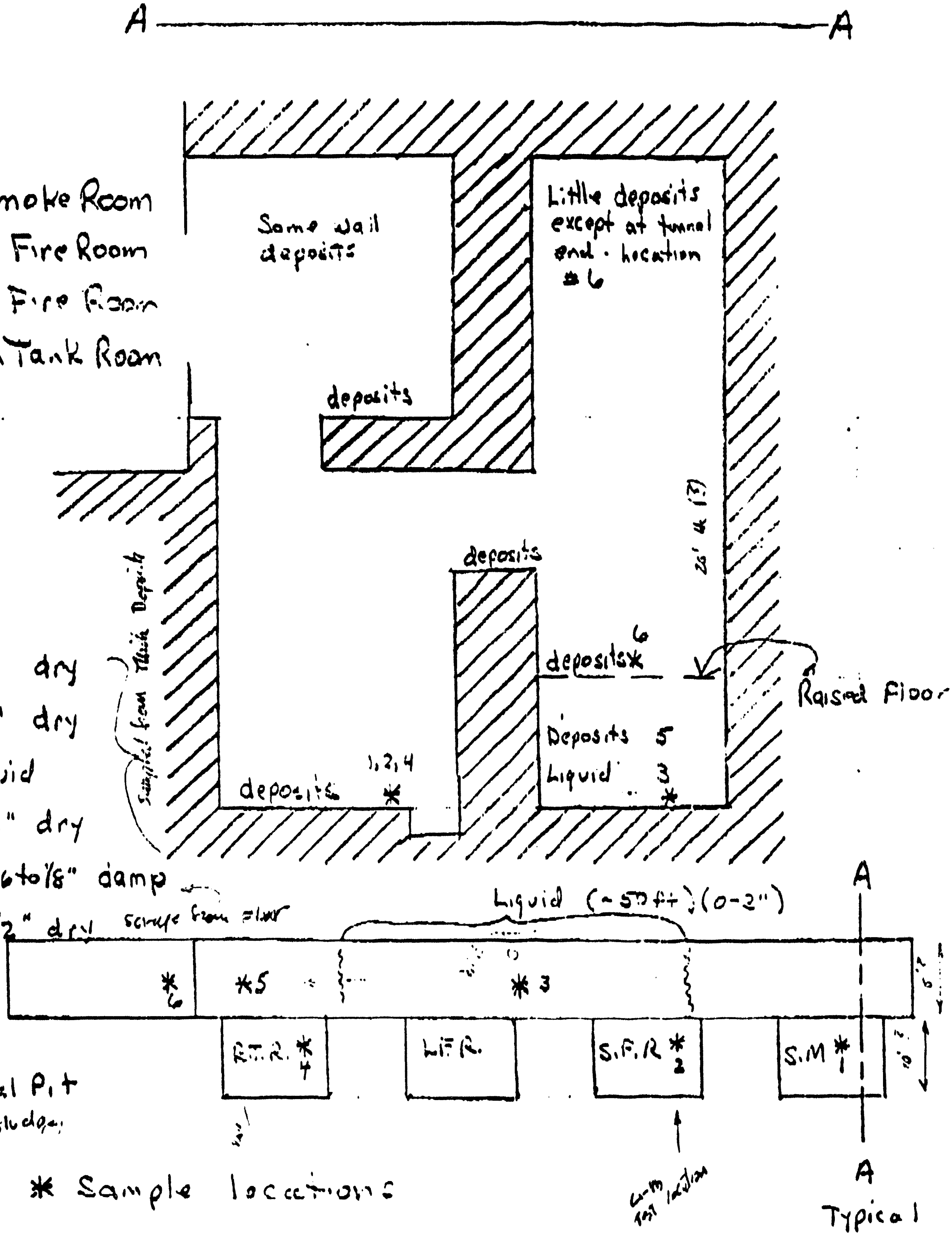
	d/m/g				
			Gamma		
Sample	Alpha	Beta	Cs-137	Co-60	Eu-152
#2	< 6	330	70	50	48
#4	< 13	< 30	< 14		
#6	< 19	< 47	< 18		
Pit	< 14	< 35	< 10		

R. F. Keough

RFK/tts

105 DR Tunnel Sampling 7-27-87

Smoke Room
Small Fire Room
Large Fire Room
Batch Tank Room



S#1 - 1" dry
S#2 - 1/2" dry
S#3 - Liquid
S#4 - 1/2" dry
S#5 - 1/16 to 1/8" damp
S#6 - 1/2" dry

#7 - Seal Pit
(sludge)

* Sample locations

JW Biglin

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APPENDIX B

SAMPLING LOCATIONS

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105-DR LARGE SODIUM FIRE FACILITY
RANDOM NUMBER GENERATOR

GRAVEL BED SAMPLING POINTS Figure C4

1 Sample for Bottom (5X6) Grid

X-coordinate	Y-coordinate
1	0

1 Sample for Top (5X6) Grid

X-coordinate	Y-coordinate
0	2

1 Sample for Middle (5X6) Grid

X-coordinate	Y-coordinate
1	0

SOIL SAMPLING POINTS Figure C3

Section A (3X10) Grid

X-coordinate	Y-coordinate
1	5

Section B (12X9) Grid

X-coordinate	Y-coordinate
7	7

Section C (15X9) Grid

X-coordinate	Y-coordinate
9	7
0	5

EXHAUST FAN ROOM SAMPLING POINTS Figure C1

NORTH WALL (9X7) GRID

X-coordinate	Y-coordinate
6	6

CEILING (9X7) GRID

X-coordinate	Y-coordinate
0	6

SOUTH WALL (9X7) GRID

X-coordinate	Y-coordinate
5	2

FLOOR (9X7) GRID

X-coordinate	Y-coordinate
7	3

EAST WALL (7X7) GRID

X-coordinate	Y-coordinate
3	5

WEST WALL (7X7) GRID

X-coordinate	Y-coordinate
0	2

BASELINE SOIL SAMPLING POINTS FROM (12X9) GRID
Figure C2

X-coordinate	Y-coordinate
9	6
6	4
4	2

CONCRETE BASELINE SAMPLING POINTS Figure C2
(3X5) GRID (3 wipe samples, 3 core)

Wipe Samples

X-coordinate	Y-coordinate
2	4
0	0
0	1

Core Samples

X-coordinate	Y-coordinate
1	2
0	4
2	2

105-DR LARGE SODIUM FIRE FACILITY
EXHAUST TUNNELS RANDOM NUMBER GENERATOR

LOWER TUNNEL (3 SAMPLES)

RANDOM WALL (1 or 2)	RANDOM HEIGHT (0-20 FT.)	RANDOM LENGTH (0-100 FT.)
2	2	75
1	17	58
2	4	44

Alternate Samples

2	18	19
2	19	84
1	9	57

UPPER TUNNEL (3 SAMPLES)

RANDOM WALL (1 or 2)	RANDOM HEIGHT (0-7 FT.)	RANDOM LENGTH (0-100 FT.)
2	1	23
2	2	3
2	1	93

Alternate Samples

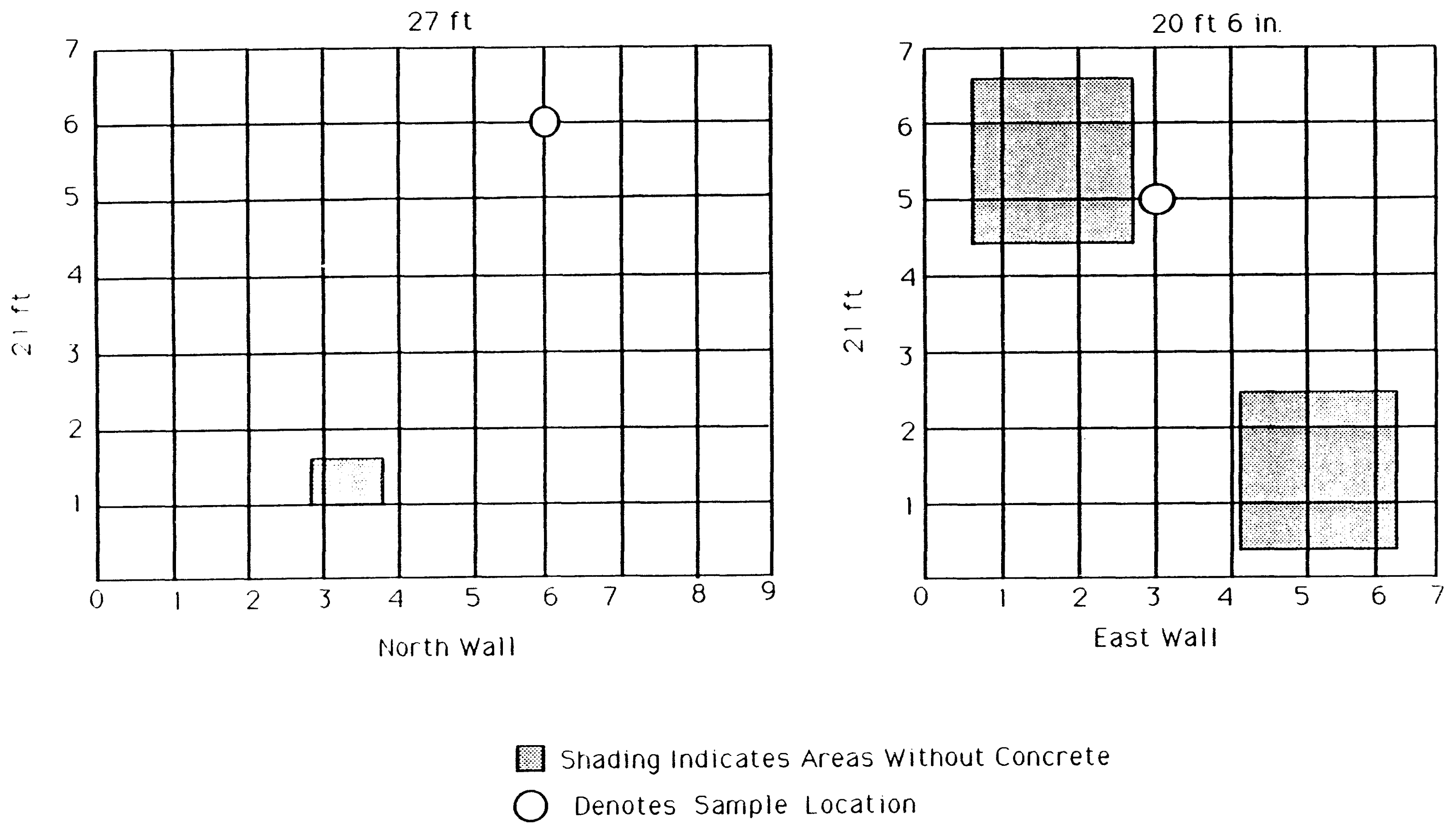
2	6	90
2	6	66
1	0	97

UNDERGROUND TUNNEL TO FILTER BUILDING (3 SAMPLES)

RANDOM WALL (1 or 2)	RANDOM HEIGHT (0-7 FT.)	RANDOM LENGTH (0-100 FT.)
2	2	31
1	4	92
1	0	45

Alternate Samples

1	4	15
2	6	29
2	0	85



1 Figure C-1. Area 1 Exhaust Fan Room Verification Concrete Core Samples. (sheet 1 of 3)

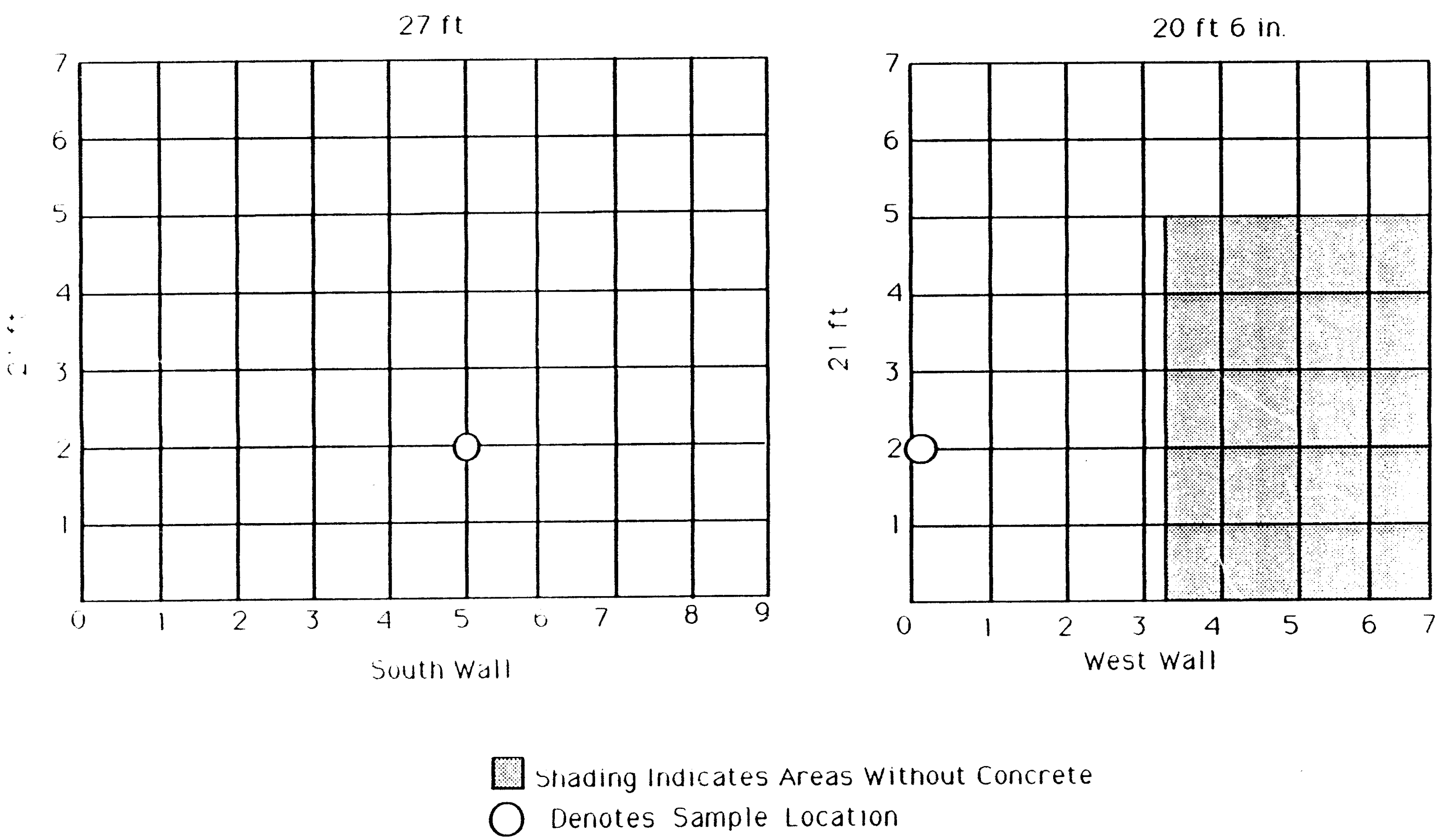
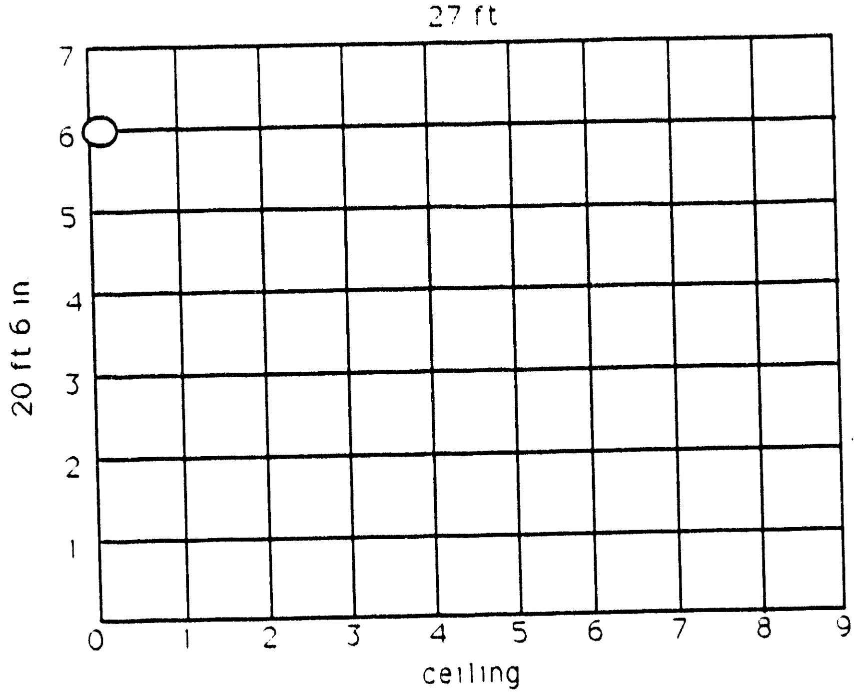


