1230765
[00804 31 H]

BHI-00012
Rev. 00

Best Available Copy

300-FF-2 Operable Unit Technical Baseline Report

Authors
D. H. DeFord
R. W. Carpenter
M. W. Einan

Date Published
August 1994

RECEIVED
AUG 04 2015
EDMC

Environmental Excellence
HANFORD

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

Bechtel Hanford, Inc.
Richland, Washington

Approved for Public Release

421

ACRONYMS

AES	atomic emission spectroscopy
CAPS	Cell Atmosphere Processing System
CCP	core component pot
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DOE	U.S. Department of Energy
DOT	Department of Transportation
DPM	disintegrations per minute
Ecology	Washington State Department of Ecology
EMSL	Environmental Monitoring Support Laboratory
FFTF	Fast Flux Test Facility
FMEF	Fuels and Materials Examination Facility
FMPC	Feed Materials Production Center
HEDL	Hanford Engineering Development Laboratory
HEPA	High-Efficiency Particulate Air
HEW	Hanford Engineering Works
HPT	health physics technician
HRS	Hazardous Ranking System
HVAC	heating, ventilating, and air conditioning
HWSA	Hazardous Waste Storage Area
ICP-AES	inductively coupled plasma-atomic emission
IDS	interim decay storage
IEM	interim examination and maintenance
ISV	in situ vitrification
KEH	Kaiser Engineers Hanford
LMFBR	Liquid Metal Fast Breeder Reactor
MED	Manhattan Engineering District
MSDS	Material Safety Data Sheets
NEPA	National Environmental Policy Act
PA/SI	preliminary assessment/site inspection
PFPP	Plutonium Fuels Pilot Plant
PNL	Pacific Northwest Laboratory
PRTR	Plutonium Recycle Test Reactor
RLW	radioactive liquid waste
RLWS	radioactive liquid waste system
RMW	radioactive mixed waste
SFIA	Surplus Facility Inventory and Assessment
Tri-Party Agreement	Hanford Federal Facility Agreement and Consent Order
TSCA	Toxic Substances Control Act
URO	Uranium Recovery Operations
WATS	Waste Acid Treatment System
XRF	x-ray fluorescence

CONTENTS

1.0 INTRODUCTION 1-1

2.0 BACKGROUND 2-1

3.0 300 AREA FACILITIES AND WASTE SITES IN OPERABLE UNIT 300-FF-2 . . . 3-1
- 3.1 300 AREA HISTORY AND BACKGROUND 3-1
- 3.2 GENERAL DESCRIPTION OF THE 300 AREA 3-1
- 3.3 300 AREA PROCESS SEWER AND LIQUID WASTE DISPOSAL SYSTEM . . . 3-8
  - 3.3.1 Introduction and Physical Layout 3-8
  - 3.3.2 Contributors 3-11
  - 3.3.3 Environmental Controls 3-12
  - 3.3.4 Past Activities 3-11
  - 3.3.5 Retention Process Sewer 3-17
  - 3.3.6 Contamination 3-17
  - 3.3.7 Sample Data 3-17
- 3.4 300 AREA SANITARY SEWER 3-18
- 3.5 UNDERGROUND PETROLEUM STORAGE TANKS 3-19
- 3.6 DOCUMENTED 300 AREA WASTE SITES 3-20
  - 3.6.1 300 IFBD (300 Area Interim Filter Backwash Disposal) . 3-20
  - 3.6.2 300 PHWSA (300 Area Powerhouse HWSA) 3-20
  - 3.6.3 300 RLWS 340 C (300 Area Radioactive Liquid Waste System and 340 Complex) 3-21
  - 3.6.4 300 RRLWS (300 Area Retired Radioactive Liquid Waste System) 3-26
  - 3.6.5 300 Area Solvent Evaporator 3-27
  - 3.6.6 300 VTS (300 Area Vitrification Test Site) 3-31
  - 3.6.7 300-1 (Old North Richland Automotive Maintenance Yard) 3-34
  - 3.6.8 303-K CWS (303-K Contaminated Waste Storage) 3-34
  - 3.6.9 303-M SA (303-M Storage Area) 3-39
  - 3.6.10 303-M UOR (303-M Uranium Oxide Facility) 3-40
  - 3.6.11 304 CF (304 Concretion Facility) 3-41
  - 3.6.12 304 SA (304 Storage Area) 3-45
  - 3.6.13 305-B SF (305-B Storage Facility) 3-45
  - 3.6.14 307 RB (307 Retention Basin) 3-46
  - 3.6.15 309-TW-1 (309-TW Tank No. 1) 3-51
  - 3.6.16 309-TW-2 (309-TW Tank No. 2) 3-51
  - 3.6.17 309-TW-3 (309-TW Tank No. 3) 3-51
  - 3.6.18 309-WS-1 (Reactor Ion Exchange Pit) 3-51
  - 3.6.19 309-WS-2 (Rupture Loop Ion Exchanger) 3-54
  - 3.6.20 311 MT1 (311 Methanol Tank 1) 3-55
  - 3.6.21 311 MT2 (311 Methanol Tank 2) 3-56
  - 3.6.22 311-TK-40 (311 Neutralized Waste Tank 1) 3-57
  - 3.6.23 311-TK-50 (311 Neutralization Waste Tank 2) 3-58
  - 3.6.24 313 Centrifuge 3-62
  - 3.6.25 313 CRO (313 Copper Remelt Operations) 3-62
  - 3.6.26 313 ESSP (313 East Side Storage Pad) 3-62
  - 3.6.27 313 FP (313 Filter Press) 3-63
  - 3.6.28 313 MT (313 Methanol Tank) 3-64
  - 3.6.29 313-TK-2 (313 Waste Acid Neutralization Tank) 3-65
  - 3.6.30 313 URO (313 Uranium Recovery Operations) 3-66

