START

0033621

DOE/RL-88-37
Revision 3A

UC-630, 721

2727-S Nonradioactive Dangerous Waste Storage Facility Closure Plan

Date Published
October 1992

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

OCT 1993
RECEIVED
EPIC

Approved for Public Release

THIS PAGE INTENTIONALLY
LEFT BLANK

4
OCT 1993
RECEIVED
EPIC

9413097.1978

TRADEMARK DISCLAIMER

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy. Available in paper copy and microfiche.

Available to the U.S. Department of Energy
and its contractors from
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831
(615) 576-8401

Available to the public from the U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

Printed in the United States of America

DISCLM-5.CHP (8-91)

THIS PAGE INTENTIONALLY
LEFT BLANK

RECORD OF REVISION	(1) Document Number DOE/RL-88-37	Page 1

(2) Title
2727-S Nonradioactive Dangerous Waste Storage Facility Closure Plan

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
3A	(7) Responses (noted with change bars) to Ecology comments received 7/2/92, 8/5/92 and 9/4/92; clarification of figures; and, QAPP (APP G) change (noted with change bars). Page changes: Cover, Spine, Title Page, v, 4-3, 4-4, 4-5, 4-7, 4-8, 4-9, 4-10, 4-11, 4-13, 5-1, APP F-1, APP F-5, APP G-9	S. N. Luke	F. A. Ruck 10/7/92

THIS PAGE INTENTIONALLY
LEFT BLANK

CONTENTS

1.0 INTRODUCTION 1-1
1.1 LOCATIONAL INFORMATION 1-1
1.2 SECURITY 1-3
1.3 FACILITY DESCRIPTION AND OPERATIONS 1-7
1.4 WASTES STORED AT THE 2727-S NRDWS FACILITY 1-9

2.0 CLOSURE PERFORMANCE STANDARD 2-1

3.0 ESTIMATE OF MAXIMUM INVENTORY OF WASTE 3-1

4.0 CLOSURE ACTIVITIES 4-1
4.1 HOW THE 2727-S NRDWS FACILITY WILL BE CLOSED 4-1
4.2 SAMPLING PLAN 4-2
4.2.1 2727-S Building Sampling 4-2
4.2.2 Concrete Sampling 4-2
4.2.3 Soil Sampling 4-3
4.3 DISPOSAL REQUIREMENTS 4-12
4.3.1 The 2727-S Building Disposal 4-12
4.4 EQUIPMENT DECONTAMINATION 4-12
4.5 RESTORATION 4-12
4.6 COST ESTIMATES 4-13
4.7 CERTIFICATION 4-13

5.0 CONTINGENCY PLAN 5-1

6.0 TRAINING REQUIREMENTS 6-1
6.1 PERSONNEL TRAINING 6-1

7.0 CLOSURE PLAN SCHEDULE 7-1

8.0 REFERENCES 8-1

APPENDICES

DANGEROUS WASTE COMPLIANCE CHECKLIST/QUESTIONNAIRE
CHAPTER 173-303 WAC . . . . . APP A-i

PHOTOGRAPHS . . . . . APP B-i

SPILL REPORTS . . . . . APP C-i

PART A PERMIT APPLICATION . . . . . APP D-i

2727-S NRDWS FACILITY WASTE INVENTORY . . . . . APP E-i

SAMPLING AND HANDLING PROCEDURES . . . . . APP F-i

APPENDICES (Cont)

QUALITY ASSURANCE PROJECT PLAN . . . . . APP G-i

PERSONNEL TRAINING . . . . . APP H-i

CERTIFICATION STATEMENTS . . . . . APP I-i

FIGURES

1 Regional Map 1-2

2 Vicinity Map 200 West Area 1-4

3 Site Plan 2727-S NRDWS Facility 1-5

4 Waste Transportation Route to Hanford Site Boundary 1-6

5 Concrete Pad and Building Plan 1-8

6 Soil Sampling Locations Within Building 4-6

7 Soil Sampling Locations on Exterior Concrete Pad 4-8

8 Specific Perimeter Sampling Site Plan, Soil 4-9

9 Background Soil Sampling Plan 4-11

10 The 2727-S NRDWS Facility Closure Plan Schedule 7-2

TABLES

1 Offsite Treatment, Storage, and/or Disposal Facilities Receiving 2727-S Wastes 1-10

2 Sample Types and Number 4-4

3 Company-General Training Matrix 6-2

The DOE-RL and Westinghouse Hanford contend that through process knowledge and historical records the 2727-S NRDWS Facility has received little or no contamination. Any sampling of the interior concrete pad will be performed in compliance with the receiving offsite RCRA landfill's waste analysis plan. Copies of any sample analytical report(s) prepared by the receiving offsite RCRA landfill will be promptly transferred to Westinghouse Hanford. Any sample information pertinent for recordkeeping purposes will be transmitted to Westinghouse Hanford from the receiving TSD facility within an acceptable time frame. Concrete coring will be performed on the interior concrete to obtain undisturbed soil samples (Section 4.2.3.1) underneath the pad. The coring procedure being used is documented in Appendix F.

4.2.2.2 Exterior Pad. The exterior pad consists of all portions of the exterior concrete pad not previously addressed in the description of the interior concrete pad. Waste containers were stored outside the 2727-S Building on the exterior pad when the building storage capacity was exceeded. The exterior pad will be disposed of in an offsite RCRA landfill.

Historical data indicates a limited potential for chemical contamination of the exterior concrete pad. However, instead of expending funds to perform an extensive sampling activity, clean closure will be achieved through handling and disposing of the 2727-S NRDWS Facility as a dangerous waste. The DOE-RL and Westinghouse Hanford contend that through process knowledge and historical records the 2727-S NRDWS Facility has received little or no contamination. Any sampling of the exterior concrete pad will be performed in compliance with the receiving offsite RCRA landfill's waste analysis plan. Copies of any sample analytical report(s) prepared by the receiving offsite RCRA landfill will be promptly transferred to Westinghouse Hanford. Any sample information pertinent for recordkeeping purposes will be transmitted to Westinghouse Hanford from the receiving offsite RCRA landfill within an acceptable time frame. Concrete coring will be performed on the exterior concrete to obtain undisturbed soil samples (Section 4.2.3.2) underneath the pad. The coring procedure being used is documented in Appendix F.

4.2.3 Soil Sampling

Soil sampling at the 2727-S NRDWS Facility will encompass the following specific areas.

- The soils along the perimeter fence.

  These samples will be used to establish local background levels for establishing site cleanup criteria.

- The soils beneath the building.

- The soils beneath the exterior concrete pad.

- The soils outside the concrete pad perimeter.

- Areas of discolored soil.

These samples will be used to verify that chemical contamination did not reach the soil beneath the concrete (Table 2).

Table 2. Sample Types and Number.

Sample media	Type of sample	Number of samples
Structural material	None[a]	
Interior concrete pad	None[a]	
Exterior concrete pad	None[a]	
Soils beneath interior pad[d]	Verification[c]	6 - 3 per bay
Soils beneath exterior pad[d]	Verification[c]	10 - 2 per pad sample site
Perimeter soils[d]	Verification[c]	4 - 1 per each side of exterior pad
Soils beneath stained areas[d]	Constituent determination[c]	1 composite for both areas
Soils beneath stained areas[d]	Verification[c]	2 - 1 per each stained area
Soils along perimeter fence[d]	Background	3
Total		26 total samples[b]

[a]Any samples taken from these areas will be at the request of the TSD facility selected to dispose of 2727-S NRDWS Facility.
[b]This does not include field quality control samples. These samples will be taken for each matrix as required in the 2727-S NRDWS Facility Quality Assurance Project Plan (QAPP) (Appendix F).
[c]Closure verification samples will be analyzed on an individual basis.
[d]Includes field screening of each sample by X-ray fluorescence.

4.2.3.1 Soils Beneath the Building. The top 6 in. of soil immediately beneath the 2727-S Building pad will be removed and disposed of along with the concrete section immediately above it. The soils beneath the top 6 in., which are not scheduled for removal and disposal, will be sampled to verify the absence of soil contamination below the planned depth of disposal. This will

require access to the soils through the concrete pad. Closure verification sampling will take place before any removal and disturbance of soils at the site.

The 2727-S Building was constructed with the floor divided into two bays. It has been agreed that the soil beneath each bay will be sampled. The selection of sampling points has been made with input from Ecology and can be seen in Figure 6. The sample location in the west bay area is located at the junction of cracks in the floor. This is a likely pathway for any contamination to reach the support soils beneath the 2727-S Building. The sampling point in the east bay of the 2727-S NRDWS Facility is located on a stain in the northerly area of the concrete. This staining is attributed to this point being the lowest in the east bay; therefore, liquids on the floor may have collected at this point. The stain appears to be algae growth from rainwater periodically pooling in the area since the 2727-S Building use ceased.