Figure C-1. Area 1 Exhaust Fan Room Verification Concrete Core Samples. (sheet 2 of 3)



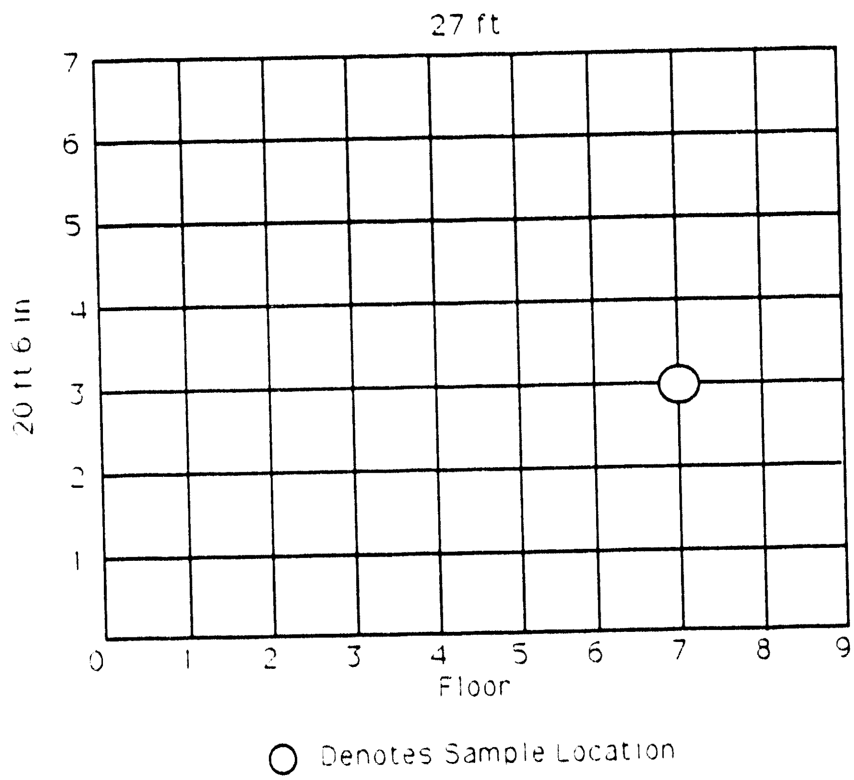


Figure C-1. Area 1 Exhaust Fan Room Verification
Concrete Core Samples. (sheet 3 of 3)

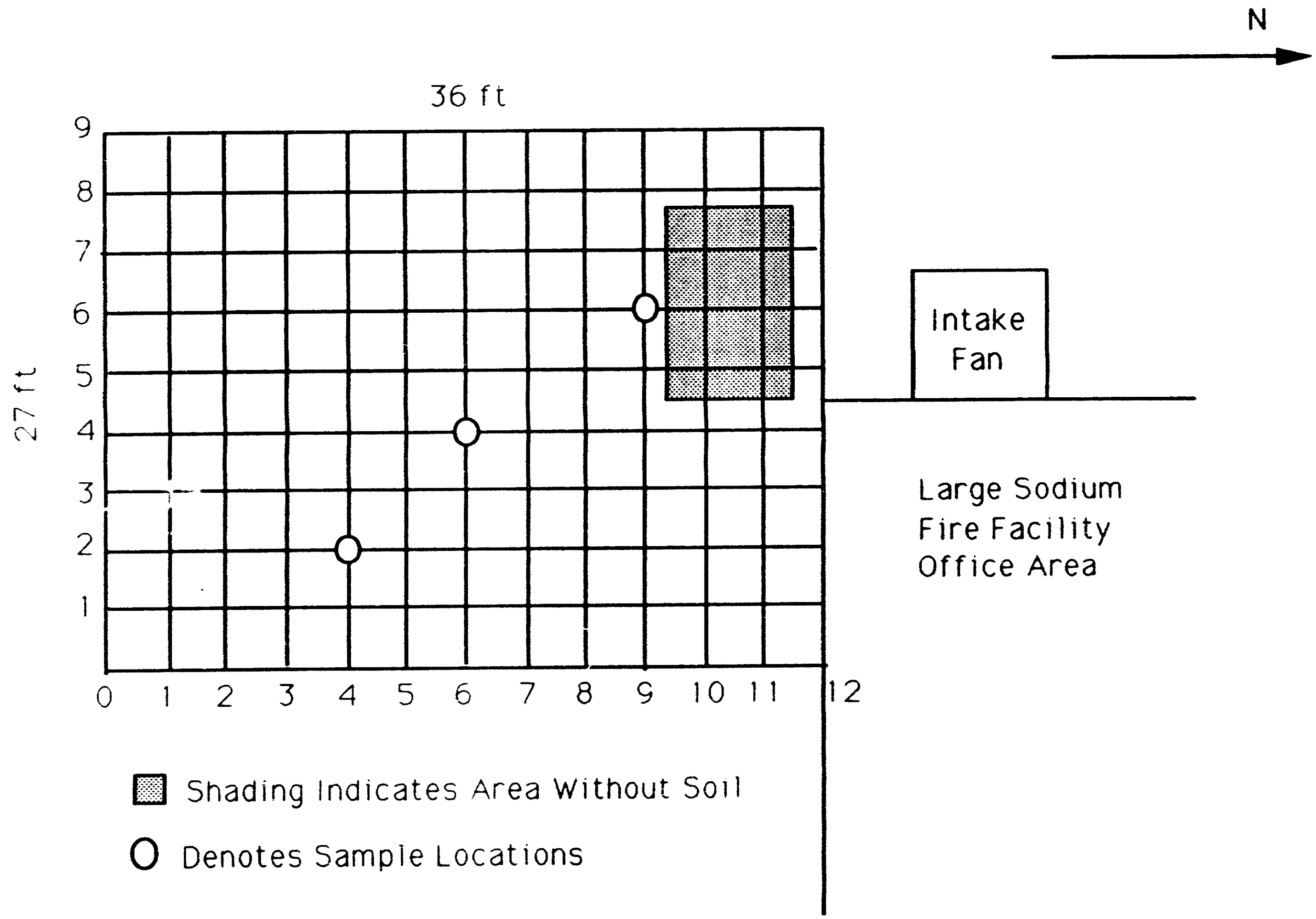


Figure C-2. Baseline Soil Locations for Area 7. (sheet 1 of 2)

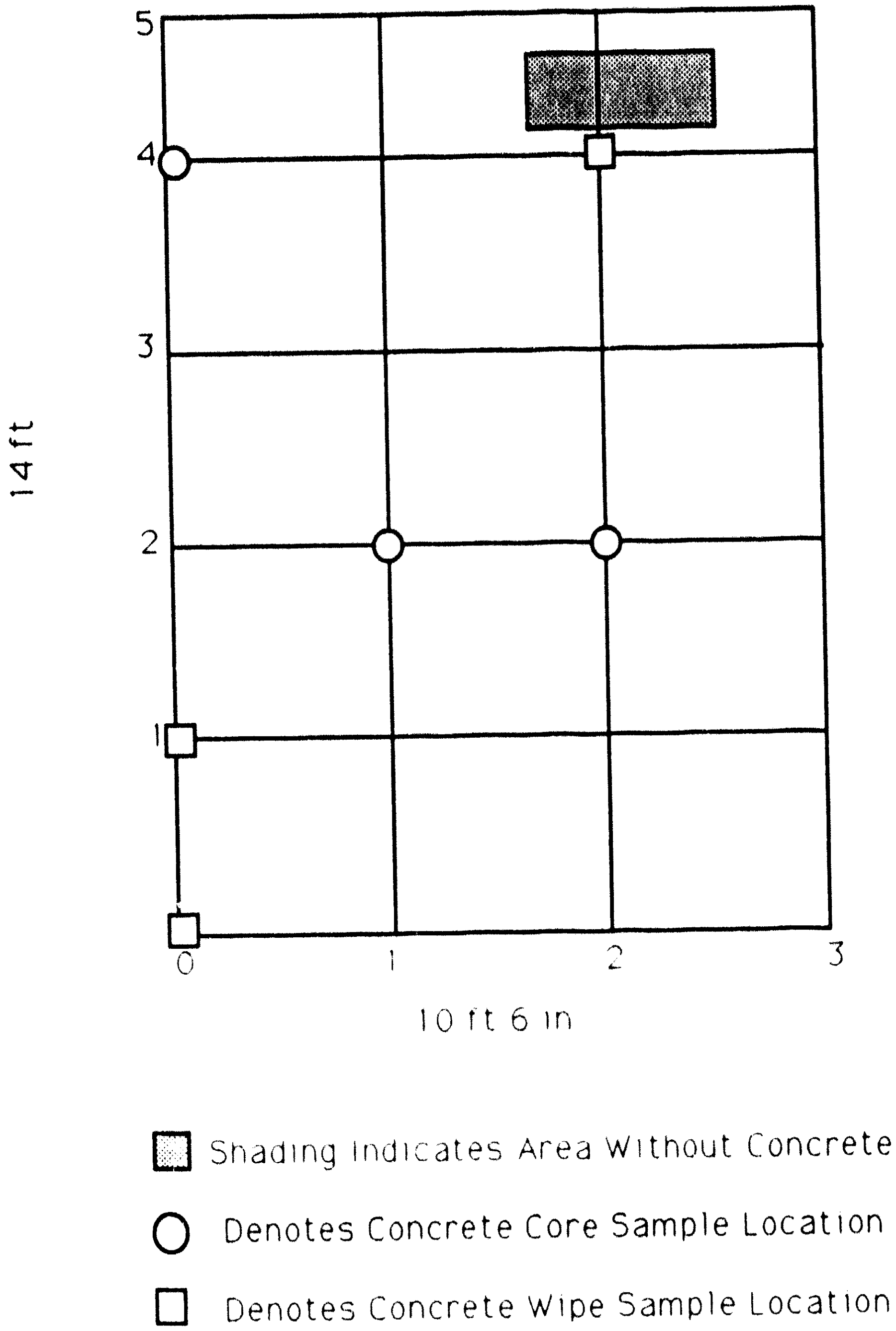
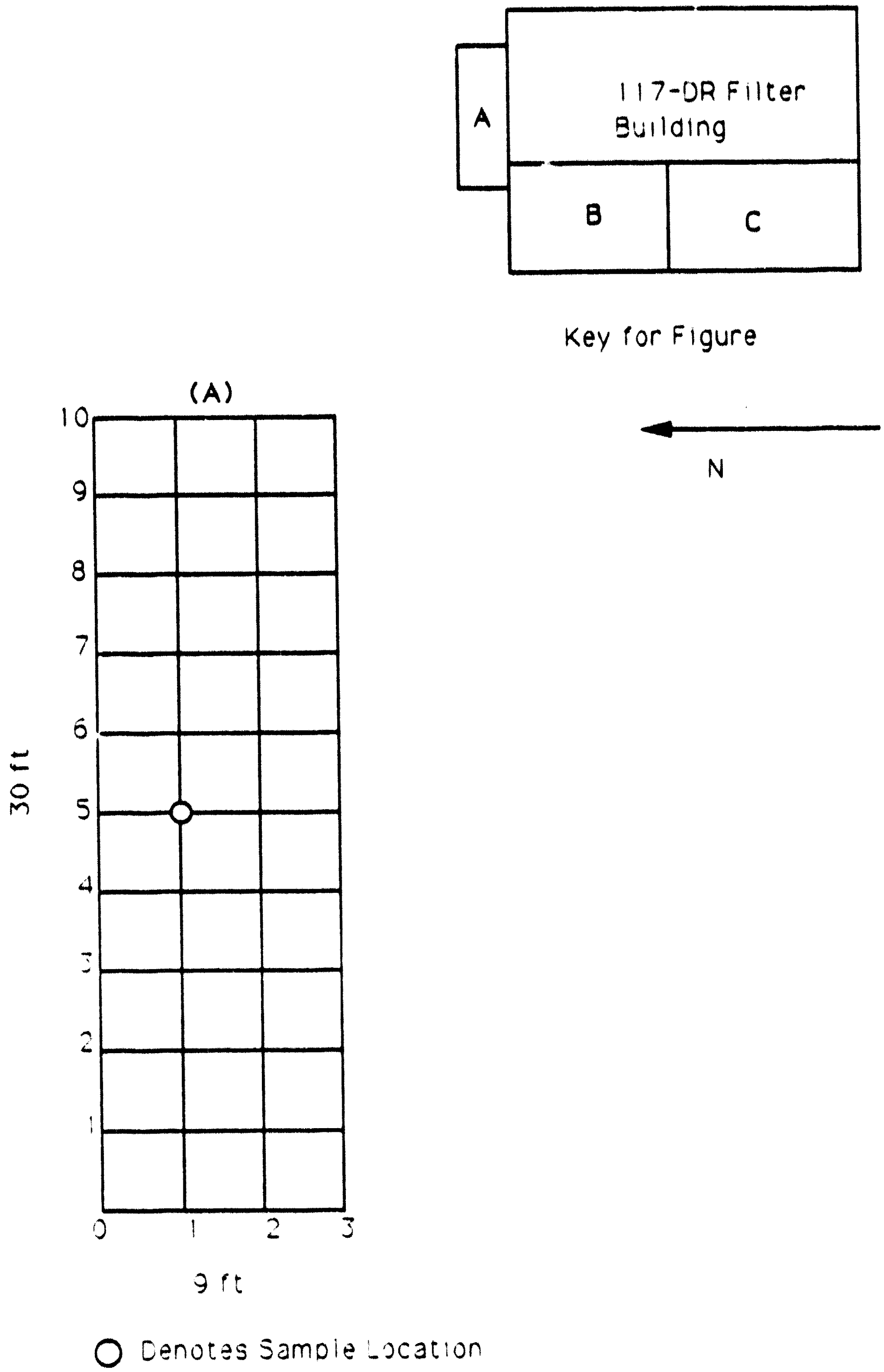


Figure C-2. Baseline Concrete Locations for Area 7. (sheet 2 of 2)