CONTENTS (Continued)

3.6.31 315 RSDF (315 Retired Sanitary Drain Field) 3-67
3.6.32 316-3 (307 Disposal Trenches) 3-67
3.6.33 316-4 (300 North Cribs) 3-69
3.6.34 323 Tank 1 3-70
3.6.35 323 Tank 2 3-71
3.6.36 323 Tank 3 3-72
3.6.37 323 Tank 4 3-75
3.6.38 324 SRPP (324 Sodium Removal Pilot Plant) 3-76
3.6.39 325 WTF (325 Waste Treatment Facility) 3-76
3.6.40 331 LSLDF (331 LSL Drain Field) 3-77
3.6.41 331 LSLT1 (331 LSL Trench 1) 3-77
3.6.42 331 LSLT2 (331 LSL Trench 2) 3-77
3.6.43 331-C HWSA (331-C Hazardous Waste Staging Area) . . . 3-78
3.6.44 333 ESHWSA (333 East Side HWSA) 3-78
3.6.45 333 ESHTSSA (333 East Side Heat Treat Salt Storage Area) 3-79
3.6.46 333 LHWSA (333 Laydown HWSA) 3-79
3.6.47 333-TK-7 (333 Chromium Treatment Tank 1) 3-80
3.6.48 333-TK-11 (333 Chromium Treatment Tank 2) 3-80
3.6.49 333 WSWOT (333 West Side Waste Oil Tank) 3-81
3.6.50 334 TFWAST (334 Tank Farm Waste Acid Storage Tank) . . 3-81
3.6.51 334-A-TK-B (334-A Waste Acid Storage Tank 1) 3-83
3.6.52 334-A-TK-C (334-A Waste Acid Storage Tank 2) 3-85
3.6.53 335 and 336 RSDF (335 and 336 Retired Sanitary Drain Field) 3-86
3.6.54 350 HWSA (350 Building Hazardous Waste Staging Area) 3-86
3.6.55 3712 USSA (3712 Uranium Storage Area) 3-87
3.6.56 3713 PWHWSA (3713 Paint Shop Hazardous Waste Satellite Area) 3-89
3.6.57 3713 SSHWSA (3713 Sign Shop Hazardous Waste Satellite Area) 3-90
3.6.58 3718-F BS (3718-F Burn Shed) 3-90
3.6.59 3718-F SF (3718-F Storage Facility) 3-92
3.6.60 3718-F TT1 (3718-F Treatment Tank 1) 3-93
3.6.61 3718-F TT2 (3718-F Treatment Tank 2) 3-93
3.6.62 3746-D SR (3746-D Silver Recovery) 3-94
3.6.63 BTTF (Biological Treatment Test Facilities) 3-94
3.6.64 PCTTF (Physical and Chemical Treatment Test Facilities) 3-95
3.6.65 TTTF (Thermal Treatment Test Facilities) 3-96
3.7 UNDOCUMENTED 300 AREA WASTE SITES 3-99
3.7.1 Solid Waste Burial Ground 3-99
3.7.2 366 and 366A Fuel Oil Bunkers 3-99
3.7.3 Process Sewer System 3-100
3.7.4 3705 Photography Building 3-100
3.7.5 3730 Gamma Neutron Irradiation Facility 3-100
3.7.6 Solid Waste Burial Ground (Early Burial Ground) . . 3-100
3.7.7 382 Pump House Underground Gasoline Tank 3-104
3.7.8 3709A Fire Station 3-105
3.7.9 325 Laboratory Diesel Fuel Tank 3-105