The procedure outlined in Appendix F will be followed for the removal of concrete cores to obtain access to the soil. After removal of the concrete cores, soil samples will be taken. Soil sampling will follow the guidelines set forth in EII 5.2 "Soil and Sediment Sampling" of WHC-CM-7-7, *Environmental Investigations and Site Characterization Manual*. The sample collection method used to collect samples will be either the use of a thin-walled ('Shelby') tube, a hand auger or scoop, spade, or shovel sampling technique. These methods are discussed in Appendices C and E, respectively, of WHC-CM-7-7. The specific method chosen to take samples will depend on field conditions at the time of sample collection.

Given the extent and nature of storage activities at the 2727-S NRDWS Facility, it is unlikely that any soil with evidence of chemical constituents above background levels will be present. In the event that any constituents above background levels are determined to be present in these closure verification samples, the next 6 in. of soil would be removed and disposed of in an offsite RCRA landfill. If any soil is removed because of chemical contamination (other than the topmost 6-in. layer scheduled for removal with the interior pad), a buffer zone will be implemented. The buffer zone will consist of removing the adjoining soil to a circular distance of 5 ft and a depth of 4 in. past the last known point or area of soil contamination. Closure verification sampling will be performed by taking 4 samples located in a 5 ft radius around the remediated area (including the buffer zone), and one sample located in the center of the same area.

4.2.3.2 Soils Beneath Exterior Pad. The soils beneath the exterior pad at the 2727-S NRDWS Facility will be sampled in the same manner as the soils beneath the building pad. The difference is in the depths from which soil will be sampled. Samples beneath the exterior pad will be taken from a depth of 0-6 in., and from 18-24 in. These soil samples will be used as closure verification samples for that particular section of the concrete pad. However, unlike the soil removal action under the interior concrete pad, the

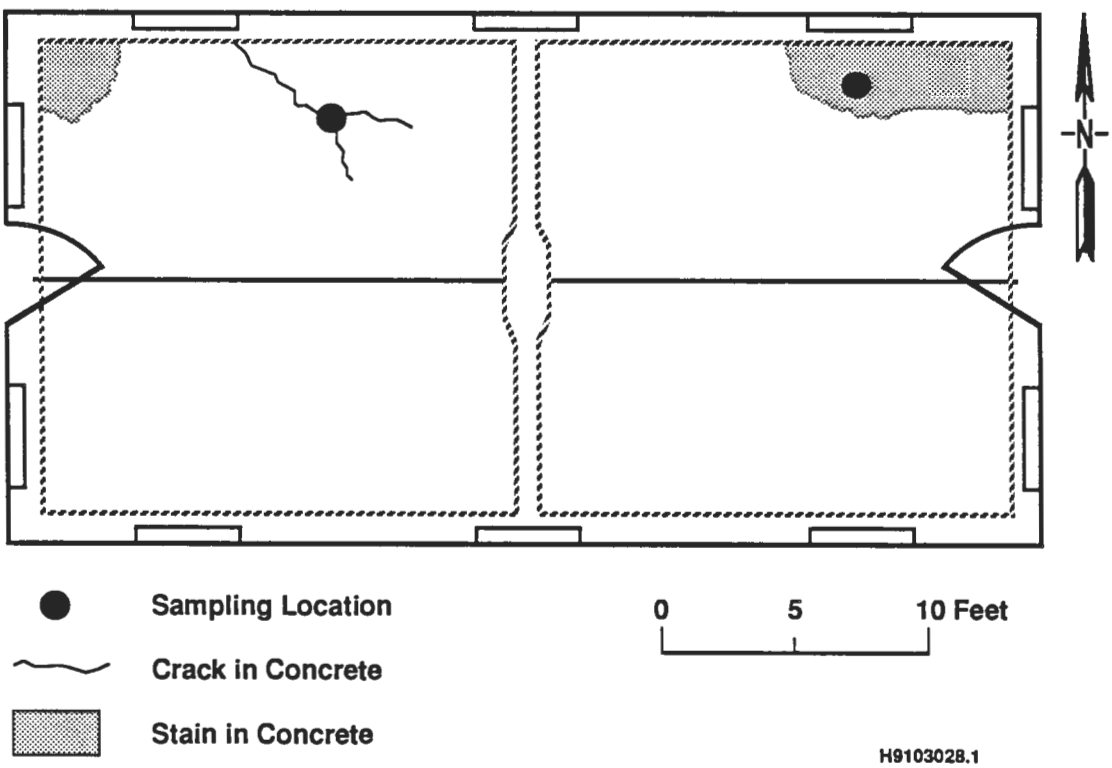


Figure 6. Soil Sampling Locations Within Building.

topmost 6 in. of soil under the exterior pad will not be removed unless evidence of chemical contamination is present. The selection of sampling points has been made with input from of Ecology and can be seen in Figure 7.

The procedures outlined in Appendix F will be followed for the removal of concrete cores to obtain access to the soil. After removal of the concrete cores, soil samples will be taken. Soil sampling will follow the guidelines set forth in EII 5.2 "Soil and Sediment Sampling" of WHC-CM-7-7, *Environmental Investigations and Site Characterization Manual*. The sample collection method used to collect samples will be either a thin-walled ('Shelby') tube, a hand auger or scoop, spade, or shovel sampling technique. These methods are discussed in Appendices C and E, respectively, of WHC-CM-7-7. The specific method chosen to take samples will depend on field conditions at the time of sample collection.

Given the extent and nature of storage activities at the 2727-S NRDWS Facility, it is unlikely that any soil with evidence of chemical constituents above background levels will be present. If any constituents above background levels are determined to be present in the closure verification samples, the next 6 in. of soil would be removed and disposed of in an offsite RCRA landfill.

If any soil is removed because of chemical contamination, a buffer zone will be implemented. The buffer zone will consist of removing the adjoining soil to a circular distance of 5 ft and a depth of 4 in. past the last known point or area of soil contamination. Closure verification sampling will be performed by taking 4 samples located in a 5 ft radius around the remediated area (including the buffer zone), and one sample located in the center of the same area.

4.2.3.3 Perimeter Soils. Soil surrounding the exterior pad will be sampled to verify that waste handling activities did not affect it. There will be four samples taken from the perimeter soils. The selection of sampling points has been made under the guidance of Ecology. Samples will be taken to a depth of 6 in.

The soil sample location for each side of the pad is shown in Figure 8. Each sample location was selected based on the assumption that this would be the side most likely to encounter detectable levels of chemical constituents in the soil. The north and west sample locations are in surface depressions. The east sample location is at the area where the transport trucks entered and left the site. The south sample location is located approximately south of the southwest corner of the 2727-S Building.

Two areas of discolored soil, soil stains No. 1 and No. 2, shown in Figure 8, will be sampled, analyzed, and removed as a separate and distinct removal action. Soil stain No. 1 is located in perimeter soils along the south edge of the exterior pad. Soil stain No. 2 is located in a soil-filled culvert that surfaces within the exterior pad. Soil stain No. 2 will be removed laterally to the culvert walls and to a depth of 4 in. deeper than the last visible area of contamination. Soil stain No. 1 will be completely removed to a depth of 4 in. deeper than the last visible area of contamination