1 Figure C-3. Area 4 Soil Sampling Locations. (sheet 1 of 2)

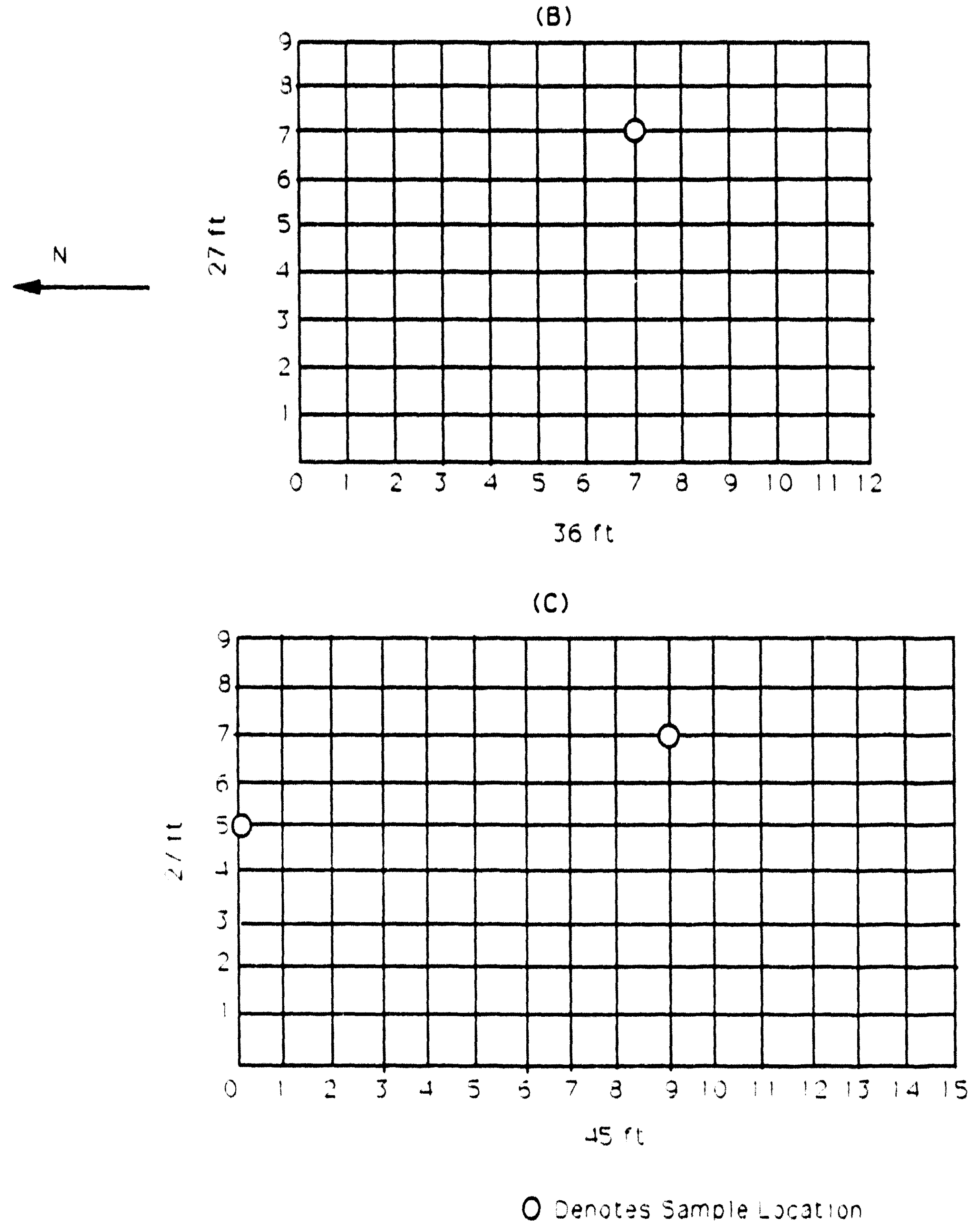
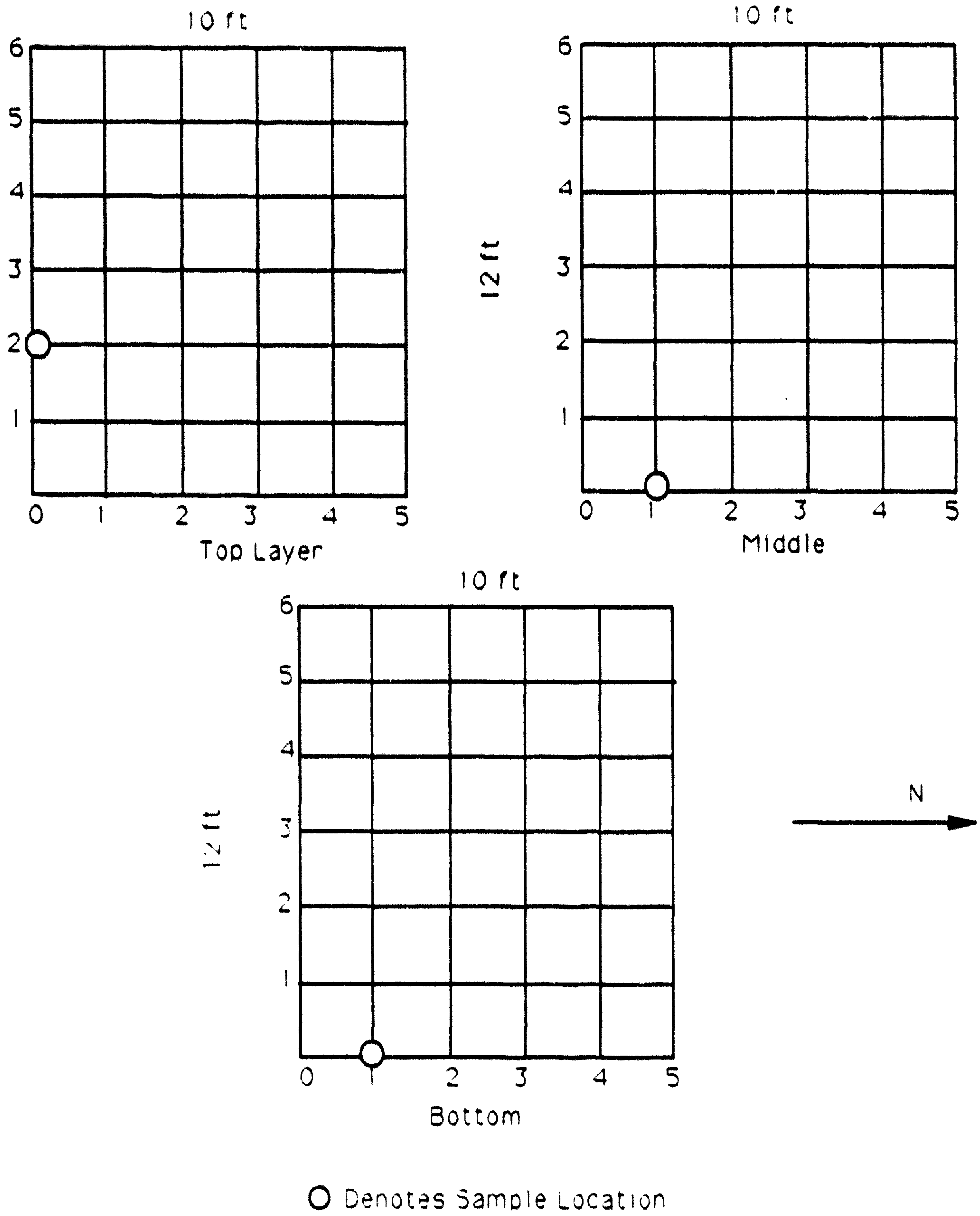


Figure C-3. Area 4 Soil Sampling Locations. (sheet 2 of 2)



1 Figure C-4. Area 3 Gravel Bed Sampling Points.

APPENDIX C

SELECTED MATERIAL SAFETY DATA SHEETS

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MSDS # 1288

MATERIAL SAFETY DATA SHEET OHS12510

OCCUPATIONAL HEALTH SERVICES, INC.
450 SEVENTH AVENUE, SUITE 2407
NEW YORK, NEW YORK 10123
(800) 445-MSDS (212) 967-1100

EMERGENCY CONTACT:
JOHN S. BRANSFORD, JR. (615) 292-1180

MSDS # 1288

SUBSTANCE IDENTIFICATION

CAS-NUMBER 7439-92-1
RTEC-NUMBER OF7525000

SUBSTANCE: LEAD

TRADE NAMES/SYNONYMS:
C.I. PIGMENT METAL 4: C.I. 77575: LEAD FLAKE: KS-4: LEAD S 2: SI: SO: PLUMBUM: S0: PB-S 100: LEAD ELEMENT: L-18: L-24: L-29: L-27: T-134: PB: OHS12510

CHEMICAL FAMILY:
METAL

MOLECULAR FORMULA: PB MOLECULAR WEIGHT: 207.19

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: LEAD PERCENT: 99.8

OTHER CONTAMINANTS: BISMUTH, COPPER, ARSENIC, ANTIMONY, TIN, IRON, SILVER, ZINC

EXPOSURE LIMIT:
LEAD, INORGANIC FUMES AND DUST (AS PB):
50 UG(PB)/M3 OSHA 8 HOUR TWA
30 UG(PB)/M3 OSHA 8 HOUR TWA ACTION LEVEL
IF AN EMPLOYEE IS EXPOSED TO LEAD FOR MORE THAN 8 HOURS PER DAY THE FOLLOWING FORMULA IS USED:
MAXIMUM PERMISSIBLE LIMIT (IN UG/M3)= 400 DIVIDED BY HOURS WORKED IN THE DAY
0.15 MG(PB)/M3 ACGIH TWA
<0.10 MG(PB)/M3 NIOSH RECOMMENDED 10 HOUR TWA

1 POUND CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY WARNING AND RELEASE REQUIRMENTS- (FEBRUARY 27, 1987)

PHYSICAL DATA

DESCRIPTION: BLUISH-WHITE, SILVERY GRAY, HEAVY, MALLEABLE METAL

BOILING POINT: 3164 F (1740 C) MELTING POINT: 622 F (328 C)

SPECIFIC GRAVITY: 11.3 SOLUBILITY IN WATER: INSOLUBLE

MSDS #1288

VAPOR PRESSURE: 1.3 MMHG @ 970 C

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN NITRIC ACID, HOT CONCENTRATED SULFURIC ACID

OTHER PHYSICAL DATA
HARDNESS: 1.5 MOHS

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
NEGLIGIBLE FIRE HAZARD IN METALLIC FORM; HOWEVER, POSSIBLE FIRE AND EXPLOSION HAZARD IN DUST FORM WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:
NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING VAPORS OR DUSTS; KEEP UPWIND.

USE AGENTS SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID BREATHING HAZARDOUS VAPORS, KEEP UPWIND.

TOXICITY

LEAD:
450 MG/KG/6 YEAR ORAL-WOMAN TDLO; 10 UG/M3 INHALATION-HUMAN TCLO; 1000 MG/KG INTRAPERITONEAL-RAT LDLO; 160 MG/KG ORAL-PIGEON LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).
CARCINOGEN STATUS: HUMAN INADEQUATE EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC CLASS-2B FOR INORGANIC LEAD COMPOUNDS). RENAL TUMORS WERE PRODUCED IN ANIMALS BY LEAD ACETATE, SUBACETATE AND PHOSPHATE GIVEN ORALLY, SUBCUTANEOUSLY OR INTRAPERITONEALLY. NO EVALUATION COULD BE MADE OF THE CARCINOGENICITY OF POWDERED LEAD.
LEAD IS A NEUROTOXIN, NEPHROTOXIN, TERATOGEN, AND A CUMULATIVE POISON WHICH MAY ALSO AFFECT THE BLOOD, HEART, ENDOCRINE, AND IMMUNE SYSTEMS. PERSONS WITH NERVOUS SYSTEM OR GASTROINTESTINAL DISORDERS, ANEMIA, OR CHRONIC BRONCHITIS MAY BE AT AN INCREASED RISK FROM EXPOSURE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
LEAD:

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NEUROTOXIN/NEPHROTOXIN/TERATOGEN.

ACUTE EXPOSURE- INHALATION OF LARGE AMOUNTS OF LEAD MAY CAUSE A METALLIC TASTE, THIRST, A BURNING SENSATION IN THE MOUTH AND THROAT, SALIVATION, ABDOMINAL PAIN WITH SEVERE COLIC, VOMITING, BLOODY DIARRHEA, CONSTIPATION FATIGUE, SLEEP DISTURBANCES, DULLNESS, RESTLESSNESS, IRRITABILITY, MEMORY LOSS, LOSS OF CONCENTRATION, DELIRIUM, OLIGURIA OFTEN WITH HEMATURIA AND ALBUMINURIA, ENCEPHALOPATHY WITH VISUAL FAILURE, PARESTHESIAS, MUSCLE PAIN AND WEAKNESS, CONVULSIONS, AND PARALYSIS. DEATH MAY RESULT FROM CARDIORESPIRATORY ARREST OR SHOCK. SURVIVORS OF ACUTE EXPOSURE MAY EXPERIENCE THE ONSET OF CHRONIC INTOXICATION. LIVER EFFECTS MAY INCLUDE ENLARGEMENT AND TENDERNESS AND JAUNDICE. THE FATAL DOSE OF ABSORBED LEAD IS APPROXIMATELY 0.5 GRAMS. PATHOLOGICAL FINDINGS INCLUDE GASTROINTESTINA INFLAMMATION AND RENAL TUBULAR DEGENERATION. METAL FUME FEVER, AN INFLUENZA-LIKE ILLNESS, MAY OCCUR DUE TO THE INHALATION OF FRESHLY FORMED METAL OXIDE PARTICLES SIZED BELOW 1.5 MICRONS AND USUALLY BETWEEN 0.02-0.05 MICRONS. SYMPTOMS MAY BE DELAYED 4-12 HOURS AND BEGIN WITH A SUDDEN ONSET OF THIRST AND A SWEET, METALLIC OR FOUL TASTE IN THE MOUTH. OTHER SYMPTOMS MAY INCLUDE UPPER RESPIRATORY TRACT IRRITATION ACCOMPANIED BY COUGHING AND A DRYNESS OF THE MUCOUS MEMBRANES, LASSITUDE AND A GENERALIZED FEELING OF MALAISE. FEVER, CHILLS, MUSCULAR PAIN, MILD TO SEVERE HEADACHE, NAUSEA, OCCASIONAL VOMITING, EXAGGERATED MENTAL ACTIVITY PROFUSE SWEATING, EXCESSIVE URINATION, DIARRHEA, AND PROSTRATION MAY ALSO OCCUR. TOLERANCE TO FUMES DEVELOPS RAPIDLY, BUT IS QUICKLY LOST. ALL SYMPTOMS USUALLY SUBSIDE WITHIN 24-36 HOURS.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO LOW LEVELS OF LEAD MAY RESULT IN AN ACCUMULATION IN BODY TISSUES AND EXERT ADVERSE EFFECTS ON THE BLOOD, NERVOUS SYSTEMS, HEART, ENDOCRINE AND IMMUNE SYSTEMS, KIDNEYS, AND REPRODUCTION. EARLY STAGES OF LEAD POISONING, "PLUMBISM", MAY BE EVIDENCED BY PALLOR, ANOREXIA, WEIGHT LOSS, CONSTIPATION, APATHY OR IRRITABILITY, OCCASIONAL VOMITING, FATIGUE, HEADACHE, WEAKNESS, METALLIC TASTE IN THE MOUTH, GINGIVAL LEAD LINE IN PERSONS WITH POOR DENTAL HYGIENE, AND ANEMIA. LOSS OF RECENTLY DEVELOPED MOTOR SKILLS IS GENERALLY OBSERVED ONLY IN CHILDREN. MORE ADVANCED STAGES OF POISONING MAY BE CHARACTERIZED BY INTERMITTENT VOMITING, IRRITABILITY AND NERVOUSNESS, MYALGIA OF THE ARMS, LEGS, JOINTS, AND ABDOMEN, PARALYSIS OF THE EXTENSOR MUSCLES OF THE ARMS AND LEGS WITH WRIST AND/OR FOOT DROP, AND INTESTINAL SPASMS WHICH CAUSE SEVERE ABDOMINAL PAIN. SEVERE "PLUMBISM" MAY RESULT IN PERSISTENT VOMITING, ATAXIA, PERIODS OF STUPOR OR LETHARGY, ENCEPHALOPATHY WITH VISUAL DISTURBANCES WHICH MAY PROGRESS TO OPTIC NEURITIS AND ATROPHY, HYPERTENSION, PAPILLEDEMA, CRANIAL NERVE PARALYSIS, DELIRIUM, CONVULSIONS, AND COMA. NEUROLOGIC SEQUELAE MAY INCLUDE MENTAL RETARDATION, SEIZURES, CEREBRAL PALSY, AND DYSTONIA MUSCULORAM DEFORMANS. IRREVERSIBLE KIDNEY DAMAGE HAS BEEN ASSOCIATED WITH INDUSTRIAL EXPOSURE. REPRODUCTIVE EFFECTS HAVE BEEN EXHIBITED IN BOTH MALES AND FEMALES. PATERNAL EFFECTS MAY INCLUDE DECREASED SEX DRIVE, IMPOTENCE, STERILITY, AND ADVERSE EFFECTS ON THE SPERM WHICH MAY INCREASE THE RISK OF BIRTH DEFECTS. MATERNAL EFFECTS MAY INCLUDE MISCARRIAGE AND STILLBIRTHS IN EXPOSED WOMEN OR WOMEN WHOSE HUSBANDS WERE EXPOSED, ABORTION, STERILITY OR DECREASED FERTILITY, AND ABNORMAL MENSTRUAL CYCLES. LEAD CROSSES THE PLACENTA AND MAY AFFECT THE FETUS CAUSING BIRTH DEFECTS, MENTAL RETARDATION, BEHAVIORAL DISORDERS, AND DEATH DURING THE FIRST YEAR OF CHILDHOOD. ANIMAL STUDIES INDICATE THAT REPRODUCTIVE EFFECTS MAY BE ADDITIVE IF BOTH PARENTS ARE EXPOSED TO LEAD.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

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LEAD:
ACUTE EXPOSURE- DIRECT CONTACT WITH LEAD POWDERS OR DUST MAY CAUSE IRRITATION. LEAD IS NOT ABSORBED THROUGH THE SKIN, BUT MAY BE TRANSFERRE TO THE MOUTH INADVERTENTLY BY CIGARETTES, CHEWING TOBACCO, FOOD, OR MAKE-UP.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO THE POWDER OR DUST MAY RESULT IN DERMATITIS. SYSTEMIC TOXICITY MAY DEVELOP IF LEAD IS TRANSFERR TO THE MOUTH BY CIGARETTES, CHEWING TOBACCO, FOOD, OR MAKE-UP.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
LEAD:
ACUTE EXPOSURE- LEAD DUST OR POWDERS MAY CAUSE IRRITATION. METALLIC LEAD PARTICLES MAY CAUSE AN INFLAMMATORY FOREIGN BODY REACTION; INJURY IS GENERALLY THOUGHT TO BE MECHANICAL AND NOT TOXIC.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
LEAD:
NEUROTOXIN/NEPHROTOXIN/TERATOGEN.
ACUTE EXPOSURE- ABSORPTION OF LARGE AMOUNTS OF LEAD FROM THE INTESTINAL TRACT MAY CAUSE SYSTEMIC EFFECTS AS DETAILED IN ACUTE INHALATION. THE FATAL DOSE OF ABSORBED LEAD IS APPROXIMATELY 0.5 GRAMS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO LOW LEVELS OF LEAD MAY RESULT IN AN ACCUMULATION IN BODY TISSUES AND ADVERSE EFFECTS ON THE KIDNEYS, HEART, AND BLOOD, AND ON THE NERVOUS, REPRODUCTIVE, ENDOCRINE, AND IMMUNE SYSTEMS AS DETAILED IN CHRONIC INHALATION.