CONTENTS (Continued)

3.7.10 384 Powerhouse #6 Fuel Oil Spill 3-105
3.7.11 350 Building Sanitary Sewer Lift Station 3-106
3.7.12 309 Building Glycol Spill 3-106
3.7.13 Hanford Grout Lysimeter Facility 3-106
3.7.14 The 329 Biophysics Laboratory 3-106
3.7.15 314 Metal Extrusion Building 3-106
3.7.16 324 Building 3-107
3.7.17 331 Building Animal Waste Tanks and Trench 3-107
3.7.18 333 Building 3-109
3.7.19 306E Fabrication and Testing Laboratory, 306W Metal Fabrication Development Building 3-115
3.7.20 Burial Trench West of Process Trenches 3-116
3.7.21 DOE 351 Substation 3-116
3.7.22 Benton Switch Substation 3-117
3.7.23 H. J. Ashe Substation Switchyard 3-120
3.7.24 H. J. Ashe Substation Oil/Water Separator and Dry Well, BPA SWMU #13 3-123
3.7.25 H. J. Ashe Substation Storage Area, BPA SWMU #12 . . 3-123
3.7.26 Cutup Oil Dump 3-125
3.7.27 Aluminum Recycle Staging Area 3-125
3.7.28 Solid Waste Site Near 314 Building 3-127
3.7.29 Solid Waste Site Near 303-G Building 3-127

4.0 400 AREA FACILITIES AND WASTE SITES IN THE 300-FF-2 OPERABLE UNIT 4-1
4.1 400 AREA HISTORY AND BACKGROUND 4-1
4.2 FAST FLUX TEST FACILITY DESCRIPTION AND HISTORY 4-1
4.2.1 Reactor Configuration 4-10
4.2.2 Reactor Fuel Pins and Assemblies 4-11
4.2.3 Fuel Pin Breaches 4-12
4.2.4 Molten Sodium Heat Transport System 4-12
4.2.5 Cooling Towers 4-16
4.2.6 Gaseous Emissions and the Combined Exhaust System . . 4-20
4.2.7 Reactor Process Wastewater and Cooling Water Effluent 4-22
4.2.8 FFTF Radioactive Liquid Waste System 4-22
4.2.9 Problems Encountered During Operation 4-23
4.2.10 Storage of Unirradiated Fuel 4-24
4.2.11 Hazardous Materials Stored at FFTF 4-25
4.3 FUELS AND MATERIALS EXAMINATION FACILITY 4-28
4.4 400 AREA WATER SUPPLY 4-31
4.5 UNDERGROUND PETROLEUM TANKS 4-33
4.5.1 Documented Information About 400 Area Underground Storage Tanks 4-33
4.5.2 Visual Observations 4-37
4.6 400 AREA SANITARY WASTES 4-40
4.7 NONRADIOACTIVE LIQUID WASTES 4-44
4.8 NONRADIOACTIVE SOLID WASTES 4-44
4.9 RADIOACTIVE SOLID WASTES 4-44
4.10 DOCUMENTED 400 AREA WASTE SITES 4-45
4.10.1 400 FD1A (400 Area French Drain 1A) 4-45

CONTENTS (Continued)