920930.1319

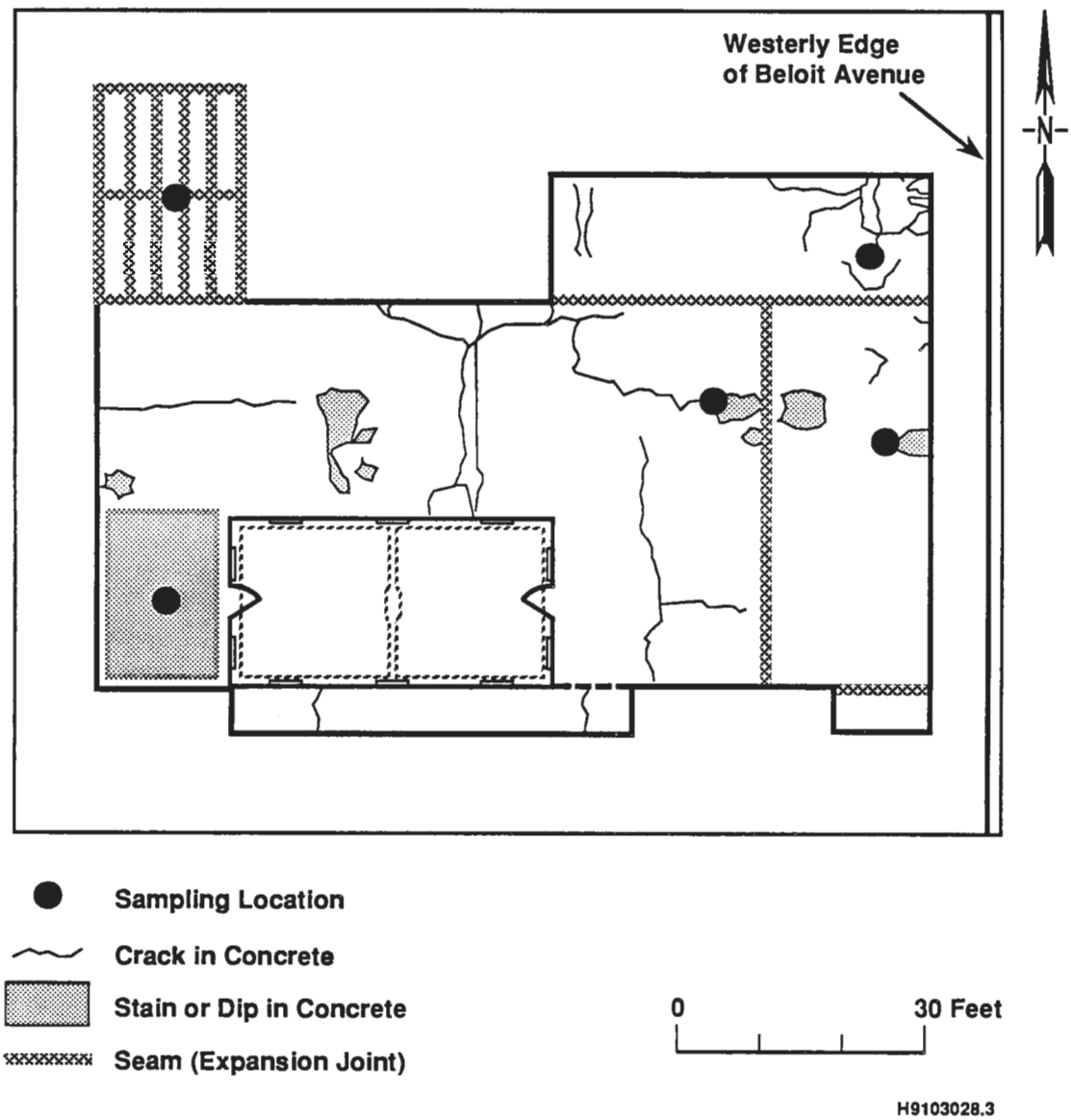


Figure 7. Soil Sampling Locations on Exterior Concrete Pad.

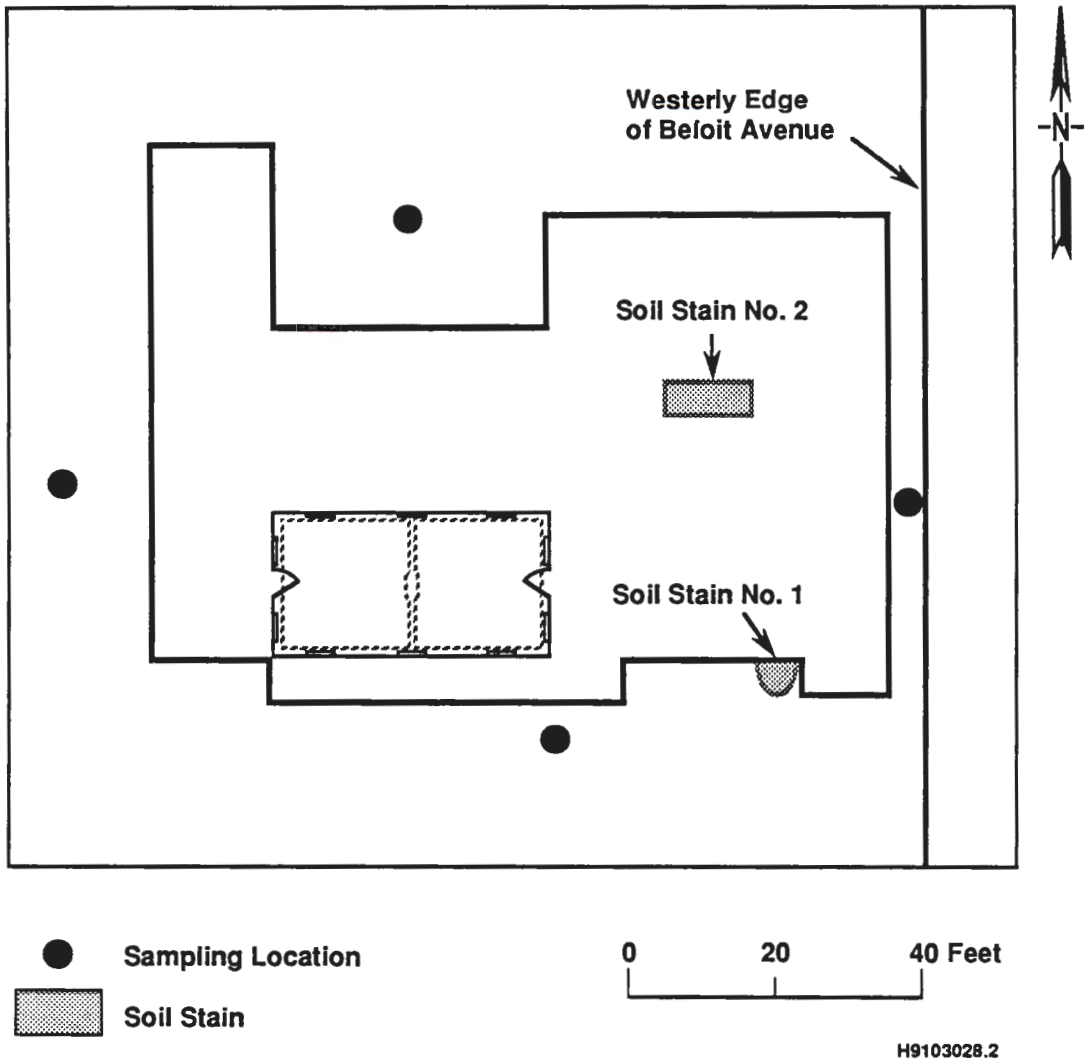


Figure 8. Specific Perimeter Sampling Site Plan, Soil.

and will include a 5-in. lateral buffer. Each stained soil removal area will have one verification sample taken, which may be taken prior to the stained soil removal. If analysis indicates a waste code comparable to the 2727-S NRDWS Facility, removed soil may also be shipped to the offsite RCRA landfill. If found to be a dangerous waste, the area will be subject to the same soil removal criteria as other portions of the 2727-S NRDWS Facility, except that once contaminated soil is removed, only one verification sample, obtained from the center of this area, will be required.

If any soil is removed because of chemical contamination in the remaining four perimeter locations, a buffer zone will be implemented. The buffer zone will consist of removing the adjoining soil to a circular distance of 5 ft and a depth of 4 in. past the last known point or area of soil contamination. Closure verification sampling will be performed by taking 4 samples located in a 5 ft radius around the remediated area (including the buffer zone), and one sample located in the center of the same area.

Soil sampling will follow the guidelines set forth in EII 5.2 "Soil and Sediment Sampling" of WHC-CM-7-7, *Environmental Investigations and Site Characterization Manual*. The sample collection method used to collect samples will be either the use of a thin-walled ('Shelby') tube, a hand auger or scoop, spade, or shovel sampling technique. These methods are discussed in Appendices C and E, respectively, of WHC-CM-7-7. The specific method chosen to take samples will depend on field conditions at the time of sample collection.

Closure verification sampling will then be done at five locations. Four of the closure verification samples will be located within 5 ft of the perimeter of the remediated area: one each to the north, south, east, and west. The fifth closure verification sample will be located in the center of the remediated area. Any closure verification sample with chemical constituents present above background levels will have the soil removed and disposed of in the same manner discussed previously. This process would continue as necessary until verification of adequate soil removal is achieved.

4.2.3.4 Soil Background. The soil located along the perimeter fence of the 2727-S NRDWS Facility will be sampled to determine background level of chemical constituents. There will be three samples taken from within the perimeter fence. The amount and selection of sampling points has been made with input from Ecology and can be seen in Figure 9. One sample will be obtained from each portion of the fence not bordered by Beloit Avenue. Hence, the northern, western, and southern fence line will have one sampling location each. The exact location will be chosen by the responsible Westinghouse Hanford field sampling personnel.

Soil sampling will follow the guidelines set forth in EII 5.2 "Soil and Sediment Sampling" of WHC-CM-7-7, *Environmental Investigations and Site Characterization Manual*. The sample collection method used to collect samples will be either a thin-walled ('Shelby') tube, a hand auger or scoop, spade, or shovel sampling technique. These methods are discussed in Appendices C and E, respectively, of WHC-CM-7-7. The specific method chosen to take samples will depend on field conditions at the time of sample collection.