FIRST AID- DO NOT INDUCE VOMITING. QUALIFIED MEDICAL PERSONNEL SHOULD REMOVE CHEMICAL BY GASTRIC LAVAGE OR CATHARSIS. ACTIVATED CHARCOAL IS USEFUL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:
THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

FOR LEAD POISONING:
INITIATE URINE FLOW FIRST. GIVE 10% DEXTROSE IN WATER INTRAVENOUSLY, 10-20 ML/KG BODY WEIGHT, OVER A PERIOD OF 1-2 HOURS. IF URINE FLOW DOES NOT START, GIVE MANNITOL, 20% SOLUTION, 5-10 ML/KG BODY WEIGHT INTRAVENOUSLY OVER 20 MINUTES. FLUID MUST BE LIMITED TO REQUIREMENTS AND CATHERTIZATION MAY BE NECESSARY IN COMA. DAILY URINE OUTPUT SHOULD BE 350-500 ML/M2/24 HOURS. EXCESSIVE FLUIDS FURTHER INCREASE CEREBRAL EDEMA.
FOR ADULTS WITH ACUTE ENCEPHALOPATHY, GIVE DIMERCAPROL, 4 MG/KG, INTRAMUSCULARLY EVERY 4 HOURS FOR 30 DOSES. BEGINNING 4 HOURS LATER, GIVE CALCIUM DISODIUM EDETATE AT A SEPERATE INJECTION SITE, 12.5 MG/KG INTRAMUSCULARLY EVERY 4 HOURS AS A 20% SOLUTION, WITH 0.5% PROCAINE ADDED FOR A TOTAL OF 30 DOSES. IF SIGNIFICANT IMPROVEMENT HAS NOT OCCURRED BY THE FOURTH DAY, INCREASE THE NUMBER OF INJECTIONS BY 10 FOR EACH DRUG.
FOR SYMPTOMATIC ADULTS, THE COURSE OF DIMERCAPROL AND CALCIUM DISODIUM EDETATE CAN BE SHORTENED OR CALCIUM DISODIUM EDETATE ONLY CAN BE GIVEN IN

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DOSAGE OF 50 MG/KG INTRAVENOUSLY AS 0.5% SOLUTION IN 5% DEXTROSE IN WATER NORMAL SALINE BY INFUSION OVER NOT LESS THAN 8 HOURS FOR NOT MORE THAN 5 DAYS. FOLLOW WITH PENICILLAMINE, 500-750 MG/DAY, ORALLY FOR 1-2 MONTHS OR UNTIL URINE LEAD LEVELS DROPS BELOW 0.3 MG/24 HOURS (DREISBACH, HANDBOOK OF POISONING, 11TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY SECTION

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

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INCOMPATIBILITIES:
LEAD:
- AMMONIUM NITRATE: VIOLENT OR EXPLOSIVE REACTION.
- CHLORINE TRIFLUORIDE: VIOLENT REACTION.
- DISODIUM ACETYLIDE: TRITURATION IN MORTAR MAY BE VIOLENT AND LIBERATE CARBON.
- HYDROGEN PEROXIDE (52% OR GREATER): VIOLENT DECOMPOSITION.
- HYDROGEN PEROXIDE (60% SOLUTION) AND TRIOXANE: SPONTANEOUSLY DETONABLE.
- METALS (ACTIVE): INCOMPATIBLE.
- NITRIC ACID: LEAD-CONTAINING RUBBER MAY IGNITE.
- OXIDIZERS (STRONG): INCOMPATIBLE.
- SODIUM AZIDE: FORMS LEAD AZIDE AND COPPER AZIDE IN COPPER PIPE.
- SODIUM CARBIDE: VIGOROUS REACTION.
- SULFURIC ACID (HOT): REACTS.
- ZIRCONIUM-LEAD ALLOYS: IGNITION ON IMPACT.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS ARE TOXIC OXIDES OF LEAD.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE-DISPOSAL

OBSERVE ALL FEDEPAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY.

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SPILLS AND LEAKS

WATER-SPILL:
THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL-SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH A CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

REPORTABLE QUANTITY (RQ): 1 POUND
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

LEAD (ELEMENTAL, INORGANIC, AND SOAPS):
VENTILATION SHOULD MEET THE REQUIREMENTS IN 29CFR1910.1025(E).

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENTS AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29 CFR 1910, SUBPART Z.

RESPIRATORY PROTECTION FOR LEAD AEROSOLS

AIRBORNE CONCENTRATION OF LEAD OR CONDITION OF USE	REQUIRED RESPIRATOR
NOT IN EXCESS OF 0.5 MG/M3 (10X PEL)	HALF-MASK, AIR PURIFYING RESPIRATOR EQUIPPED WITH HIGH-EFFICIENCY FILTERS.
NOT IN EXCESS OF 2.5 MG/M3 (50X PEL)	FULL FACEPIECE, AIR-PURIFYING RESPIRATOR WITH HIGH-EFFICIENCY FILTERS.

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NOT IN EXCESS OF 50 MG/M3 (1000X PEL)	ANY POWERED AIR-PURIFYING RESPIRATOR WITH HIGH EFFICIENCY FILTERS; OR HALF-MASK SUPPLIED-AIR RESPIRATOR OPERATED IN POSITIVE-PRESSURE MODE.
NOT IN EXCESS OF 100 MG/M3	SUPPLIED-AIR RESPIRATORS WITH FULL FACEPIECE, HOOD OR HELMET OR SUIT, OPERATED IN POSITIVE PRESSURE MODE.
GREATER THAN 100 MG/M3, UNKNOWN CONCENTRATIONS OR FIREFIGHTING	FULL FACEPIECE, SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE-PRESSURE MODE.

(RESPIRATORS SPECIFIED FOR HIGHER CONCENTRATIONS CAN BE USED AT LOWER CONCENTRATIONS OF LEAD).
(FULL FACEPIECE IS REQUIRED IF THE LEAD AEROSOLS CAUSE EYE OR SKIN IRRITATION AT THE USE CONCENTRATIONS.)
(A HIGH EFFICIENCY PARTICULATE FILTER MEANS 99.97% EFFICIENT AGAINST 0.3 MICRON PARTICLES.)

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

LEAD, INORGANIC FUMES AND DUSTS (AS PB):

0.50 MG(PB)/M3- ANY SUPPLIED-AIR RESPIRATOR.
ANY AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SELF-CONTAINED BREATHING APPARATUS.

1.25 MG(PB)/M3- ANY POWERED AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

2.50 MG(PB)/M3- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND A HIGH-EFFICIENCY PARTICULATE FILTER.
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A TIGHT-FITTING FACEPIECE OPERATED IN A CONTINUOUS FLOW MODE.

50.0 MG(PB)/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A HALF-MASK AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

100.0 MG(PB)/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A

MSDS #1288

HIGH-EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITION.

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

LEAD (ELEMENTAL, INORGANIC, AND SOAPS):
PROTECTIVE CLOTHING SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1025(G).

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

LEAD (ELEMENTAL, INORGANIC & SOAPS):
PROTECTIVE GLOVES SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1025(G).

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

LEAD (ELEMENTAL, INORGANIC, AND SOAPS):
PROTECTIVE EYE EQUIPMENT SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE WORK CLOTHING AND EQUIPMENT IN 29 CFR 1910.1025(G).

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 12/10/84 REVISION DATE: 10/13/89

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MATERIAL SAFETY DATA SHEET OHS21080

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EMERGENCY CONTACT:
JOHN S. BRANSFORD, JR. (615) 292-1180

SUBSTANCE IDENTIFICATION

CAS-NUMBER 497-19-8
RTEC-NUMBER VZ4050000

SUBSTANCE: SODIUM CARBONATE

TRADE NAMES/SYNONYMS:
CARBONIC ACID, DISODIUM SALT: BISODIUM CARBONATE: CALCINED SODA: CARBONIC ACID SODIUM SALT: CARBONIC ACID SODIUM SALT (1:2): DISODIUM CARBONATE: NA-X: SODA: SODA ASH: OHS21080

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: C-O3.2NA MOLECULAR WEIGHT: 105.99

CERCLA RATINGS (SCALE 0-3): HEALTH=2 FIRE=0 REACTIVITY=1 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=0 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: SODIUM CARBONATE PERCENT: 100

[illegible]ER CONTAMINANTS: NONE

EXPOSURE LIMIT:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: ODORLESS, COLORLESS TO WHITE, HYGROSCOPIC CRYSTALLINE POWDER, SMALL CRYSTALS, OR GRANULES WITH AN ALKALINE TASTE.

BOILING POINT: DECOMPOSES MELTING POINT: 1564 F (851 C)

SPECIFIC GRAVITY: 2.536 SOLUBILITY IN WATER: 7.1% @ 0 C

PH: 11.5 @ 1% AQ SOLN

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN GLYCEROL; INSOLUBLE IN ALCOHOL, ACETONE

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
[illegible]GLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR STANDARD FOAM (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:
NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING VAPORS OR DUSTS; KEEP UPWIND.

TOXICITY

SODIUM CARBONATE:
ANHYDROUS: 500 MG/24 HOURS SKIN-RABBIT MILD IRRITATION; 100 MG/24 HOURS EYE-RABBIT MODERATE IRRITATION; 100 MG RINSED EYE-RABBIT MILD IRRITATION; 4090 MG/KG ORAL-RAT LD50; 2300 MG/M3/2 HOURS INHALATION-RAT LC50; 1200 MG/M3/2 HOURS INHALATION-MOUSE LC50; 2210 MG/KG SUBCUTANEOUS-MOUSE LD50; 117 MG/KG INTRAPERITONEAL-MOUSE LD50; 800 MG/M3/2 HOURS INHALATION-GUINEA PIG LC50; REPRODUCTIVE EFFECTS DATA (RTECS).
MONOHYDRATE: NO DATA AVAILABLE.
DECAHYDRATE: NO DATA AVAILABLE.
CARCINOGEN STATUS: NONE.
SODIUM CARBONATE IS TOXIC AND A SEVERE EYE, SKIN, AND MUCOUS MEMBRANE IRRITANT.

HEALTH EFFECTS AND FIRST AID

INHALATION:
SODIUM CARBONATE:
IRRITANT/TOXIC.
ACUTE EXPOSURE- DUSTS OR VAPORS MAY CAUSE MUCOUS MEMBRANE IRRITATION WITH COUGHING, SHORTNESS OF BREATH, AND GASTROINTESTINAL CHANGES. EXPOSURE TO 1200 MG/M3/2 HOURS WAS THE LETHAL CONCENTRATION IN MICE TESTED.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE PERFORATION OF THE NASAL SEPTUM. EXPOSURE TO A CONCENTRATION OF 10 TO 20 MG/M3 OF A 2% AQUEOUS SOLUTION OF SODIUM CARBONATE FOR 4 HOURS/DAY, 5 DAYS/WEEK, FOR 3 AND A HALF MONTHS CAUSED NO PRONOUNCED EFFECTS IN MALE MICE. HOWEVER, AT HIGHER CONCENTRATIONS, A DECREASE IN WEIGHT GAIN WAS RECORDED. HISTOLOGICAL EXAMINATIONS SHOWED THICKENING OF THE INTRA-ALVEOLAR WALLS, HYPEREMIA, LYMPHOID INFILTRATION, AND DESQUAMATION OF THE LUNGS.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
SODIUM CARBONATE:
IRRITANT.
ACUTE EXPOSURE- CONTACT MAY CAUSE IRRITATION AND REDNESS. CONCENTRATED

SOLUTIONS MAY CAUSE ERYTHEMA, BLISTERING AND SKIN NECROSIS. 500 MG APPLIED TO RABBIT SKIN FOR 24 HOURS PRODUCED MILD IRRITATION. A SINGLE APPLICATION OF A 50% WEIGHT BY VOLUME AQUEOUS SOLUTION OF SODIUM CARBONATE TO INTACT SKIN OF RABBITS, GUINEA PIGS, AND HUMANS SHOWED NO ERYTHEMA, EDEMA, OR CORROSION. HOWEVER, WHEN APPLIED TO ABRADED SKIN, MODERATE ERYTHEMA AND EDEMA RESULTED IN RABBITS AND HUMANS, WITH NEGLIGIBLE EFFECTS IN GUINEA PIGS. IN ONE-THIRD OF THE HUMAN VOLUNTEERS, TISSUE DESTRUCTION WAS SEEN AT THE ABRADED SITES.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS AND POSSIBLE "SODA ULCERS" OF THE HANDS AND WRISTS. SENSITIVITY REACTIONS MAY OCCUR FROM REPEATED EXPOSURES.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
SODIUM CARBONATE:
IRRITANT.

ACUTE EXPOSURE- CONTACT WITH DUSTS MAY CAUSE SEVERE IRRITATION WITH REDNESS, PAIN, AND BLURRED VISION. APPLICATION OF 100 MG TO RABBIT EYES AND THEN RINSED CAUSED ONLY MILD IRRITATION. IN SOLUTION, SODIUM CARBONATE IS SUFFICIENTLY ALKALINE TO DAMAGE THE CORNEAL EPITHELIUM, BUT IF PROMPTLY WASHED FROM THE EYES WITH WATER IT IS UNLIKELY TO CAUSE PERMANENT DAMAGE TO THE CORNEAL STROMA. AN APPLICATION OF SEVERAL DROPS OF A 10% SOLUTION (PH 10.7) TO A RABBIT'S EYE FOLLOWED BY IRRIGATION WITH WATER FOR 30 SECONDS CAUSED NO DETECTABLE INJURY. CONCENTRATED SOLUTIONS MAY CAUSE NECROSIS OF THE EYE.

CHRONIC EXPOSURE- DEPENDING UPON CONCENTRATION AND DURATION, SYMPTOMS MAY BE THOSE AS FOR ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
SODIUM CARBONATE:
CORROSIVE.

ACUTE EXPOSURE- INGESTION MAY CAUSE CORROSION OF THE GASTRIC MUCOSA WITH SORE THROAT AND PAIN. IT MAY CAUSE GASTROINTESTINAL DISTURBANCES SUCH AS NAUSEA, VOMITING, ABDOMINAL PAIN, AND DIARRHEA. DEATH IS GENERALLY DUE TO CIRCULATORY COLLAPSE. THE ESTIMATED LETHAL HUMAN DOSE IS APPROXIMATELY 30 GRAMS.

CHRONIC EXPOSURE- SODIUM CARBONATE IS USED AS A GENERAL PURPOSE FOOD ADDITIVE. NO ADVERSE EFFECTS HAVE BEEN REPORTED FROM EXPOSURE TO SMALL AMOUNTS.

FIRST AID- DILUTE THE ALKALI BY GIVING WATER OR MILK IMMEDIATELY AND ALLOW VOMITING TO OCCUR. AVOID GASTRIC LAVAGE OR EMETICS. ESOPHAGOSCOPY IS THE ONLY WAY TO EXCLUDE THE POSSIBLITY OF CORROSION IN THE UPPER GASTROINTESTINAL TRACT; IF CORROSION IS SUSPECTED, ESOPHAGOSCOPY SHOULD USUALLY BE PERFORMED WITHIN 24 HOURS (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). MAINTAIN AIRWAY AND TREAT SHOCK. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:
REACTS WITH WATER WITH THE EVOLUTION OF HEAT.

INCOMPATIBILITIES:
SODIUM CARBONATE:
ACIDS (STRONG): MAY REACT VIOLENTLY.
ALUMINUM (HOT): EXPLOSIVE REACTION.
AMMONIA + SILVER NITRATE: EXPLOSIVE REACTION UPON HEATING.
AN AROMATIC AMINE + A CHLORONITRO COMPOUND: EXOTHERMIC REACTION.
2,4-DINITROTOLUENE: INCREASES EXPLOSIVENESS.
FLUORINE: VIOLENT IGNITION.
LITHIUM (BURNING): RELEASES REACTIVE SODIUM.
PHOSPHORUS PENTOXIDE: HIGHLY EXOTHERMIC REACTION.
SODIUM SULFIDE (HOT): EXPLOSIVE REACTION ON CONTACT WITH WATER.
SULFURIC ACID: VIOLENT ERUPTION.
2,4,6-TRINITROTOLUENE: REDUCED EXPLOSION TEMPERATURE.
ZINC: CORROSIVE.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC SODIUM OXIDE AND TOXIC OXIDES OF CARBON.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE-DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

NONE REPORTED.

SPILLS AND LEAKS

OCCUPATIONAL-SPILL:

SWEEP UP AND PLACE IN SUITABLE (FIBERBOARD) CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

DUST AND MIST RESPIRATOR WITH A FULL FACEPIECE.

AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND HIGH-EFFICIENCY PARTICULATE FILTER.

TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS-FLOW MODE.

SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 12/19/84 REVISION DATE: 10/13/89

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MATERIAL SAFETY DATA SHEET OHS12880

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 554-13-2
RTEC-NUMBER OJ5800000

SUBSTANCE: LITHIUM CARBONATE

TRADE NAMES/SYNONYMS:
CARBONIC ACID, DILITHIUM SALT: DILITHIUM CARBONATE: CARBONIC ACID, LITHIUM SALT: LITHIUM CARBONATE (LI2CO3): CARBOLITH: ESKALITH: HYPNOREX: LITHONATE: LITHOTABS: PLENUR: L-119: CLI2O3: OHS12880

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: LI2-C-O3 MOLECULAR WEIGHT: 73.89

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=U FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: LITHIUM CARBONATE PERCENT: 100

EXPOSURE LIMIT:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: WHITE CRYSTALLINE POWDER.

BOILING POINT: 2390 F (1310 C)
(DECOMPOSES)

MELTING POINT: 1333 F (723 C)

SPECIFIC GRAVITY: 2.11

SOLUBILITY IN WATER: 1.54% @ 0 C

PH: 11.2 @ 1% SOLUTION

OTHER SOLVENTS (SOLVENT - SOLUBILITY):
INSOLUBLE IN ALCOHOL, ACETONE, AMMONIA.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
EXTINGUISH USING AGENT SUITABLE FOR TYPE OF SURROUNDING FIRE.

FIREFIGHTING:
NO ACUTE HAZARD. MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. AVOID BREATHING VAPORS OR DUSTS; KEEP UPWIND.

TOXICITY

LITHIUM CARBONATE:
4111 MG/KG ORAL-HUMAN TDLO; 54 MG/KG ORAL-MAN TDLO; 8 MG/KG ORAL-MAN TDLO; 1080 MG/KG/13 WEEKS INTERMITTENT ORAL-MAN TDLO; 120 MG/KG/10 DAYS INTERMITTENT ORAL-WOMAN TDLO; 525 MG/KG ORAL-RAT LD50; 531 MG/KG ORAL-MOUSE LD50; 556 MG/KG/32 DAYS UNREPORTED-WOMAN TDLO; 500 MG/KG ORAL-DOG LD50; 156 MG/KG INTRAPERITONEAL-RAT LD50; 241 MG/KG INTRAVENOUS-RAT LD50; 434 MG/KG SUBCUTANEOUS-RAT LD50; 236 MG/KG INTRAPERITONEAL-MOUSE LD50; 497 MG/KG INTRAVENOUS-MOUSE LD50; 413 MG/KG SUBCUTANEOUS-MOUSE LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.

LITHIUM CARBONATE IS AN EYE IRRITANT AND MAY IRRITATE THE SKIN AND MUCOUS MEMBRANES. POISONING MAY AFFECT THE NERVOUS SYSTEM, KIDNEYS AND THYROID. PERSONS AT INCREASED RISK FROM EXPOSURE MAY INCLUDE INDIVIDUALS WITH SIGNIFICANT CARDIOVASCULAR OR RENAL DISEASE; SODIUM AND WATER IMBALANCE; AND PREEXISTING HYPOTHYROIDISM. TASKS REQUIRING ALERTNESS MAY BE IMPAIRED.

HEALTH EFFECTS AND FIRST AID

INHALATION:
LITHIUM CARBONATE:
ACUTE EXPOSURE- INHALATION MAY CAUSE COUGHING, SORE THROAT AND IRRITATION.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
LITHIUM CARBONATE:
ACUTE EXPOSURE- APPLICATION OF 0.5 GRAMS TO RABBIT SKIN UNDER OCCLUSIVE WRAP FOR 4 HOURS PRODUCED MINIMAL IRRITATION. A GRADE OF 0.3 ON A SCALE OF 0 TO 8 WAS REPORTED FOLLOWING A 30 MINUTE INTERVAL AFTER THE SKIN WAS RINSED. ONE RABBIT IN THE STUDY HAD SLIGHT ERYTHEMA ON DAYS 1-4 FOLLOWING THE EXPOSURE.
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

LITHIUM CARBONATE:
IRRITANT.
ACUTE EXPOSURE- INSTILLATION OF 0.10 GRAMS INTO RABBIT EYES PRODUCED MODERATE IRRITATION. SLIGHT TO MILD CORNEAL OPACITIES, IRITIS, SLIGHT TO MODERATE CONJUNCTIVITIS, HEMORRHAGES AND WHITE AREAS ON THE CONJUNCTIVA WERE NOTED. A GRADE OF 41 ON A SCALE OF 0-110 WAS REPORTED AFTER 24 HOURS. NO EFFECTS WERE NOTED BY DAY 7 OF THE STUDY. WASHING THE EYES WITH TAP WATER SHORTLY AFTER EXPOSURE DECREASED BOTH THE SEVERITY AND DURATION OF EFFECTS WITH RECOVERY OCCURRING IN 4 DAYS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
LITHIUM CARBONATE:
ACUTE EXPOSURE- INGESTION OF A LARGE DOSE MAY CAUSE SEVERE GASTROENTERITIS AND EFFECTS ON THE CENTRAL NERVOUS SYSTEM, RENAL FUNCTION AND FLUID AND ELECTROLYTE BALANCE. SYMPTOMS, POSSIBLY DELAYED, MAY INCLUDE NAUSEA, VOMITING, THIRST, ANOREXIA, DIARRHEA, BLURRED VISION, DROWSINESS, WEAKNESS, TREMOR, STAGGERING, BRADYCARDIA AND COMA. MORE UNUSUAL REACTIONS MAY INCLUDE DELIRIUM WITH EEG CHANGES, ACTION MYOCLONUS, RHABDOMYOLYSIS, ECG CHANGES, GLYCOSURIA, AND ALLERGIC ERYTHEMA. A PAINFUL DISCOLORATION OF THE FINGERS AND TOES AND COLDNESS OF THE EXTREMITIES WITHIN 1 DAY OF THERAPEUTIC USE HAS BEEN REPORTED. IN SEVERE CASES, DEATH MAY OCCUR DUE TO RENAL FAILURE OR CARDIAC OR PULMONARY COMPLICATIONS. SOME SURVIVORS MAY HAVE LONG-LASTING OR PERMANENT SEQUELAE, MOSTLY OF CEREBELLAR NATURE BUT, SOMETIMES WITH PERIPHERAL NEUROPATHY OR PARKINSONISM.
CHRONIC EXPOSURE- REPEATED OR PROLONGED INGESTION MAY CAUSE SYMPTOMS AS DETAILED IN ACUTE INGESTION. IN ADDITION, A METALLIC TASTE, DRY MOUTH, EXCESSIVE THIRST, ABDOMINAL PAIN AND INCONTINENCE OF URINE AND FECES MAY OCCUR. NERVOUS SYSTEM EFFECTS MAY INCLUDE A DAZED FEELING, CONFUSION, GIDDINESS, MENTAL LAPSES, DYSPRAXIA, DROWSINESS, VERTIGO, HEADACHE, APATHY, RESTLESSNESS, ANXIETY, SOME SUPPRESSION OF THE REM PHASES OF SLEEP, POSITIVE ROMBERG SIGN, BLACKOUT SPELLS, STUPOR, TINNITUS, AND UNCONSCIOUSNESS. NEUROLOGIC ASYMMETRY, PSYCHOMOTOR RETARDATION, SLURRED SPEECH, NYSTAGMUS AND EPILEPTIFORM SEIZURES MAY OCCUR. PSEUDOTUMOR CEREBRI (INCREASED INTRACRANIAL PRESSURE AND PAPILLEDEMA) HAS BEEN REPORTED AND MAY POSSIBLY RESULT IN ENLARGEMENT OF THE BLIND SPOT, CONSTRICTION OF VISUAL FIELDS AND EVENTUAL BLINDNESS DUE TO OPTIC ATROPHY. PHOTOPHOBIA HAS BEEN REPORTED. MUSCULAR EFFECTS MAY INCLUDE TREMORS, ATAXIA, MUSCULAR AND REFLEX HYPERIRRITABILITY WITH FASCICULATIONS, TWITCHING AND SPASTIC OR CHOREO-ATHETOTIC MOVEMENTS, COGWHEEL RIGIDITY, PARKINSONISM AND DYSTONIA. TWO CASES INVOLVING SEVERE GENERALIZED SENSORIMOTOR PERIPHERAL NEUROPATHY HAVE BEEN REPORTED. CARDIAC ARRHYTHMIAS, HYPOTENSION, PERIPHERAL CIRCULATORY COLLAPSE, AND INTERSTITIAL MYOCARDITIS ARE POSSIBLE. LEUKOCYTOSIS IS FAIRLY COMMON. ENDOCRINE EFFECTS MAY INCLUDE DISTURBED IODINE METABOLISM, STIMULATION OF ANTITHYROIDAL AUTO-ANTIBODIES, HYPOTHYROIDISM WITH MYXEDEMA, OR RARELY HYPERTHYROIDISM. OSTEOPOROSIS, AN INCREASE IN SERUM TOTAL CALCIUM, IONIZED CALCIUM AND PARATHYROID HORMONE AND INDEPENDENTLY FUNCTIONING PARATHYROID ADENOMAS HAVE BEEN REPORTED. TRANSITORY NEPHROTIC SYNDROME AND ACQUIRED NEPHROGENIC DIABETES INSIPIDUS MAY OCCUR. TRANSIENT HYPERGLYCEMIA, LOWERED URINARY CONCENTRATING ABILITY LEADING TO HYPERNATREMIA AND HYPEROSMOLALITY, SODIUM DEPLETION, POLYURIA,

GLYCOSURIA, OLIGURIA, ANURIA, AND AZOTEMIA ARE POSSIBLE. MORPHOLOGIC CHANGES WITH GLOMERULAR AND INTERSTITIAL FIBROSIS AND NEPHRON ATROPHY HAVE BEEN REPORTED. HOWEVER, A CAUSAL RELATIONSHIP HAS NOT BEEN ESTABLISHED. DERMATOLOGIC EFFECTS MAY INCLUDE CUTANEOUS HYPERALGESIA OR ANESTHESIA, XEROSIS CUTIS, CHRONIC FOLLICULITIS, GENERALIZED PRURITUS WITH OR WITHOUT RASH, DEVELOPMENT OR EXACERBATION OF ACNE OR PSORIASIS, CUTANEOUS ULCERS AND ALOPECIA. HYPER- OR HYPOTHERMIA, WEIGHT GAIN, EDEMA OF THE ANKLES AND WRISTS, AND SEXUAL DYSFUNCTION HAVE BEEN REPORTED. DEATH MAY OCCUR DUE TO RENAL FAILURE, BRAIN DAMAGE OR PULMONARY COMPLICATIONS. LITHIUM READILY CROSSES THE PLACENTAL BARRIER AND IS EXCRETED IN BREAST MILK. THE USE OF LITHIUM IN PREGNANCY HAS BEEN ASSOCIATED WITH NEONATAL GOITER, CARDIAC ANOMALIES, ESPECIALLY EBSTEIN'S, CENTRAL NERVOUS SYSTEM DEPRESSION AND HYPOTONIA. MARKED FUNCTIONAL AND STRUCTURAL CHANGES IN THE KIDNEYS OF NEWBORN RATS EXPOSED TO LITHIUM VIA THEIR MOTHER'S MILK HAVE BEEN REPORTED. ADVERSE EFFECTS ON NIDATION IN RATS AND EMBRYO VIABILITY IN MICE HAVE BEEN ATTRIBUTED TO LITHIUM, AS HAVE TERATOGENICITY IN SUBMAMMALIAN SPECIES AND CLEFT PALATES IN MICE. HOWEVER, OTHER STUDIES IN RATS, RABBITS AND MONKEYS HAVE SHOWN NO EVIDENCE OF LITHIUM-INDUCED DEVELOPMENTAL DEFECTS. LEUKEMIA HAS BEEN REPORTED DURING LITHIUM TREATMENT. HOWEVER, AN EPIDEMIOLOGIC STUDY INVOLVING A POPULATION OF 173,000 PERSONS YEILDED NEGATIVE RESULTS.

FIRST AID- IF VICTIM IS CONSCIOUS AND PRODUCTIVE VOMITING HAS NOT ALREADY OCCURRED, REMOVE POISON BY IPECAC EMESIS OR GASTRIC LAVAGE. (GOSSELIN, SMITH AND HODGE, CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS, 5TH EDITION) MAINTAIN AIRWAY, RESPIRATION AND BLOOD PRESSURE. GET MEDICAL ATTENTION. ADMINISTRATION OF GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
LITHIUM CARBONATE:
- ACIDS (DILUTE): DECOMPOSES.
- ACIDS (STRONG): MAY REACT VIOLENTLY.
- FLUORINE: DECOMPOSES WITH INCANDESCENCE.
- METALS: MAY BE CORROSIVE IN THE PRESCENCE OF MOISTURE.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE-DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

PREVENT DISPERSION OF DUST IN AIR.

SPILLS AND LEAKS

OCCUPATIONAL-SPILL:
FOR LARGE SPILLS, SWEEP UP WITH A MINIMUM OF DUSTING AND PLACE INTO SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL.

RESIDUE SHOULD BE CLEANED UP USING A HIGH-EFFICIENCY PARTICULATE FILTER VACUUM.

PROTECTIVE EQUIPMENT SECTION

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

DUST AND MIST RESPIRATOR.

AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER.

POWERED AIR-PURIFYING RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

TYPE 'C' SUPPLIED-AIR RESPIRATOR OPERATED IN THE PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE OR CONTINUOUS-FLOW MODE.

SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:
PROTECTIVE CLOTHING NOT REQUIRED. AVOID REPEATED OR PROLONGED CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED BY- OCCUPATIONAL HEALTH SERVICES, INC.