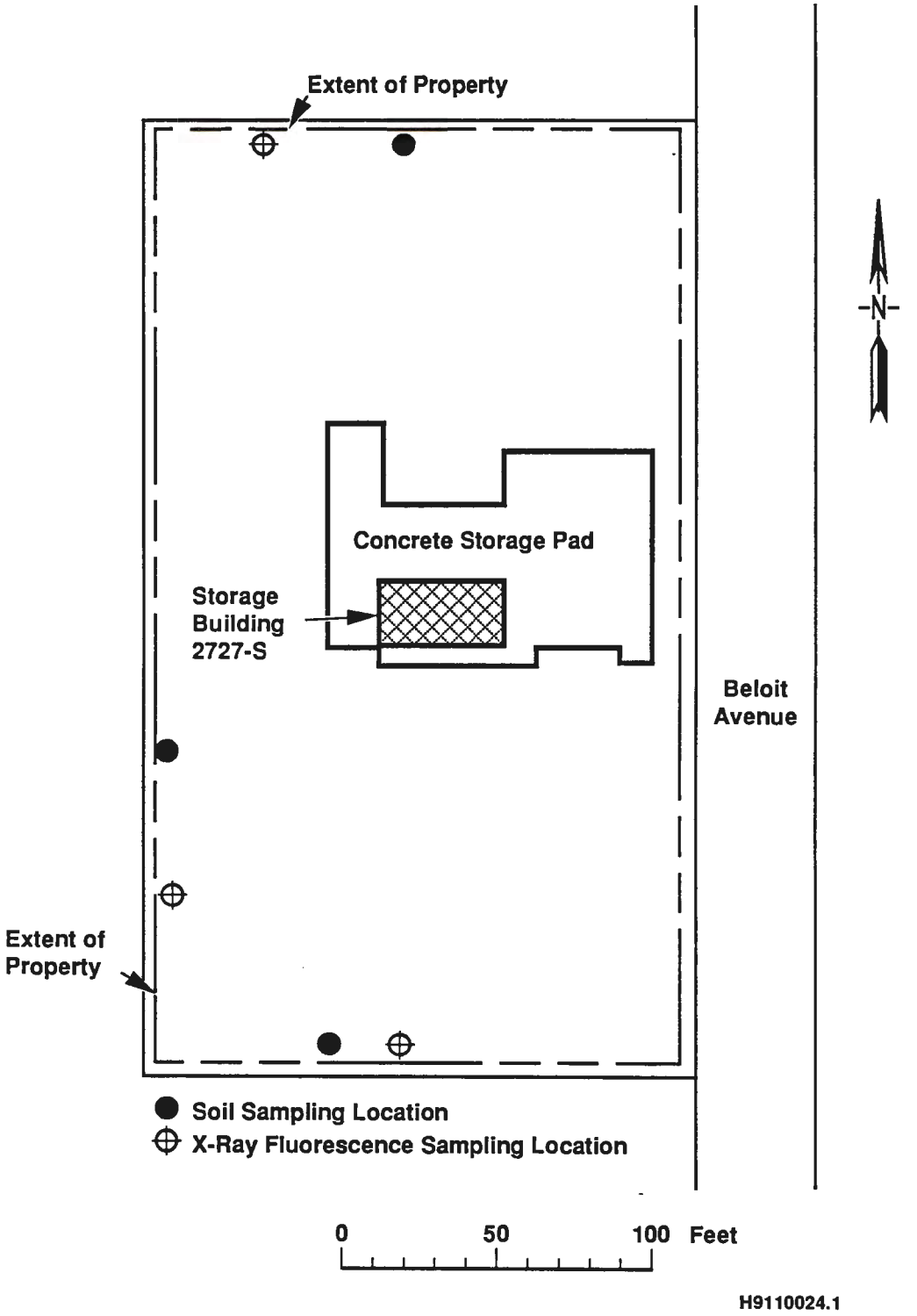


Figure 9. Background Soil Sampling Plan.

*NOTE: All sampling locations are approximations.

An X-ray fluorescence device will be used as a field screening technique onsite (Appendix F). To calibrate the X-ray fluorescence device for local background constituents, an additional three sampling locations along the perimeter fence is required. Exact locations will be chosen at the discretion of the personnel responsible for calibration of the device; however, they will be in the proximity of the three original perimeter fence sample locations.

4.3 DISPOSAL REQUIREMENTS

4.3.1 The 2727-S Building Disposal

The 2727-S Building is a 20 by 40 ft metal structure with interior wallboard, insulation, and electrical wiring.

The 2727-S Building has a personnel door at each end and windows on all four walls. The structure is lined internally with insulation and wallboard. Trained personnel visually inspected the building and no evidence of asbestos was indicated. This conclusion was supported by process knowledge of the personnel responsible for building operations. The wallboard covers only the upper half of the walls, while the insulation lines both upper and lower walls. Because of the possible presence of polychlorinated biphenyls (PCBs), any fluorescent light ballasts present in the building will be removed before disposal of the building in an offsite RCRA landfill. Any fluorescent light ballasts from the 2727-S Building will be placed in an onsite PCB warehouse. Discarded fluorescent light tubes are considered a dangerous waste because of the presence of phosphorus. Discarded fluorescent light tubes from the 2727-S Building will be removed and managed in accordance with Westinghouse Hanford onsite treatment procedures.

4.4 EQUIPMENT DECONTAMINATION

Care will be taken in field sampling to ensure that there is no cross contamination of samples by sampling equipment. To prevent this source of contamination, freshly cleaned and decontaminated sampling tools will be used. When equipment must be reused in the field, it will be cleaned as thoroughly as practical. For this purpose, stringent laboratory cleaning procedures have been modified for field conditions as documented in WHC-CM-7-7, Environmental Investigation Instruction (EII) 5.5, "Decontamination of Equipment for RCRA/CERCLA Sampling."

4.5 RESTORATION

Upon removal of waste residues and contaminated structures or soil, including waste generated during closure, the site may require some degree of reclamation. This may be justified to control dust, erosion, and surface water run-off and to promote postclosure usage. Site restoration will include backfilling disturbed soil areas with noncontaminated native soils, compaction, grading, and revegetation.

4.6 COST ESTIMATES

It is DOE-RL's understanding that federal facilities are not required to comply with WAC 173-303-620 (1991a). However, projections of anticipated costs of closure will be provided annually during closure activities (starting October 1992).

4.7 CERTIFICATION

Within 60 days of completion of closure of the 2727-S NRDWS Facility, certifications will be submitted. Suggested certification statements are contained in Appendix I. The independent registered professional engineer who will be monitoring closure will visit the site at least at the commencement and end of each activity described in the closure plan (e.g., soil sampling, building removal, soil excavation, etc.). The professional engineer will review all records, notes, analyses, files, manifests, etc. relating to the closure activities. After the final professional engineer closure certification has been executed, a responsible DOE official will certify that the facility has been closed in accordance with the closure plan. The responsible government official(s) is identified in Appendix I.

This page intentionally left blank.

9413097.1993

5.0 CONTINGENCY PLAN

A health and safety plan (HASP) is required for all hazardous waste sampling sites. This plan is intended to specify information pertinent to field assignments and to be a guide in unusual situations or emergencies. A site-specific version of the general RCRA/CERCLA investigation health and safety plan will be developed by Westinghouse Hanford to be used for RCRA sampling at the 2727-S NRDWS Facility. This plan will be developed and completed before initiation of RCRA sampling activities in accordance with EII 2.1, "Preparation of Health and Safety Plans." The finalized version of this plan will be forwarded to Ecology.

This page intentionally left blank.

9413097.1595

APPENDIX F

SAMPLING AND HANDLING PROCEDURES

1.0 INTRODUCTION

This appendix outlines (or describes where necessary) the procedures that will be followed in the collection and handling of samples at the 2727-S Nonradioactive Dangerous Waste Site (NRDWS) Facility. For the most part, these procedures are contained in *WHC-CM-7-7, Environmental Investigations and Site Characterization Manual* (WHC 1989) and referenced where applicable in the sampling plan (Chapter 4.0). Table F-1 identifies those procedures that will be followed for sample collection and handling during the 2727-S NRDWS Facility field activities. The two following techniques are addressed because a written procedure does not yet exist in WHC-CM-7-7.

Concrete Coring--Section 2.0 outlines the basic procedures for extracting concrete cores for the purpose of obtaining soil samples for *Resource Conservation and Recovery Act of 1976* (RCRA) investigations.

X-Ray Fluorescence (XRF)--The procedure for field screening techniques, to be used at hazardous waste sites on the Hanford Site, is currently in development. Section 3.0 outlines the analysis plan for 2727-S NRDWS soil sampling that has been prepared using the draft form of Hanford Site XRF procedures. A finalized version of a procedure documenting the use of the X-Met* is under discussion with Ecology and will remain outside the scope of this closure plan.

2.0 CORE DRILL SAMPLING

2.1 PURPOSE

This procedure describes the methods and equipment required to core drill through concrete floor structures for the purpose of obtaining RCRA samples for site characterization at the 2727-S NRDWS Facility. These samples will consist of concrete and/or soils.

Access to the underlying soils will be obtained by coring through the concrete floors. The cores will be drilled using concrete coring equipment. From each concrete core hole access, samples of the underlying soils will be

*X-Met is a trademark of Outokumpu.

Table F-1. Investigative Procedures for 2727-S Nonradioactive Dangerous Waste Site Facility Sampling.

Procedure	Title[a]
EII 1.1	Hazardous Waste Site Entry Requirements
EII 1.2	Preparation and Revision of Environmental Investigation Instructions
EII 1.4	Deviation from Environmental Investigation Instructions
EII 1.5	Field Logbook
EII 1.6	Records Management
EII 1.7	Indoctrination, Training and Qualification
EII 2.1	Preparation of Hazardous Waste Operations Permits
EII 2.2	Occupational Health Monitoring
EII 3.2	Health and Safety Monitoring Instruments
EII 4.2	Interim Control of Unknown, Suspected Hazardous and Mixed Waste
EII 5.1	Chain of Custody
EII 5.2	Soil and Sediment Sampling
EII 5.4	Field Decontamination of Drilling, Well Development and Sampling Equipment
EII 5.5	1706-KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment
EII 5.11	Sample Packaging and Shipping

[a]Procedures are EIIs selected from the latest approved version of WHC-CM-7-7 (WHC 1989).

RCRA = Resource Conservation and Recovery Act of 1976
CERCLA = Comprehensive Environmental Response, Compensation and Liability Act of 1980.

920929.0941

3.0 X-RAY FLUORESCENCE SAMPLING

3.1 INTRODUCTION

Field screening for heavy metals using a portable XRF analyzer provides a means to determine levels of contamination by heavy metals in the field. This document reports in draft form the technical basis and site-specific procedures to be used in field screening of soil samples from the 2727-S NRDWS Facility for detection of elemental contaminants, which may be present. This plan will discuss generalized site- and task-specific requirements and procedures for sample collection, data handling, and data evaluation. The final versions of specific procedures are under discussion with Ecology and will remain outside the scope of this closure plan.

3.2 BACKGROUND INFORMATION

Although process knowledge indicates a limited potential for chemical contamination in the 2727-S Facility, soils beneath the concrete pad are to be sampled before demolition to verify that no contamination exists below the planned depth of disposal. After demolition, if further remediation is necessary due to the presence of metals, XRF will be used as a field screening technique. This will assist in determining the extent of contamination.

3.3 ANALYTICAL REQUIREMENTS

The X-Met-880 is to be used to detect the presence of inorganic contaminants in soil and concrete. Qualitative or semiquantitative data is to be provided on a quick turnaround basis, subject to confirmation by validated laboratory tests. The basic goal of field screening is to quickly identify elevated levels of elemental contaminants in soils.

Most elements are present in soils at some concentration. Table F-2 indicates typical ranges of concentration for various elements amenable to analysis by XRF. Because most elements of interest are likely to be present as part of the natural background, the basic function of XRF analysis is to identify situations when a particular element is present in concentrations significantly above typical background levels. However, this must be based on background levels specific to the soil under analysis.

Factors that affect the ability of a field-portable XRF unit to detect and quantify a specific element include matrix scattering and absorption, secondary excitation, and peak overlaps. Also, because the X-Met uses isotopic sources with fixed energy levels to irradiate the sample, the relative efficiency by which a given element can be excited will depend on the relationship between the absorption edge and the source energy lines.

The X-Met determines elemental concentrations by means of "models" in which measurements of total count rates are made in a maximum of ten "windows" associated with specific elements. Peak overlap effects are accounted for by

Table F-2. Typical Concentration of Various Elements in Soils.

Element	Common range for soils (ppm)[a]
Arsenic	1 - 50
Barium	100 - 3,000
Bromine	1 - 10
Cadmium	0.01 - 0.70
Cesium	0.3 - 25
Chromium	1 - 1,000
Cobalt	1 - 40
Copper	2 - 100
Gallium	5 - 70
Germanium	1 - 50
Iodine	0.1 - 40
Iron	7,000 - 550,000
Lanthanum	1 - 5,000
Lead	2 - 200
Mercury	0.01 - 0.3
Manganese	20 - 3,000
Molybdenum	0.2 - 5
Nickel	5 - 500
Rubidium	50 - 500
Selenium	0.1 - 2
Silver	0.01 - 5
Strontium	50 - 1,000
Tin	2 - 200
Titanium	1,000 - 10,000
Vanadium	20 - 500
Yttrium	25 - 250
Zinc	10 - 300
Zirconium	60 - 2,000

[a]Source: Lindsay, W. (1979) Chemical Equilibrium in Soils; John Wiley & Sons, New York, 1979.

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 by the Technical Lead or the OSM. However, all sample data shall be retained by the analytical laboratory and made available for systems or program audit purposes upon request by Westinghouse Hanford, U.S. Department of Energy-Richland Operations Office (DOE-RL), or regulatory agency representatives (Section 10.0). Such data shall be retained by the analytical laboratory through the duration of contractual statement of work, at which point the data shall be turned over to Westinghouse Hanford for archiving.

The completed data package shall be reviewed and approved by the analytical laboratory's QA Manager before submittal to the OSM for validation as discussed in Section 8.2. The requirements of this section shall be included in procurement documentation or work orders, as appropriate, in compliance with the standard Westinghouse Hanford procurement control procedures referenced in Section 4.1.

8.2 VALIDATION

Validation of the completed data package shall be performed by Westinghouse Hanford OSM personnel. The following validation requirements shall be defined within approved OSM data validation procedures at a minimum of Level B as outlined in Westinghouse Hanford's *Sample Management and Administration WHC-CM-5-3*, (WHC 1990b).

- Sample holding times
- Accuracy (i.e., spikes, control standards, etc.)
- Precision (i.e., duplicates, splits, etc.)
- Blanks.

8.3 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 at the direction of the Technical Lead before submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments shall be retained as permanent project quality records in compliance with EII 1.6, "Records Management" (WHC 1989a) and QA 17.0, "Quality Assurance Records" (WHC 1989b).

9.0 INTERNAL QUALITY CONTROL

All analytical samples shall be subject to in-process quality control measures in both the field and laboratory. Unless superseded by specific directions provided in the sampling plan, the following minimum field quality control requirements apply. The following requirements are adapted from *Test Methods for Evaluating Solid Waste* (SW-846) (EPA 1986), as modified by the proposed rule changes included in the *Federal Register*, Volume 54, No. 13 (EPA 1989).

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

- 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 or the primary laboratory. Frequency shall meet the minimum requirements identified in the bullets below.

- Field/Equipment Blanks--A water blank consists of pure deionized, distilled water whose chemical composition is known, drawn through decontaminated sampling equipment and taken as a sample. Blanks are used to verify the adequacy of sampling equipment decontamination procedures and are used to check for possible contamination originating with the sampling environment. Blanks will be run before the initiation of sampling each day or if blank contamination is suspected or detected.

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

- Matrix spiked (MS) and matrix spiked duplicate (MSD) 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. Spike compound selection, quantities, and concentrations shall be described in the laboratories analytical procedures. Minimum QC requirements should be an analysis of either a (1) MS/MSD analysis, of (2) matrix spike and duplicate sample analysis at a frequency of once/batch or once every 20 samples, whichever is greater, and at least once for each sample matrix analyzed.

Ecology Comment Number 1

1. <u>Section 1.0, Page 1-2, first paragraph</u>

Deficiency: How will activities between Operations, D&D, and the ER program be coordinated? During the February 27, 1992, 100-N Area Unit Manager Meeting, USDOE informed Ecology that they "wanted relief" from coordinating with Operations and D&D. Ecology stated that this was unacceptable and that the issue should be discussed by the project managers as soon as possible.

Recommendation: Expand the text to explain exactly how this integration and coordination will take place and who will be responsible.

Response: The paragraph referenced in Comment Number 1 (Section 1.0, page 1-2, first paragraph) is deleted from Draft C of the workplan (DOE/RL-90-22). The concern that DOE/RL expressed by "wanting relief" from coordinating with Operations an D&D is based on the fact that these are three separate programs within DOE/RL and each has it's own funding and milestones. Changes in funding and milestones in one program will affect the other programs. DOE/RL's proposal is to identify the program interfaces and current schedules of each and build a 100-NR-1 schedule on this basis. Once a 100-NR-1 RFI/CMS schedule was approved, "relief" would be needed to revise the schedule as the realities of funding the operations and D&D programs are known.