CREATION DATE: 10/23/84 REVISION DATE: 09/07/89

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APPENDIX D

PHOTOGRAPHS

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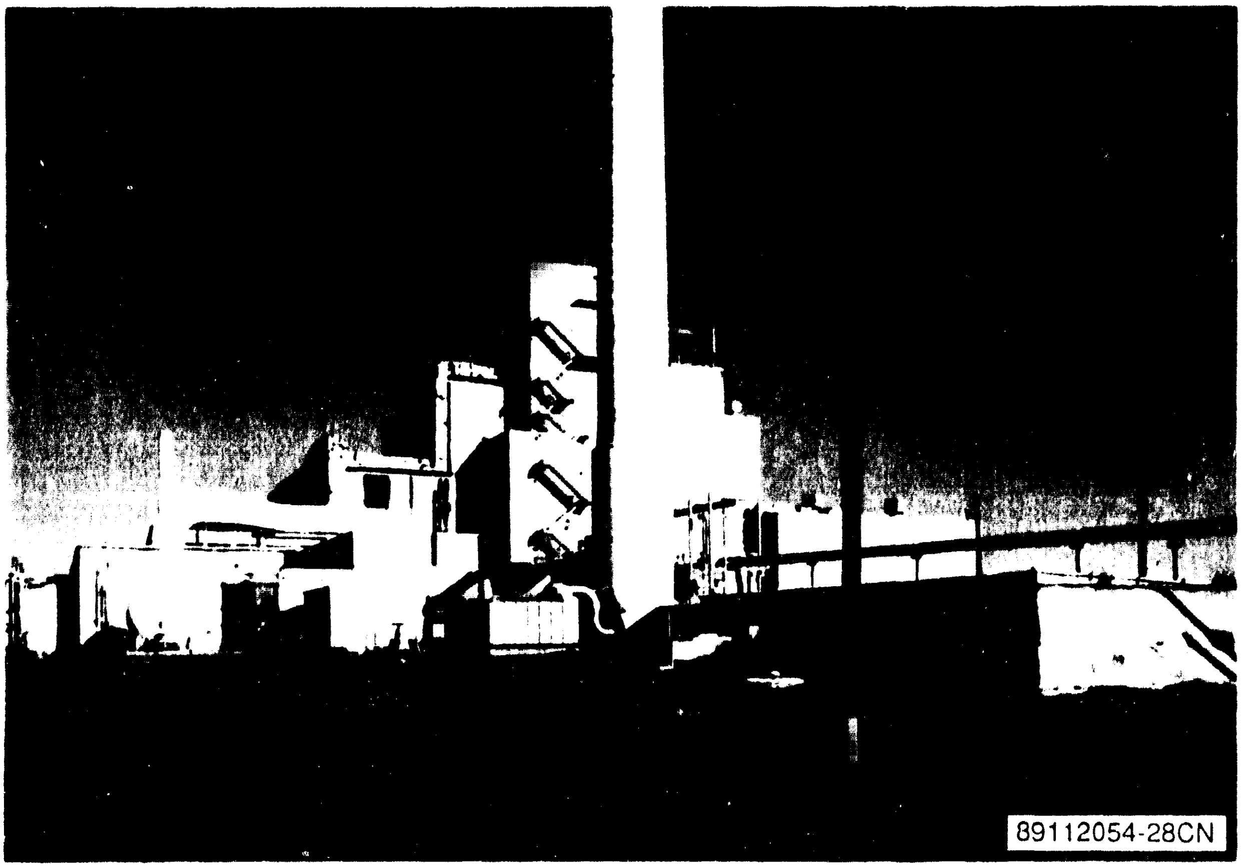
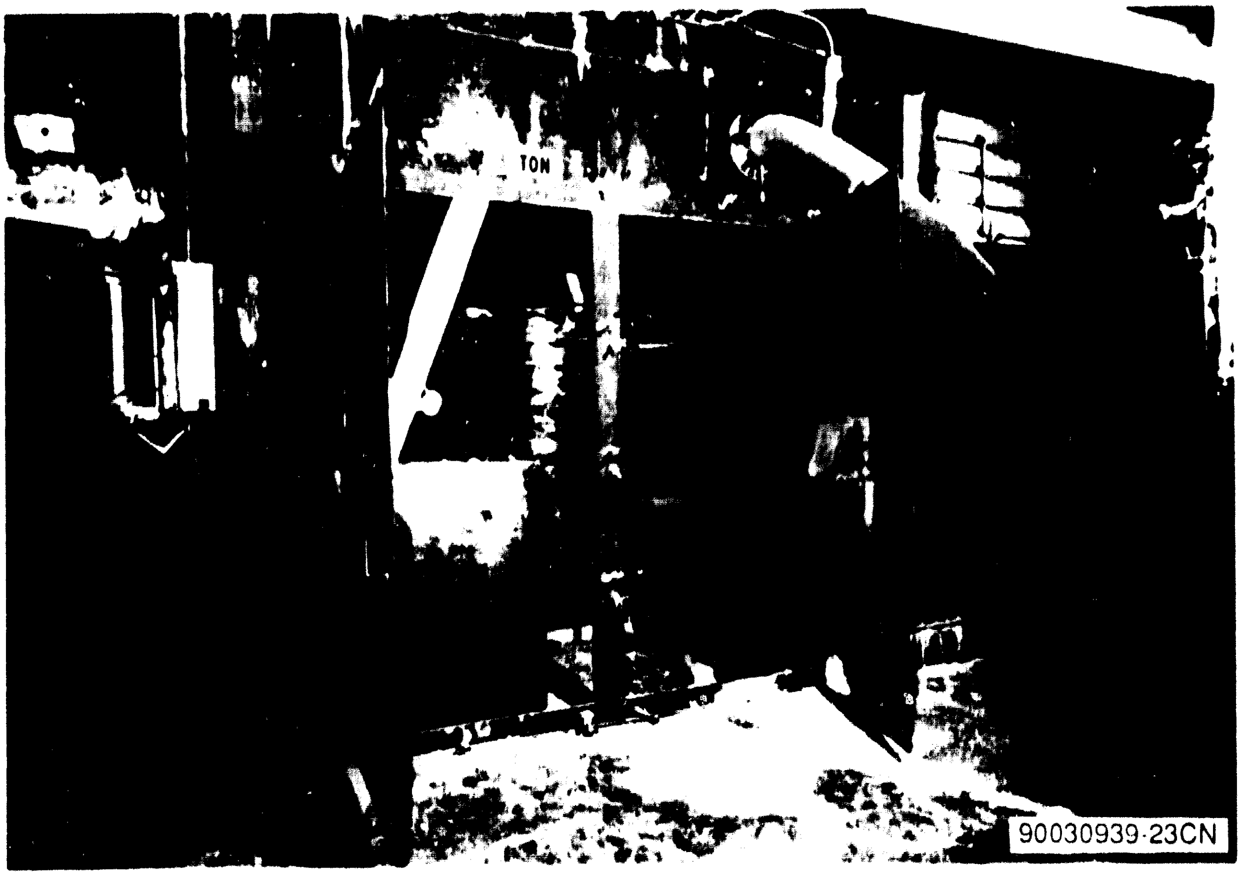


Figure D-1. A View of 105-DR Reactor Building from the LSFF (Fan Room) Side.

Figure D-2. The Exhaust Fan Room of the LSFF.

1 Figure D-3. The Exhaust Fan Room of the LSFF.
2 (Looking at the Southeast Corner)



1 Figure D-4. The Large Fire Test Room of the LSFF.

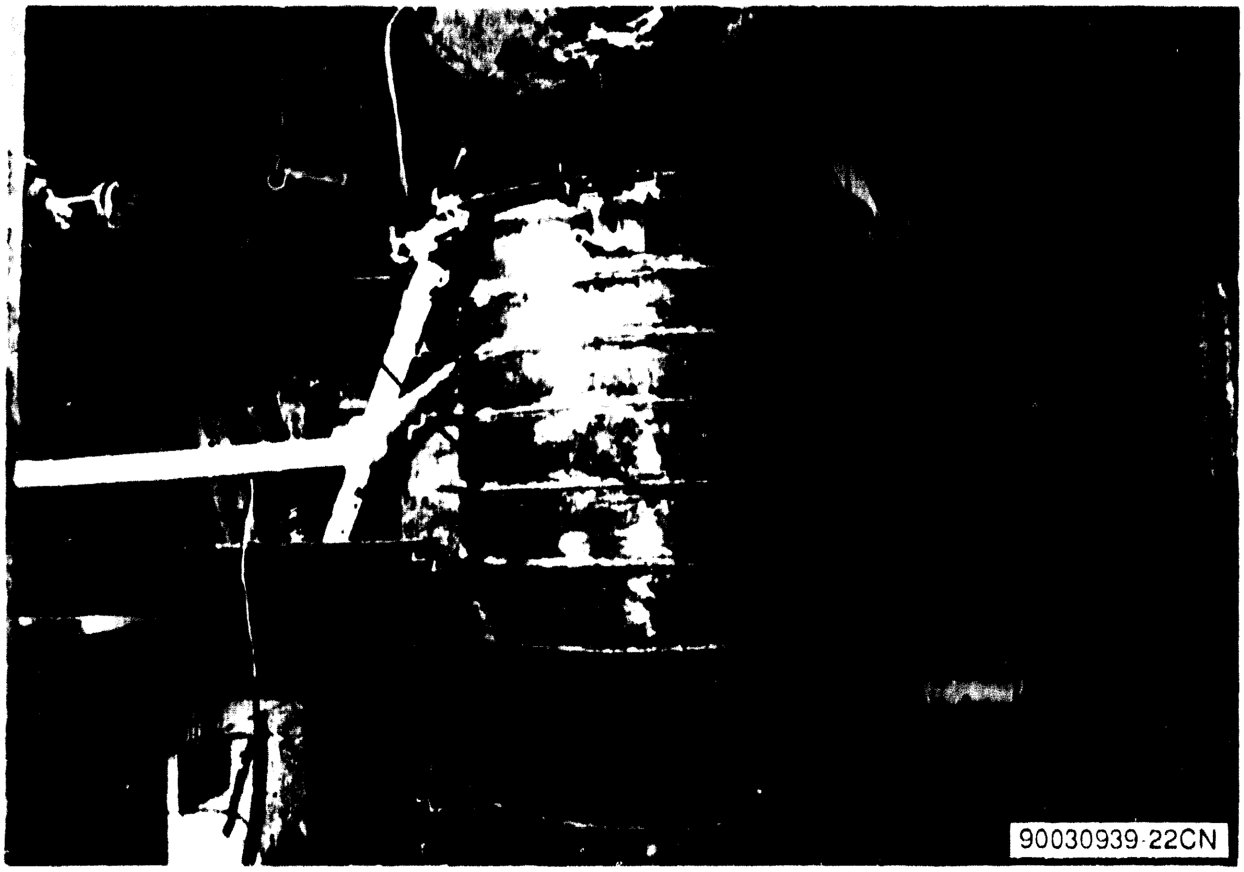


Figure D-5. The Large Fire Test Room and Apparatus of the LSFF.

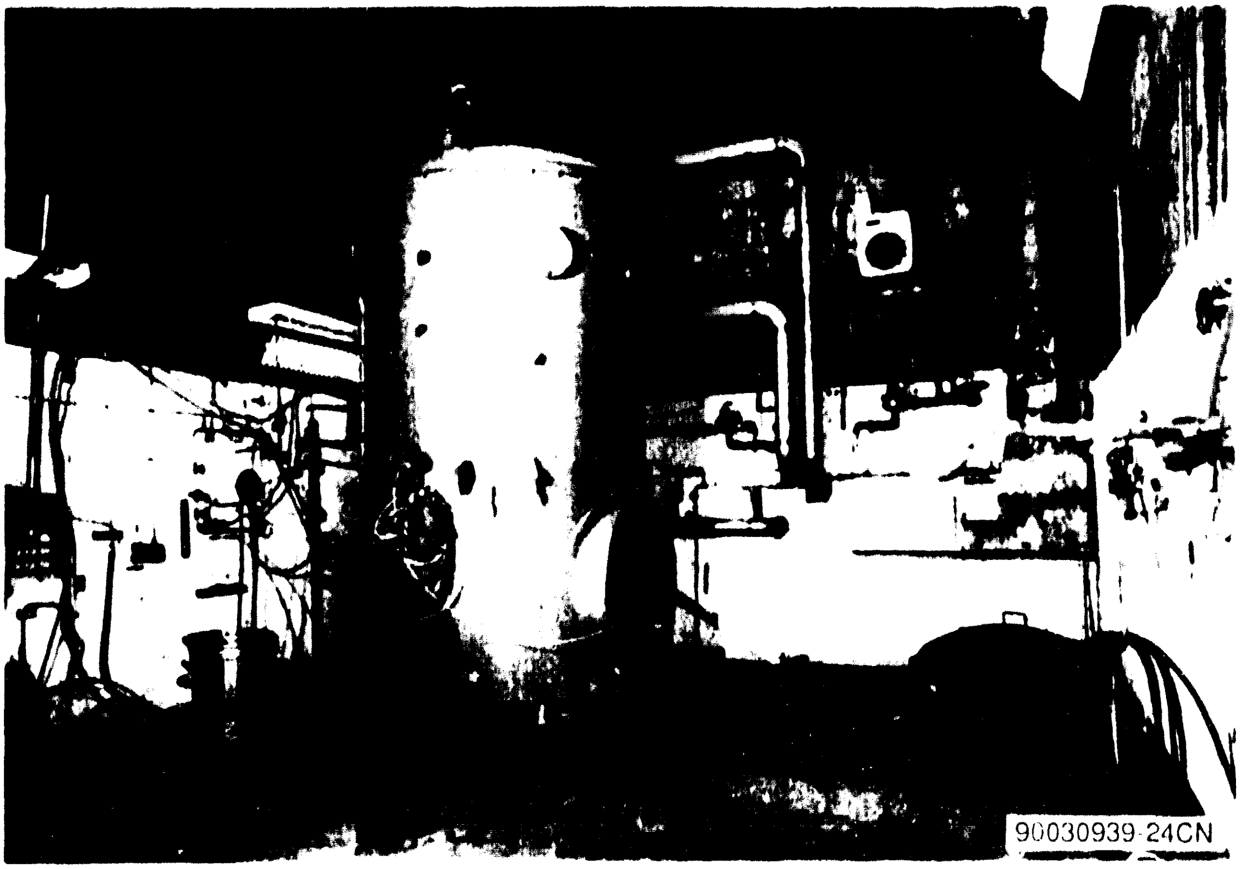


Figure D-6. The Small Fire Test Room of the LSFF.

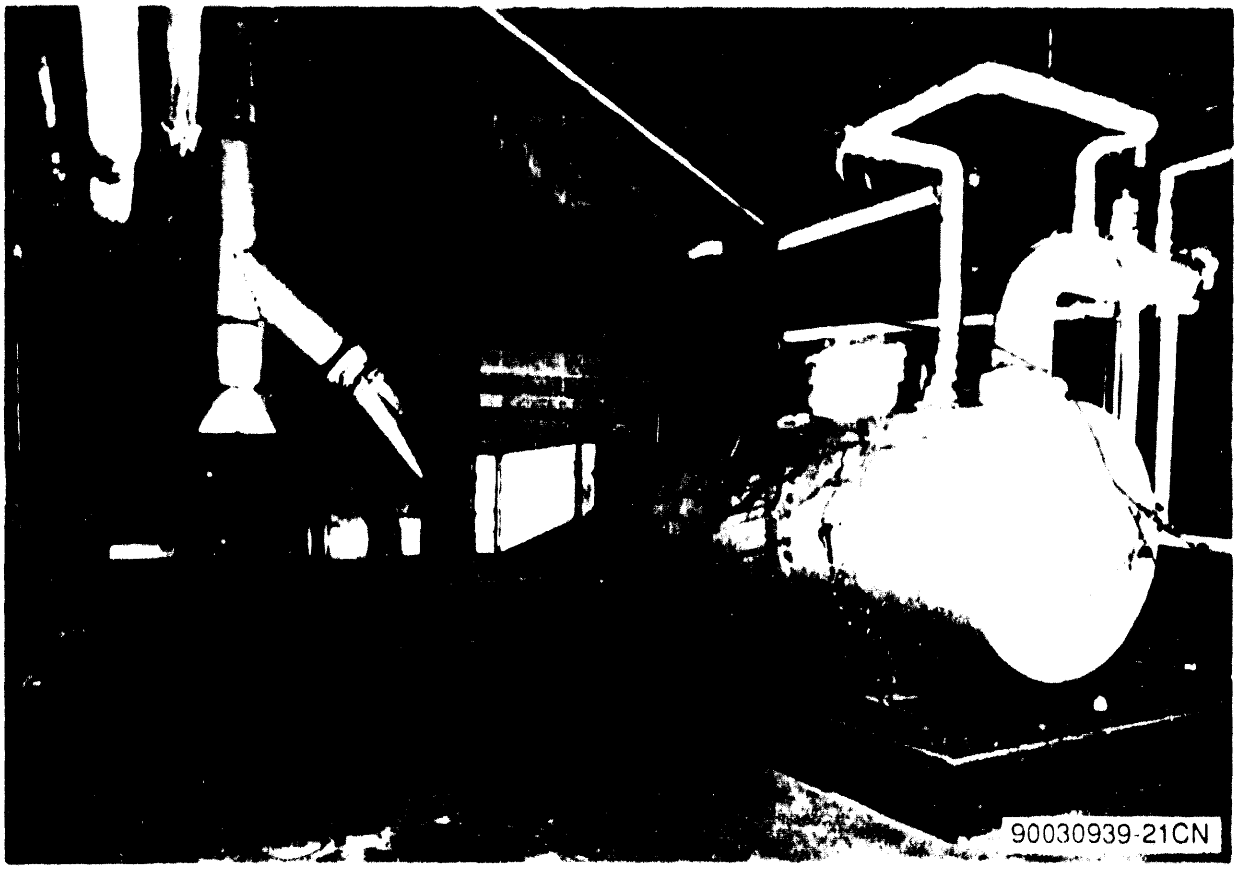


Figure D-7. The Sodium Handling Room of the LSFF.

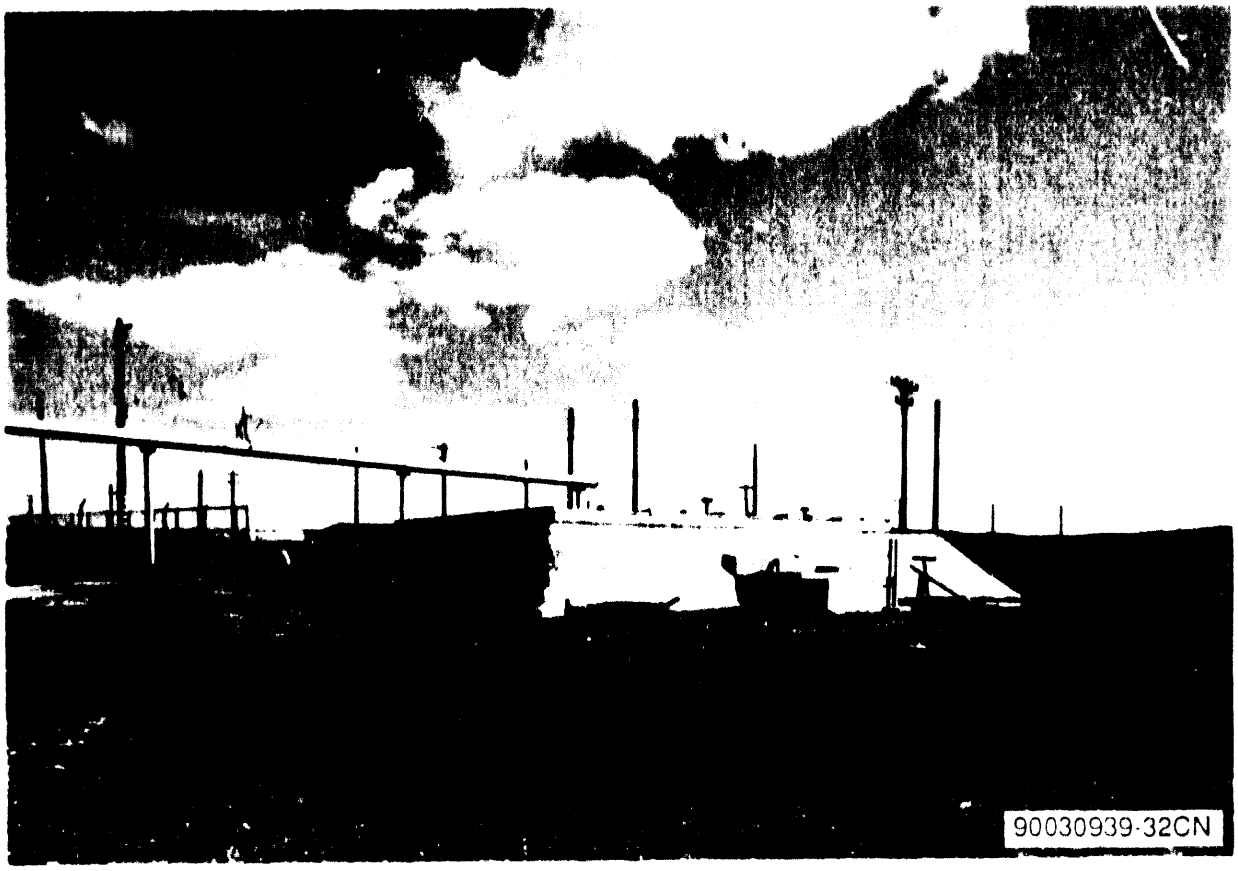


Figure D-8. Filter Building (117-DR) Used to Clean up the LSFF Exhaust Before 1983.