The following paragraph, which is similar to the original deleted paragraph, should be added to Page WP 1-1, Section 1.0, as paragraph 4:

RFI/CMS activities directed by the 100-NR-1 work plan will be integrated with the N Reactor Shutdown Program Plan (WHC-SP-0615, Rev. 1) and D&D activities. The shutdown plan provides the guidance necessary for permanent closure of the N reactor in preparation for turnover to the Hanford Surplus Facilities Program (HSFP). Turnover activities primarily involve shutdown of operating systems and radiological/hazardous waste clean-up and/or stabilization in response to DOE and WHC requirements. The schedule for shutdown is currently anticipated to extend through 1999 when N reactor is to be turned over to D&D. While the D&D activities may include D&D of a limited number of N Area facilities prior to turnover of the N Reactor to D&D the bulk of the work will be accomplished after turnover. The 100-NR-1 RFI/CMS schedule is based upon the current N Reactor Shutdown Program Plan schedule and the current D&D schedule. It is recognized that the three parties (DOE, Ecology and EPA) need to be flexible in dealing with the commitments and milestones associated with the outyear aspects of this schedule. Opportunities for advancing various activities may be possible by careful coordination and planning and various activities may be delayed in response to changes in programs and funding in the outyears.

Additionally the N-Springs ERA will be initiated (field activities) in FY-94. N-Springs is the N-Areas most important issue that needs to be addressed in the near-term. Resources need to be concetrated on the reduction of Sr-90 to the river. The other high priority at 100-N is

9413097.2002

THIS PAGE INTENTIONALLY
LEFT BLANK

basin clean out. N-Springs and the basin clean outs are being actively persued and are addressing the two largest concerns at the N-Reactor.

Ecology Comment Number 9

9. <u>Section 2.1.1, page WP 2-1, fifth paragraph, and table 4-2, sheet 6 of 7</u>

Deficiency: Possible contamination originating from the Hanford Generating Plant or the Bonneville Power Administration substation that may affect the general 100-N Area is not considered in the work plan.

Recommendation: The text should clearly identify who has the responsibility for identification and remediation of contaminants from these facilities. The potential contamination originating from these facilities should be discussed in the work plan as they relate to the 100-N Area.

Response: The Tri-Party Agreement specifically excludes leased lands, State owned land, and lands owned by the BPA from the Hanford Site. The relationship between the 100-NR-1 operable unit and the HGP and BPA is therefore no different then with any site and it's neighbors. The primary responsibility for identification and remediation of contaminants from these offsite facilities belongs with the Washington Public Power Supply System (WPPSS), operator of the HGP and with the Bonneville Power Administration (BPA), operator of the electrical substation. No schedule has, however, been established to date by WPPSS and the BPA to accomplish this. Should the DOE, in the course of the 100-NR-1 and 100-NR-1 RFI/CMS activities, discover such contamination, it will be brought to the attention of the responsible party and negotiations undertaken to achieve remediation. Such actions would be agreed to by the three parties (DOE, Ecology and EPA).

Table 4-2 has been modified to delete reference to the HGP sites. It is proposed to add to the last paragraph of Section 2.1.1, page 2-2, the following:

Should any contamination be found to have migrated off of these two sites, into the 100-NR-1 operable unit, the three parties (DOE, Ecology, and EPA) must reach agreement with the operator (WPPS/HGP or BPA) as to the scope and schedule for remediation.

Ecology Comment Number 77

77. <u>Section 4.2.1.2, Page 4-11, first paragraph</u>

Deficiency: This paragraph discuses the completion of shutdown within a time frame compatible with the new past practice strategy. What is the time frame? If shutdown is incorporated into the program, how will it be done?

Recommendation: Expand the text to define how shutdown activities will be incorporated into the program in adequate detail.

9413207.2003

Response: No change in the text is proposed for this comment. A discussion of integration and the associated schedules will be included in Chapter 6.

Ecology Comment Number 125

125. <u>Section 6.0, Figure 6-1:</u>

Note: The letter from USDOE to EPA and Ecology dated DEC 19 1991 (91-ERB-226) states that major remediation at most of the high priority sites cannot begin until after the completion of the N Reactor shutdown. Therefore, there is a 24 month delay between completion of the IRM Plan (March 1995) and the start of the Interim ROD preparation (September 1997) so that the Interim ROD is timed to be 15 months prior to completion of the shutdown. The 15 month period reflects the requirement that "substantial continuous physical onsite remedial action shall be commenced at each facility not later than 15 months after completion of the investigation and study," (i.e., after the (RFI/CMS).

Deficiency: The schedule for N-Reactor shutdown lacks sufficient detail to evaluate its integration with other activities within the 100 Area, especially within the 24 month period of inactivity. Also, the schedule for preparation and issuance of interims ROD's is unclear and is not discussed in the text of the report.

There is no need to delay start of the interim ROD preparation. Remediation can begin elsewhere on the site before the completion of N reactor shutdown. Work could begin on all of the medium and most of the low priority sites before the end of the reactor shutdown. Also, cleanup of 116-N-4 (Emergency Dump Basin) could begin sooner than January of 1998. In addition, the schedule for the cleanup of 118-N-1 (Spacer Storage Silos) and 1304-N (Emergency Dump Tank) is not shown on the operable unit schedule (Figure 6-1).

Recommendation: Provide a clear and detailed discussion of the schedule and activities of N reactor shutdown. In addition, provide better justification for the 24-month delay for the start of the Interim ROD report or move the Interim ROD start date to September 1995. The over 15-month delay in remedial action after completion of investigation and study would violate CERCLA.

Response: Chapter 6 will be rewritten to address these comments. A copy of the N Reactor Shutdown Program Schedule will be included as Figure 6-2. A copy of the Waste Site Remedial Action Interference Schedule will be included as Table 6-1 to help explain the 24-month delay for the start of the Interim ROD report. Existing Figures 6-2, 6-3 and 6-4 will be deleted since these activities are complete. A proposed draft of revised Chapter 6 is attached.

We have no response to the statement that a 15-month delay would violate CERCLA. In our estimation, the N Reactor shutdown can not be expedited to avoid such a delay.

9413097.2004

Ecology Comment Number 127

127. Figure 6-1, Operable Unit Schedule, pocket insert

Deficiency: The text at the bottom of the schedule states that Task 1 - Project Management is not applicable to this operable unit. But, Task 1 - Project Management is included with the tasks to be performed during the RFI at the 100-NR-1 operable unit (Section 5.1) and discussed extensively in Section 5.1.1.

Recommendation: The rationale for not showing Task 1 in the schedule should be explained or Task 1 should be included in the schedule.

Response: The comment is accepted and Task 1 will be added to the figure.

Deficiency: The rationale for starting the evaluation of source data approximately 5 months after completion of vadose zone drilling is not provided and should be included. Evaluation of source data prior to completion of drilling may help to identify additional locations where boring is necessary and to obtain additional data without delay.

Response: The original decision to schedule the evaluation of source data after the vadose drilling was based upon the availability of resources. It is now a moot point since the work is accomplished. Should the source data evaluation suggest the need for additional vadose boreholes it will be considered in the LFI Report. **No change in the text is planned.**

Deficiency: Site investigations for high priority waste sites are integrated with N-reactor shutdown. However, the schedule for the remediation of 118-N-1 spacer storage silos and the 1304-N emergency dump tank is not included.

Response: The comment is accepted and the two sites will be added to the schedule.

9113097.2012

THIS PAGE INTENTIONALLY
LEFT BLANK

Proposed Revision to Chapter 6

6.0 SCHEDULE

This Chapter presents (Section 6.1) the operable unit schedule which will be used as the baseline to measure progress in implementing this work plan. It discusses integration with the N Reactor Shutdown Program in Section 6.2. The relationship to RCRA TSD facilities is discussed in Section 6.3. Integration with Decommissioning and Decontamination is discussed in Section 6.4.

The 100-NR-1 RFI/CMS schedule is based upon the current N Reactor Shutdown Program Plan (WHC-SP-0615, Rev. 1) schedule. It is recognized that the three parties (DOE, Ecology and EPA) need to be flexible in dealing with the commitments and milestones associated with the outyear aspects of this schedule. Opportunities for advancing various activities may be possible by careful coordination and planning and various activities may be delayed in response to changes in programs and funding in the outyears.

6.1 100-NR-1 OPERABLE UNIT WORK PLAN SCHEDULE

An operable unit schedule, which supports the Tri-Party Agreement Action Plan work schedule, has been prepared that details the work described in Chapter 5 of this work plan. This schedule (Figure 6-1) is the base line that will be used to measure progress in implementing this work plan. The limited field investigation described in Section 5.1 was initiated for this operable unit, prior to public review of the work plan, with the understanding that additional investigations may be required as a result of public review comments. Should such additional investigations be required, the operable unit schedule and associated milestones will be adjusted accordingly. Non-intrusive investigations (Task 2) were initiated in July of 1992 with the conduct of a surface radiation survey. Intrusive investigations (Task 5) were initiated in November of 1992 with the start of vadose borehole drilling and were completed in April of 1993 with source sampling (Task 2).