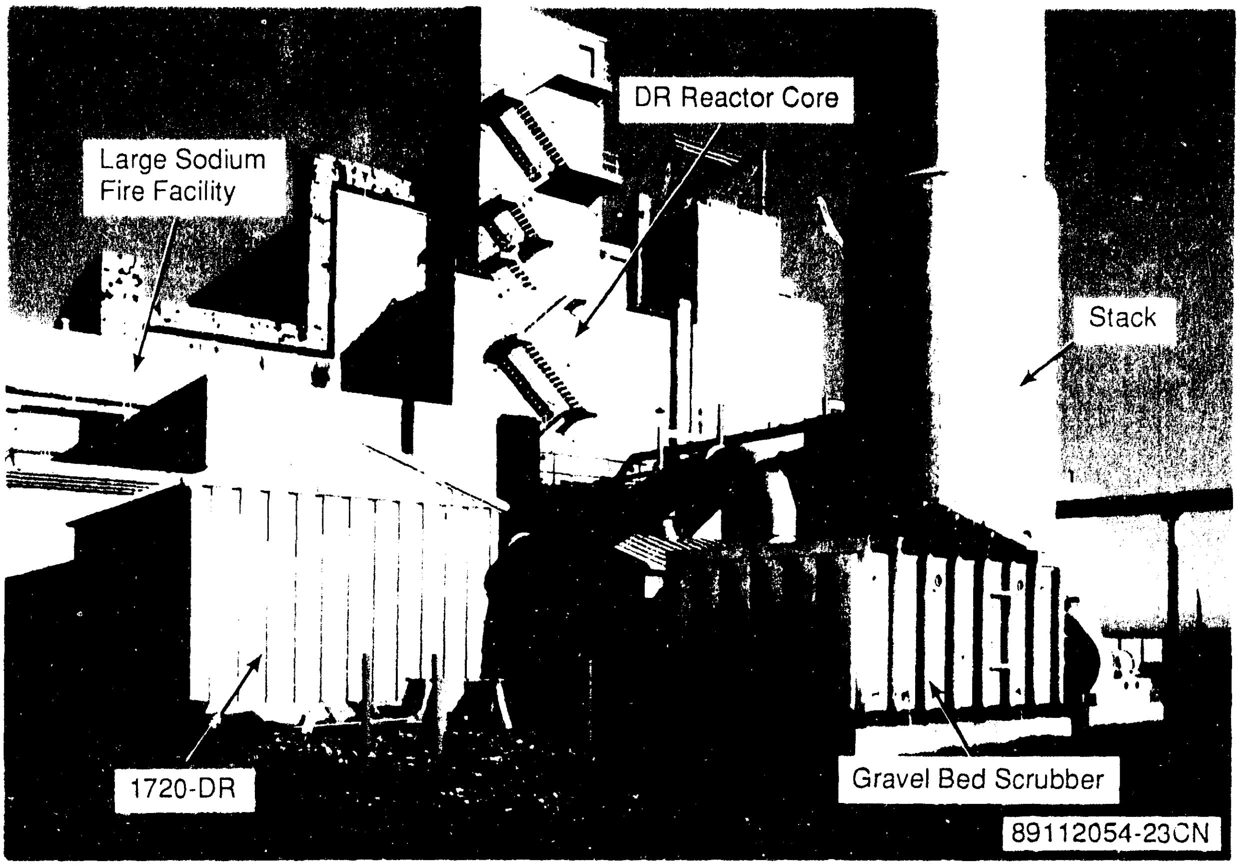


Figure D-9. The Gravel Scrubber (Installed in 1982) is the Metal Building to the Right. The 1720-DR Building is the Metal Storage Building to the Left.

Figure D-10. The Office Area of the LSFF.

APPENDIX E

QUALITY ASSURANCE PROJECT PLAN
FOR CHARACTERIZATION AND VALIDATION
SAMPLING AT THE LARGE SODIUM FIRE FACILITY

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CONTENTS

LIST OF FIGURES

LIST OF TABLES

E1.0 PROJECT DESCRIPTION

E1.1 PROJECT OBJECTIVE

The purpose of characterization and validation sampling at the LSFF will be to ensure that performance standards for closure of the facility are satisfied.

E1.2 BACKGROUND INFORMATION

The location of the LSFF and general background information are provided in the closure plan developed for the facility.

E1.3 QUALITY ASSURANCE PROJECT PLAN APPLICABILITY AND RELATIONSHIP TO THE OPERATIONS CONTRACTOR QUALITY ASSURANCE PROGRAM

This Quality Assurance Project Plan (QAPP) applies specifically to the field activities and laboratory analyses performed as part of sampling and testing investigations supporting the closure of the LSFF at the Hanford Site. It is designed to be implemented in conjunction with the specific requirements of the LSFF Closure Plan. The QAPP is prepared in compliance with the operations contractor QA program plan for CERCLA RI/FS activities. This plan describes the means selected to implement the overall QA program requirements defined by the *Westinghouse Hanford Company Quality Assurance Manual* (WHC-CM-4-2), as applicable to CERCLA RI/FS closure activities, while accommodating the specific requirements for project plan format and content agreed upon in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1992). Although specific to CERCLA RI/FS activities, the implementing procedures, plans, and instructions invoked by CERCLA RI/FS in the QA program plan are appropriate for the control of investigations requiring compliance with RCRA guidelines. The program plan contains a matrix of procedural resources [from WHC-CM-4-2 and from the *Westinghouse Hanford Closure Activities and Site Characterization Manual* (WHC-CM-7-7)] that have been drawn upon to support this QAPP. This QAPP is subject to mandatory review and revision prior to use on subsequent phases of the investigation. Distribution and revision control of this plan shall be in compliance with procedures QR 6.0, "Document Control," and QI 6.1, "Quality Assurance Document Control," all from WHC-CM-4-2). The QAPP distribution shall routinely include all review/approval personnel indicated on the title page of the document and all other individuals designated by the operations contractor Technical Lead. All plans and procedures referenced in the QAPP are available for regulatory review on request by the direction of the Technical Lead.

E1.4 SAMPLING AND TESTING ACTIVITIES

Field sampling activities include characterization of the LSFF waste-burn-related deposits, soil and concrete verification sampling, and cleanup-residue sampling for material disposal. A complete description of all test activities is provided in Section 7.0 of the LSFF Closure Plan.

E2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

E2.1 PROJECT MANAGEMENT RESPONSIBILITIES

The Environmental Engineering and Technology Function of the operations contractor has primary responsibilities for conducting the sampling and analysis for the LSFF (see Figure E-1 for the organizational chart). Responsibilities of key personnel and organizations are described below:

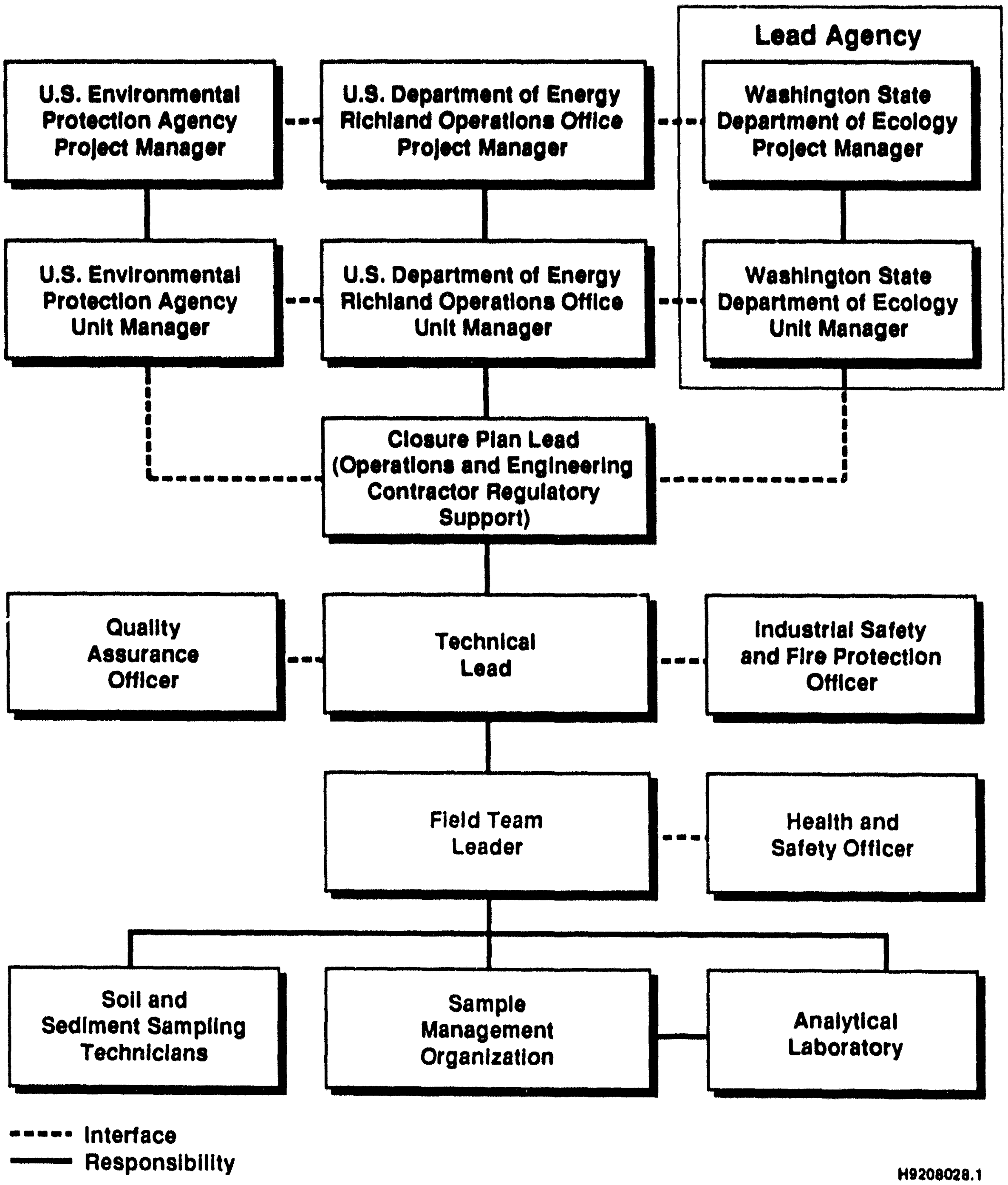
- **Closure Plan Lead (Regulatory Permitting/*National Environmental Policy Act* (NEPA) Group).** The Closure Plan Lead is responsible for overall project organization and interface with regulatory agencies and DOE.

- **Technical Lead.** The Technical Lead will be 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 oversight of performance to the QAPP 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 needed 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 radioactive, volatile, and/or toxic compounds during sample handling and sampling decontamination activities and has the responsibility and authority to halt field activities due to unacceptable health and safety hazards.

- **Field Team Leader.** The Field Team Leader is responsible for onsite direction of sampling technicians in compliance with the requirements of the closure plan, this QAPP, and all implementing EIIs.



1 Figure E-1. Project Organization, Vadose Zone Testing
2 and Sampling at the Large Sodium Fire Facility.

- **Hanford Analytical Services Management (HASM).** The operations contractor HASM is responsible for coordinating sample shipments between the field team and the analytical laboratory, resolution of any chain-of-custody issues, and for validation of all analytical data as discussed in Section E8.0.

E2.2 ANALYTICAL LABORATORIES

Soil samples shall be routed to an approved operations contractor, participant contractor, or subcontractor laboratory, which shall be responsible for performing the analyses identified in this plan in compliance with work order or contractual requirements and operations contractor-approved procedures; see Section E4.1.2. At the Technical Lead's option, services of alternate qualified laboratories may be procured for the performance of split sample analyses for performance audit purposes, or for confirmatory analysis of duplicate soil gas samples. If such an option is selected, the QA plan and applicable analytical procedures from the alternate laboratory shall also be approved by operations contractor prior to their use in compliance with Section E4.1.2 requirements. All analytical laboratory work shall be subject to the surveillance controls invoked by QI 7.3, "Source Surveillance and Inspection" (WHC-CM-4-2).

E2.3 OTHER SUPPORT CONTRACTORS

Procurements of other support contractors may be assigned project responsibilities at the direction of the Technical Lead. Such services shall be in compliance with standard operations contractor procurement procedures requirements as discussed in Section E4.1.2. All work shall be performed in compliance with operations contractor-approved QA plans and/or procedures, subject to controls of QI 7.3, "Source Surveillance and Inspection" (WHC-CM-4-2). All work performed by other support contractors will follow the guidelines contained in this closure plan and all applicable regulations.

E3.0 OBJECTIVES FOR MEASUREMENTS

The purposes of the sampling activities are to determine reaction by-product deposit composition, determine if the lead discovered (in the 1987 sampling activities) is from paint used to seal reactor tunnel walls, and determine if any contamination remaining is below action levels.

As noted in Section 4.6 of *Data Quality Objectives for Remedial Response Activities: Volume I, Development Process* (EPA 1987), universal goals for precision, accuracy, representativeness, completeness, and comparability cannot be practically established at the outset of an investigation. Data are available, however from previously negotiated analytical contracts for Hanford Site investigations, the Data Quality Objectives guidance document cited above (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 analytical methods appropriate for this investigation. Table E-1 prdvides preliminary target values for detection limits, precision, and accuracy that are intended for use in initial procurement negotiations with the analytical laboratory that will routinely perform chemical analyses for this investigation. After an individual laboratory statement of work is negotiated, and procedures are developed and approved as noted in Section 4.1, Table F-1 and this section shall be revised to reference approved detection limit, precision, and accuracy criteria as project requirements. All internal Quality Assurance documents will be available for regulatory review. All laboratory work will follow the requirements of WAC-173-303-110. If any deviation from these requirements is found necessary, approval from Ecology and EPA would be requested.

Goals for data representativeness are addressed qualitatively by the specification of sampling locations and intervals within Section 7.0 of the closure plan. Objectives for completeness for this investigation shall 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 E8.1 of this QAPP, and shall be considered in the validation process discussed in Section E8.2. Corrective action measures shall be initiated by the Technical Lead as appropriate, as noted in Section E13.0. Approved analytical procedures shall require the use of the reporting techniques and units consistent with the EPA reference methods listed in Table E-1 in order to facilitate the comparability of data sets in terms of precision and accuracy.

E4.0 SAMPLING PROCEDURES

E4.1 PROCEDURE APPROVALS AND CONTROL

E4.1.1 Operations Contractor Procedures

The operations contractor procedures that will be used to support the closure plan have been selected from the Quality Assurance Program Index (QAPI) included in the operations contractor QAPP for CERCLA RI/FS activities. Selected procedures include closure activities Instructions (EIIs) from the *Environmental Investigations and Site Characterization Manual* (WHC-CM-7-7), and Quality Requirements (QRs) and Quality Instructions (QIs), from the Westinghouse Hanford *Quality Assurance Manual* (WHC-CM-4-2).

Table E-1. Analytes of Interest and Analytical Methods for 105-DR Large Sodium Fire Facility Sampling.[b,d]

Analytical category	Analyte of interest	Standard reference method	Minimum detection limit[c]	Precision[c]	Accuracy[c]
Inorganics	Sodium	7770[a]	0.002 mg/L	± 25% RPD	± 25%
	Lithium	6010[a]	5 mg/L[e]		± 25%
	Lead	7421[a]	1.0 mg/kg	± 25% RPD	± 25%
	Zinc	6010[a]	.002 mg/L	± 25% RPD	± 25%
	Cesium	3500[f]	.02 mg/L		

[a]Methods specified are from *Test Methods for Evaluating Solid Waste* (SW-846) (EPA 1990).

[b]Analytical methods shall be in compliance with approved operations contractor or operations contractor-approved participant contractor or subcontractor procedures. All procedures shall be reviewed and approved in compliance with requirements specified in the operations contractor quality assurance program plan for CERCLA RI/FS activities.

[c]Minimum requirements for method detection levels, precision, and accuracy will be method-specific, and shall 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 difference (RPD) and accuracy is expressed as percentage recovery.

[d]Analyses shall be performed by an approved participant contractor or subcontractor laboratory.

[e]Estimated instrumental detection limit. Actual method detection limits are sample and matrix dependent and may vary.

[f]Methods specified are from *Standard Methods for the Examination of Water and Wastewater* (American Public Health Association, 1989).

Procedure approval, revision, and distribution control requirements applicable to EIIs are addressed in EII 1.2, "Preparation and Revision of Environmental Investigation Instructions" (WHC-CM-7-7); 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-CM-4-2). Other procedures applicable to the preparation, review, approval, and revision of HASM and other Hanford Site analytical laboratory procedures shall be as defined in the various procedures and manuals identified in the QA program plan for CERCLA RI/FS activities under criteria 5.00 and 6.00. All procedures are available for regulatory review on request.

E4.1.2 Participant Contractor/Subcontractor Procedures

As noted in Section E2.1, participant contractor and/or subcontractor services may be procured at the direction of the Technical Lead. All such procurements shall 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, "Procurement Planning and Control;" and/or QI 7.2, "Supplier Evaluation" (WHC-CM-4-2). Whenever such services require procedural controls, requirements for use of operations contractor procedures, or for submittal of contractor procedures for operations contractor review and approval prior to use, shall be included in the procurement document or work order, as applicable. In addition to the submittal of analytical procedures, analytical laboratories shall be required to submit the current version of their internal QA program plans. All analytical laboratory plans and procedures shall be reviewed and approved prior to use by qualified personnel from the HASM, operations contractor analytical laboratories organizations, or other qualified personnel. All reviewers shall be qualified under the requirements of EII 1.7, "Indoctrination, Training, and Qualification" (WHC-CM-7-7). All participant contractor or subcontractor procedures, plans, and/or manuals shall be retained as project quality records in compliance with EII 1.6, "Records Management" (WHC-CM-7-7); QR 17.0, "Quality Assurance Records;" and QI 17.1, "Quality Assurance Records Control" (WHC-CM-4-2). All such documents are available for regulatory review on request.

E4.2 SAMPLING AND INVESTIGATIVE PROCEDURES

All sampling activities shall be performed in compliance with EII 5.2, "Soil and Sediment Sampling" and EII 5.13, "Drum Sampling" (WHC-CM-7-7). Samples shall routinely be routed to offsite analytical laboratories for chemical analyses. Additional EIIs that have been selected to support the test activity are identified in Table E-2. Sample identification requirements and container type, preparation, and preservation requirements shall be as specified in EII 5.2. All sampling equipment decontamination shall be in compliance with EII 5.5, "Decontamination of Equipment for RCRA/CERCLA Sampling" (WHC-CM-7-7). Other procedures required to support characterization and verification activities and data interpretation will be incorporated as addenda to this QAPP, or as additional EIIs, as necessary to support the

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detailed requirements of the LSFF Closure Plan. All activities performed under these EIIs will comply with applicable regulations.

E4.3 PROCEDURE ADDITIONS AND CHANGES

Additional EIIs or EII updates that may be required as a consequence of the LSFF Closure Plan requirements shall be developed in compliance with EII 1.2, "Preparation and Revision of Closure activities Instructions" (WHC-CM-7-7). Should deviations from established EIIs be required to accommodate unforseen field situations, they may be authorized by the Field Team Leader in accordance with the requirements of EII 1.4, "Deviation from Closure Activities Instructions" (WHC-CM-7-7). Documentation, review, and disposition of instruction change authorization forms are defined within EII 1.4. Other types of document change requests shall be completed as required by the operations contractor procedures governing their preparation and revision. All work performed by other support contractors will follow the guidelines contained in this closure plan and all applicable regulations. Any deviations will comply with all applicable regulations, including approval from the regulatory agencies, if necessary.

E5.0 SAMPLE CUSTODY

All samples obtained during the implementation of the sampling and analysis plan shall be controlled as required by EII 5.1 "Chain of Custody," (WHC 1989) from the point of origin to the analytical laboratory. Laboratory chain-of-custody procedures shall be reviewed and approved as required by operations contractor procurement control procedures as noted in Section E4.1, and shall ensure the maintenance of sample integrity and identification throughout the analytical process. At the direction of the Technical Lead, requirements for return of residual sample materials after completion of analysis shall be defined in maintenance of sample integrity and identification throughout the analytical process. At the direction of the Technical Lead, requirements for return of residual sample materials after completion of analysis shall be defined in accordance with those procedures defined in the procurement documentation to subcontractor or participant contractor laboratories. Chain-of-custody forms shall be initiated for returned residual samples as required by the approved procedures applicable within the participating laboratory. Results of analyses shall be traceable to original samples through a unique code or identifier documented in the field logbook. All results of analyses shall be controlled as permanent project quality records as required by QR 17.0, "Quality Assurance Records" (WHC-CM-4-2) and EII 1.6, "Records Management" (WHC-CM-7-7).

Table E-2. Investigative Procedures for the 105-DR LSFF Sampling.

Procedure	Title[a]	Wipe sampling	Powder sampling	Soil/ gravel sampling	Core sampling
EII 1.2	Preparation and Revision of Environmental Investigation Instructions	X	X	X	X
EII 1.4	Deviation from Environmental Investigation Instructions	X	X	X	X
EII 1.5	Field Logbooks	X	X	X	X
EII 1.6	Records Management	X	X	X	X
EII 1.7	Indoctrination, Training, and Qualification	X	X	X	X
EII 1.11	Control and Transmittal of Laboratory Analytical Date	X	X	X	X
EII 2.1	Preparation of Health and Safety Plans	X	X	X	X
EII 2.3	Administration of Radiation Surveys to Support Environmental Characterization Work on the Hanford Site	X	X	X	X
EII 3.1	User Calibration of Health and Safety M&TE	X	X	X	X
EII 5.0	Sample Identification and Entry Into the HEIS	X	X	X	X
EII 5.1	Chain of Custody	X	X	X	X
EII 5.2	Soil and Sediment Sampling			X	
EII 5.5	Decontamination of Equipment for RCRA/CERCLA		X	X	X
EII 5.11	Sample Packaging and Shipping	X	X	X	X
EII 5.13	Drum Sampling	X	X	X	X
TBD	Concrete/Asphalt Core Sampling				X
TBD	Wipe Sampling		X		

Procedures are Westinghouse Hanford Closure Activities Instructions (EIIs) selected from the latest approved version of WHC-CM-7-7, *Closure Activities and Site Characterization Manual*.

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E6.0 CALIBRATION PROCEDURES

Calibration of all operations contractor measuring and test equipment, whether in existing inventory or purchased for this investigation, shall 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" (WHC-CM-4-2); QI 12.2, "Measuring and Test Equipment Calibration by User" (WHC-CM-4-2); and/or EII 3.1, "User Calibration of Health and Safety Measuring and Test Equipment" (WHC-CM-7-7). Routine operational checks for operations contractor field equipment shall be as defined within applicable EIIs or procedures; similar information shall be provided in operations contractor-approved participant contractor or subcontractor procedures.

Calibration of operations contractor, participant contractor, or subcontractor laboratory analytical equipment shall be as defined by applicable standard analytical methods, subject to operations contractor review and approval.

E7.0 ANALYTICAL PROCEDURES

Analytical methods or procedures, based on the reference methods identified in Table E-1 and Section E3.0, shall be selected or developed and approved before use in compliance with appropriate operations contractor procedure and/or procurement control requirements as noted in Section E4.1.

E8.0 DATA REDUCTION, VALIDATION, AND REPORTING

E8.1 DATA REDUCTION AND DATA PACKAGE PREPARATION

All analytical laboratories shall be responsible for preparing a report summarizing the results of analysis and for preparing a detailed data package that includes all information necessary to perform data validation to the extent indicated by the minimum requirements of Section E8.2. Data summary report format and data package content shall be defined in procurement documentation subject to operations contractor review and approval as noted in Section E4.1. At a minimum, laboratory data packages shall 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 analysis was 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 may have affected the laboratory's measurement system during the time period in which the analysis was performed

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

Other supporting information, such as initial calibration data, reconstructed ion chromatographs, spectrograms, traffic reports, and raw data, need not be included in the submittal of individual data packages unless specifically requested. All sample data, however, shall be retained by the analytical laboratory and made available for systems or program audit purposes upon request by operations contractor, DOE-RL, or regulatory agency representatives; see Section E10.0. Such data shall be retained by the analytical laboratory through the duration of their contractual statement of work, at which point it shall be turned over to operations contractor for archiving.

The completed data package shall be reviewed and approved by the analytical laboratory's QA Manager prior to submittal to HASM for validation as discussed in Section E8.2. The requirements of this section shall be included in procurement documentation or work orders, as appropriate, in compliance with the standard operations contractor procurement control procedures referenced in Section E4.1.

E8.2 VALIDATION

Validation of the completed data package shall be performed by qualified operations contractor HASM personnel. Validation requirements will be defined within approved HASM data validation procedures, but at a minimum will include the requirements defined within this section.

For inorganic analyses, validation reports shall be prepared documenting overchecks of the following areas, as recommended in *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses* (EPA 1988d):

- Data summary narrative

- Sample holding times

- Continuing calibration requirements

- Method blank sample requirements

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- Interference check sample requirements
- Laboratory control sample requirements
- Duplicate sample analysis
- Matrix spike sample requirements
- Atomic absorption quality control requirements
- Inductively coupled plasma serial dilution requirements
- Overall data assessment requirements.

E8.3 FINAL REVIEW AND RECORDS MANAGEMENT CONSIDERATIONS

All validation reports and supporting analytical data packages shall be subjected to a final technical review by a qualified reviewer prior to submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments shall be retained as permanent project quality records in compliance with EII 1.6, "Records Management" (WHC-CM-7-7) and QA 17.0, "Quality Assurance Records" (WHC-CM-4-2).

E9.0 INTERNAL QUALITY CONTROL

All analytical samples shall be subject to in-process QC measures in both the field and laboratory. Unless superseded by specific directions provided in Section 7.0 of the closure plan, the following minimum field QC requirements apply. These requirements are adapted from "*Test Methods for Evaluating Solid Waste*" (SW-846) (EPA 1990), as modified by the proposed rule changes included in the "*Federal Register*," Volume 54, No. 13.

- Field duplicate samples. For each shift of sampling activity under an individual sampling subtask, a minimum of 5 percent of the total collected samples shall be duplicated, or one duplicate shall be collected for every 20 samples, whichever is greater. Duplicate samples shall be retrieved from the same sampling location using the same equipment and sampling technique, and shall be placed into two identically prepared and preserved containers. All field duplicates shall be analyzed independently as an indication of gross errors in sampling techniques.

- Split samples. At the Technical Lead's direction, field or field duplicate samples may be split in the field and sent to an alternative laboratory as a performance audit of the primary laboratory. Frequency shall meet the minimum schedule requirements of Section E10.0.

- Blind samples. At the Technical Lead's direction, blind reference samples may be introduced into any sampling round as a performance and audit of the primary laboratory. Blind sample type shall be as directed by the Technical Lead.

- Field blanks. Field blanks shall consist of pure deionized distilled water, transferred into a sample container at the site and preserved with the reagent specified for the analytes of interest. Field blanks are used as a check on reagent and environmental contamination, and shall be collected at the same frequency as field duplicate samples.

- Equipment blanks. Equipment blanks shall consist of pure deionized distilled water washed through decontaminated sampling equipment and placed in containers identical to those used for actual field samples. Equipment blanks are used to verify the adequacy of sampling equipment decontamination procedures, and shall be collected at the same frequency as field duplicate samples.

The internal QC checks performed by analytical laboratories laboratory analyses shall meet the following minimum requirements:

- Matrix spiked and matrix spiked duplicate samples. Matrix spiked and matrix spiked duplicate samples require the addition of a known quantity of a representative analyte of interest to the sample as a measure of recovery percentage. The spike shall be made in a replicate of a field sample. Replicate samples are separate aliquots removed from the same sample container in the laboratory. Spike compound selection, quantities, and concentrations shall be described in the laboratory's analytical procedures. One sample shall be spiked per analytical batch, or once every 20 samples, whichever is greater.

- Quality control reference samples. A QC reference sample shall be prepared from an independent standard at a concentration other than that used for calibration, but within the calibration range. Reference samples are required as an independent check on analytical technique and methodology, and shall be run with every analytical batch, or every 20 samples, whichever is greater.

Other requirements specific to laboratory analytical equipment calibration are included in Section E6.0. The minimum requirements of this section shall be invoked in procurement documents or work orders in compliance with standard operations contractor procedures as noted in Section E4.1.

E10.0 PERFORMANCE AND SYSTEM AUDITS

Performance and system audit requirements are implemented in accordance with standard operating procedure QI 10.4, "Surveillance" (WHC 1989).

Surveillances will be performed regularly throughout the course of the work plan activities. Additional performance and system 'surveillances' may be scheduled as a consequence of corrective action requirements, or may be performed upon request. All quality-affecting activities are subject to surveillance.

All aspects of interoperable unit activities also will be evaluated as part of routine environmental restoration program-wide QA audits under the standard operating procedural requirements of WHC-CM-4-2. Program audits shall 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" by auditors qualified in accordance with QI 2.5, "Qualification of Quality Assurance Audit Personnel" (WHC 1989).

E11.0 PREVENTIVE MAINTENANCE

All measurement and testing equipment used in the field and laboratory that directly affects the quality of the analytical data shall be subject to preventive maintenance measures that ensure minimization of measurement system downtime. Field equipment maintenance instructions shall be as defined by the approved procedures governing their use. Laboratories shall be responsible for performing or managing the maintenance of their analytical equipment; maintenance requirements, spare parts lists, and instructions shall be included in individual methods or in laboratory QA plans, subject to operations contractor review and approval. When samples are analyzed using EPA reference methods, the requirements for preventive maintenance of laboratory analytical equipment as defined by the reference method shall apply.

E12.0 DATA ASSESSMENT PROCEDURES

Test data from this investigation will be assessed as required by Section 7.0 of the closure plan. Analytical data shall first be compiled and summarized by the laboratory and validated in compliance with approved HASM procedures meeting all minimum requirements of Section E8.0.

E13.0 CORRECTIVE ACTION

Corrective action requests required as a result of surveillance reports, nonconformance reports, or audit activity shall 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-CM-4-2). Primary responsibilities for corrective action resolution are assigned to the

Technical Lead and the QA Coordinator. Other measurement systems, procedures, or plan corrections that may be required as a result of routine review processes shall be resolved as required by governing procedures or shall be referred to the Technical Lead for resolution. Copies of all surveillance, nonconformance, audit, and corrective action documentation shall be routed to the project QA records upon completion or closure.

E14.0 QUALITY ASSURANCE REPORTS

As previously stated in Sections E10.0 and E13.0, project activities shall be regularly assessed by auditing and surveillance processes. Surveillance, nonconformance, audit, and corrective action documentation shall be routed to the project quality records upon completion or closure of the activity. A report summarizing all audit, surveillance, and instruction change authorization activity (see Section E4.4), as well as any associated corrective actions, shall be prepared by the QA Coordinator at the completion of the activity or annually beginning 1 year after approval of the closure plan, whichever is sooner. The report(s) shall be submitted to the Technical Lead for incorporation into the final report prepared at the end of the closure activities. The final report shall include an assessment of the overall adequacy of the total measurement system with regard to the data quality objectives of the investigation.

E15.0 REFERENCES

WHC, 1989, *Westinghouse Hanford Company Quality Assurance Manual*, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington.

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

WHC, 1989, *Westinghouse Hanford Closure activities and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.

EPA, 1987, *Data Quality Objectives for Remedial Response Activities-- Development Process*, EPA/540/6-87/003, OSWER Directive 9335.3-01, Office of Emergency and Remedial Response and Office of Waste Programs Enforcement, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988a, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, Hazardous Site Evaluation Division, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, Hazardous Site Evaluation Division, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1986, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*, SW-846, 3rd Edition, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

EPA, 1983, *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, QAMS-005/80, EPA-600/4-83/004, U.S. Environmental Protection Agency, Washington, D.C.

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