6.2 INTEGRATION WITH N REACTOR SHUTDOWN PROGRAM

The N Reactor Shutdown Program is designed to place N Reactor and supporting facilities in a radiologically and environmentally safe condition such that they can be transferred to the Decommissioning and RCRA Closure Program in FY 1999 for ultimate decommissioning. Transition activities primarily involve shutdown and isolation of operational systems and buildings, radiological/hazardous waste clean-up, and environmental stabilization of the facilities.

A schedule (Figure 6-2) was developed by the N Reactor program, assuming the availability of resources and funding. Because of the duration of this schedule through FY 1999, 100-NR-1 remedial actions are impacted and a gap shows in the operable unit schedule (Figure 6-1) between the completion of the IRM Proposed Plan and the ROD. Table 6-1 was developed to show the various items that are considered to interfere with remediation of specific 100-NR-1 Operable Unit past practice sites. Interference was categorized into two

general types; that resulting directly from the presence of essential underground utilities, and that resulting from some other reason.

The process used to determine whether N-Reactor shutdown activities interfered with past practice remedial activities consisted of three parts. The first part involved identifying those utilities (underground electrical, drain, water and fire lines) that are required by N-Reactor shutdown activities. These essential utilities were identified and color coded on composite drawings of the underground lines. Secondly, the past practice sites were plotted on the index drawing. The third and final part consisted checking the appropriate composite drawing to see if there were any identified utilities contained in or immediately adjacent to the past practice site.

An example of interference that does not result from underground utilities is Tri-Party Agreement milestone M-17-15, which is shown as an interference for the remediation of past practice sites 116-N-1 and 116-N-3. Milestone M-17-15 allows effluent discharge to 116-N-3 to continue until June, 1995. Discharges to 116-N-3 also impact the down gradient 116-N-1. It would be counterproductive to attempt to remediate either 116-N-1 or 116-N-3 before all discharges had stopped. Another example of an "other" type of interference is shown as "RR TRACKS". Radioactive solid waste is moved off-site using rail lines and specially shielded railroad cars. These rail lines (or RR Tracks) were therefore considered to be essential and a point of interference with the remediation of certain past practice sites.

If essential underground utilities were contained in or immediately adjacent to the particular past practice site, or there was an impact from some other origin, then there was considered to be interference and the impacted utility or cause was identified on the following table. If there were no essential underground utilities in the past practice site area and there was no other reasons inhibiting remediation of that site, then there was considered to be no interference.

6.3 INTEGRATION WITH RESOURCE CONSERVATION ACT CLOSURES

There are four RCRA facilities at 100-N:

- 1301-N Liquid Waste Disposal Facility (Mixed Waste);
- 1325-N Liquid Waste Disposal Facility (Mixed Waste);
- 1324-N Surface Impoundment (Hazardous Waste);
- 1324-NA Percolation Pond (Hazardous Waste).

Draft closure plans were submitted to Ecology in 1987 are scheduled to be resubmitted in 1994 as shown in Figure 6-1. The strategy being used in the RCRA closure process is adopted from the Tri-Party Agreement, which allows for a land disposal unit being closed in conjunction with an operable unit. If initial investigations show that the units no longer contain hazardous waste or constituents, the units may be "clean closed" with no physical closure action. Any remaining CERCLA-only materials (radionuclides) would be addressed as part of the past-practice process as designated for the operable unit.

9413097.2006

6.4 INTEGRATION WITH DECONTAMINATION AND DECOMMISSIONING

The scope of work for Decontamination and Decommissioning (D&D) is not fully defined at this time but is assumed to be the isolation of any remaining radioactive or hazardous waste to minimize environmental impact, especially potential health and safety impacts, on the public. The actual plans will depend upon future engineering studies and the NEPA process, which will evaluate options and will be followed by a ROD. D&D activities will begin after the completion of the N Reactor Shutdown Program.

9413097.2007

THIS PAGE INTENTIONALLY
LEFT BLANK

ATTACHMENT #1

Table 1 - Waste Site Remediation Action Interference

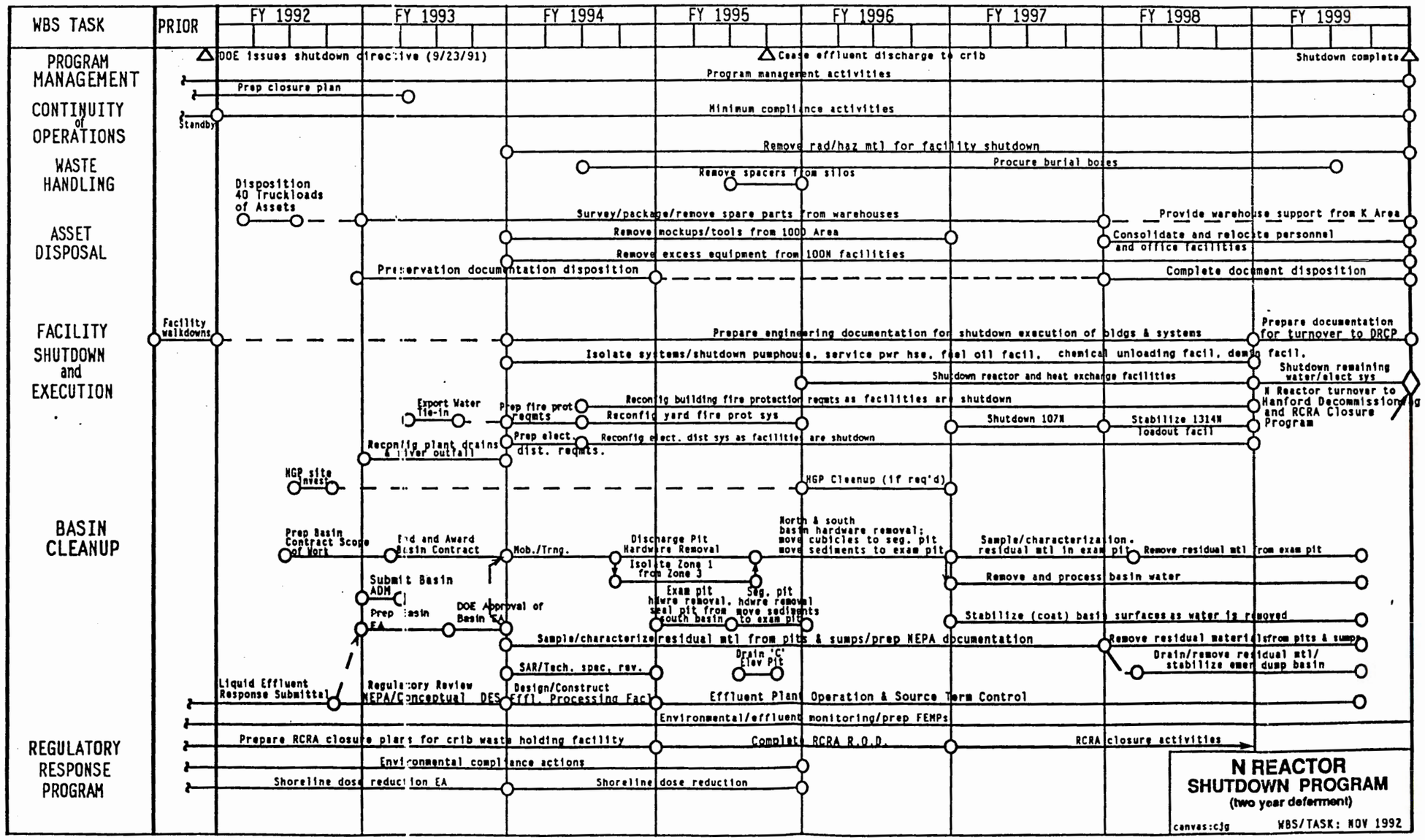
SITE (ALIAS)	WASTE SITE DESCRIPTION	NO INTERFERENCE	WASTE SITE REMEDIAL ACTION INTERFERENCE					
			ACTIVE SYSTEMS SUPPORTING N-REACTOR SHUTDOWN					
			FIRE SYSTEM LINES	RADIOACTIVE EFFLUENT DRAINS	REGULAR WATER DRAINS	AIR SYSTEM	ELECTRICAL OR UTILITY LINES	OTHER
RCRA TSD UNITS								
116-N-1 (1301-N)	EFFLUENT CRIB							6/95, M-17-15
116-N-3 (1325-N)	EFFLUENT CRIB							6/95, M-17-15
120-N-2 (1324-N)	PERCOLATION POND	X						
120-N-1 (1324-NA)	SURFACE IMPOUNDMENT	X						
120-N-1	SOUTH SETTLING POND	X						
HIGH PRIORITY SITES								
118-N-1	SPACER STORAGE SILOS		X	X	X		X	RR TRACKS (SPACERS NOT YET REMOVED)
1304-N	EMERGENCY DUMP TANK				X			RR TRACKS
116-N-4 (1300-N)	EMERGENCY DUMP BASIN		X	X	X			RR TRACKS
105-N BASIN	SPENT FUEL STORAGE BASIN		X	X	X	X	X	N-REACTOR SHUTDOWN PREREQUISITE
UN-100-N-6	DECONAMINATION WASTE DRAIN LINE			X		X	X	

SITE (ALIAS)	WASTE SITE DESCRIPTION	NO INTERFERENCE	WASTE SITE REMEDIAL ACTION INTERFERENCE					
			ACTIVE SYSTEMS SUPPORTING N-REACTOR SHUTDOWN					
			FIRE SYSTEM LINES	RADIOACTIVE EFFLUENT DRAINS	REGULAR WATER DRAINS	AIR SYSTEM	ELECTRICAL OR UTILITY LINES	OTHER
MEDIUM PRIORITY SITES								
1322-N/NA	SAMPLE BUILDINGS			X	X		X	
116-N-2 (1310-N)	TEMPORARY STORAGE FACILITY		X	X	X	X	X	
119-N	COOLING WATER DRAIN LINE			X				
LOW PRIORITY SITES								
SPRING 1983 UPR	NaOH SPILL			X		X	X	
108-N (1106-N)	CHEMICAL UNLOADING FACILITY	X						
120-N-7	FRENCH DRAIN UNLOADING STATION	X						
120-N-6	H_2SO_4 TANK FENCH DRAINS	X						
120-N-5	H^+/OH^- TRANSFER FRENCH AND NEUTRALIZATION UNIT	X						
120-N-3	NEUTRALIZATION PIT AND FRENCH DRAIN	X						
120-N-8	H_2SO_4 DAY TANK VENT FRENCH DRAIN	X						

SITE (ALIAS)	WASTE SITE DESCRIPTION	NO INTERFERENCE	WASTE SITE REMEDIAL ACTION INTERFERENCE					
			ACTIVE SYSTEMS SUPPORTING N-REACTOR SHUTDOWN					
			FIRE SYSTEM LINES	RADIOACTIVE EFFLUENT DRAINS	REGULAR WATER DRAINS	AIR SYSTEM	ELECTRICAL OR UTILITY LINES	OTHER
REGEN-WASTE TRANSPORT SYSTEM	H^+/OH^- REGEN WASTE FROM 163-N	X						
166-N	FUEL OIL UNLOADING STATION		X	X			X	RR TRACKS (POSSIBLE)
DRUM STORAGE AREA	REPORTED DRUM STORAGE AREA		X				X	
181-N	WASTE OIL TANK	X						
184-N	FUEL OIL DAY TANKS	X						
166-N TO 184-N	FUEL OIL PUMPING		X	X	X		X	REACTOR INGRESS/ EGRESS INTERFERENCE
SEPTIC TANKS AND SANITARY WASTE DISPOSAL FACILITIES								
124-N-4	SEPTIC TANK AND DRAIN FIELD	X						
124-N-3	107-N CESSPOOL							ACTIVE
124-N-1	SEWER SYSTEM							ACTIVE
124-N-5	SEPTIC TANK	X						
124-N-6	SEPTIC TANK	X						
124-N-7	SEPTIC TANK	X						
124-N-8	SEPTIC TANK							ACTIVE
124-N-9	SEPTIC TANK							ACTIVE

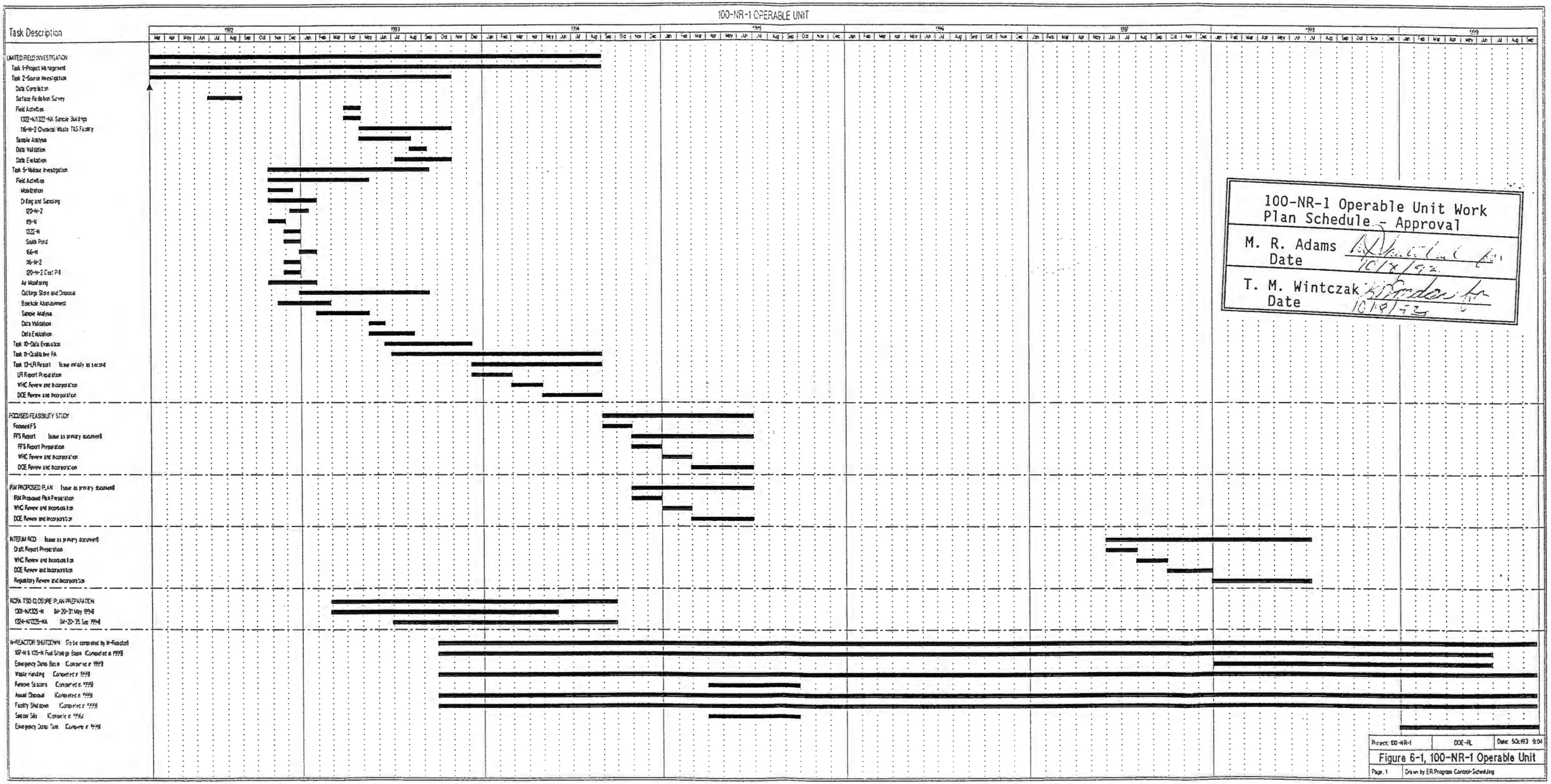
SITE (ALIAS)	WASTE SITE DESCRIPTION	NO INTERFERENCE	WASTE SITE REMEDIAL ACTION INTERFERENCE					
			ACTIVE SYSTEMS SUPPORTING N-REACTOR SHUTDOWN					
			FIRE SYSTEM LINES	RADIOACTIVE EFFLUENT DRAINS	REGULAR WATER DRAINS	AIR SYSTEM	ELECTRICAL OR UTILITY LINES	OTHER
124-N-10	SEWER SYSTEM							ACTIVE (216 PERMIT APP.)
124-N-2	SEPTIC TANK							ACTIVE
OTHER LOW PRIORITY SITES								
1314	LIQUID WASTE LOADOUT FACILITY			X			X	
128-N-1	TRASH BURN PIT / FUEL OIL STARTER	X						
1143-N	PAINT SHOP							ACTIVE
120-N-4	STORAGE AREA	X						
N-17	PAINT SHOP							ACTIVE
HGP BURN PIT	TRASH BURN PIT	X						
CONSTRUCTION DEBRIS DUMP	DUMP	X						

Figure N Reactor Shutdown Program Schedule.



DRAFT

THIS PAGE INTENTIONALLY
LEFT BLANK



The 12-month process consisting the Work Plan and preparing the interim ROD results from integrating RCRA and Past Practice activities with N-Reactor shutdown activities, etc.

9413097.2014

THIS PAGE INTENTIONALLY
LEFT BLANK

9358089D
ATTACHMENT 3

PROPOSED RESPONSES TO COMMENTS 1, 9, 77, 125, AND 127
INCLUDING REVISIONS TO CHAPTER 6 AND THE OPERABLE UNIT SCHEDULE

9413097.2015

THIS PAGE INTENTIONALLY
LEFT BLANK