4.10.2 400 FD1B (400 Area French Drain 1B) 4-46
4.10.3 400 FD2 (400 Area French Drain 2) 4-46
4.10.4 400 FD3 (400 Area French Drain 3) 4-48
4.10.5 400 FD4 (400 Area French Drain 4) 4-50
4.10.6 400 FD5 (400 Area French Drain 5) 4-51
4.10.7 400 FD6 (400 Area French Drain 6) 4-53
4.10.8 400 FD7 (400 Area French Drain 7) 4-55
4.10.9 400 FD8 (400 Area French Drain 8) 4-56
4.10.10 400 FD9 (400 Area French Drain 9) 4-58
4.10.11 400 FD10 (400 Area French Drain 10) 4-59
4.10.12 400 FD10A (400 Area French Drain 10A) 4-61
4.10.13 400 PPSS (400 Area Process Pond and Sewer System) . 4-62
4.10.14 400 RFD (400 Area Retired French Drains) 4-71
4.10.15 400 RSP (400 Area Retired Sanitary Pond) 4-72
4.10.16 400 RST (400 Area Retired Septic Tanks) 4-73
4.10.17 400 SBT (400 Area Sand Bottom Trench) 4-77
4.10.18 400-1 (400-1 Dump Site) 4-79
4.10.19 403 FD (403 French Drain) 4-80
4.10.20 427 HWSA (427 Building Fuel Cycle Plant HWSA) . . . 4-82
4.10.21 437 MASF (437 Maintenance and Storage Facility) . . 4-84
4.10.22 4608 SS (4608 Sanitary Sewer) 4-86
4.10.23 4608 STF (4608 Sanitary Tile Field) 4-87
4.10.24 4713-B FD (4713-B French Drain 4-88
4.10.25 4713-B HWSA (4713-B Hazardous Waste Staging Area) . 4-89
4.10.26 4721 FD (4721 French Drain) 4-92
4.10.27 4722 PSHWSA (4722 Paint Shop HWSA) 4-92
4.10.28 4722-B FD (4722-B French Drain) 4-93
4.10.29 4722-C FD (4722-C French Drain) 4-94
4.10.30 4831 LHWSA (4831 Laydown HWSA) 4-96
4.10.31 4843 AMSF (4843 Alkali Metal Storage Facility) . . . 4-97
4.11 UNDOCUMENTED 400 AREA WASTE SITES 4-102
4.11.1 Altitude Valve Pit T-58 French Drain 4-102
4.11.2 Altitude Valve Pit T-87 French Drain 4-102
4.11.3 Altitude Valve Pit T-330 French Drain 4-103
4.11.4 Burn Pit 4-103
4.11.5 Concrete Batch Plant 4-104
4.11.6 Construction Material Dumping Area 4-104
4.11.7 Diesel Fuel Tank Fitting Leak 4-105
4.11.8 Material Dumping Area and Building Foundation . . 4-108
4.11.9 Sanitary Waste Tie-Line from the 400 Area to the Washington Public Power Supply System 4-109
4.11.10 Septic Tank or Cistern 4-111
4.11.11 Suspected Burial Ground 4-112
4.11.12 Waste Dumping Site 4-113
4.11.13 Well Pump P-14 French Drain 4-115
4.11.14 Well Pump P-15 French Drain 4-116
4.11.15 Well Pump P-16 French Drain 4-116
4.11.16 400 Area Storm Drain Outfall Trench 4-117
4.11.17 400 Area Retired Portable Sanitary Sewage Treatment Plant 4-117
4.11.18 451-A Substation and B/N Plant French Drain . . . 4-119

CONTENTS (Continued)

4.11.19 400 FD11 (400 Area French Drain 11) 4-119
4.11.20 4607 SS (4607 Sanitary Sewer) 4-120
4.11.21 4607 STF (4607 Sanitary Tile Field) 4-123
4.11.22 4607 SSL (4607 Sanitary Sewer Lagoon) 4-125
4.11.23 4713-B Loading Dock French Drain 4-128
4.11.24 Buried Construction Waste Area Number 1 4-128
4.11.25 Buried Construction Waste Area Number 2 4-128
4.11.26 440 HWTSF (440 Hazardous Waste Temporary Storage Facility) 4-129
4.11.27 4831 FSF (4831 Flammable Storage Facility) . . . 4-131
4.12 LIST OF 400 AREA BUILDINGS, FACILITIES, AND STRUCTURES . . 4-132

5.0 300-FF-2 UNPLANNED RELEASES 5-1
5.1 UPR-300-1 (307 TO 340 WASTELINE LEAK) 5-1
5.2 UPR-300-2 5-1
5.3 UPR-300-4 5-2
5.4 UPR-300-5 5-2
5.5 UPR-300-7 5-8
5.6 UPR-300-10 5-8
5.7 UPR-300-11 5-8
5.8 UPR-300-12 5-9
5.9 UPR-300-13 5-10
5.10 UPR-300-14 5-10
5.11 UPR-300-17 5-14
5.12 UP4-300-18 5-14
5.13 UPR-300-38 5-14
5.14 UPR-300-39 5-15
5.15 UPR-300-40 5-16
5-16 UPR-300-41 (340 BUILDING PHOSPHORIC ACID SPILL) 5-17
5-17 UPR-300-42 (300 AREA POWERHOUSE FUEL OIL SPILL) 5-17
5-18 UPR-300-43 (300 AREA SOLVENT REFINED COAL SPILL) 5-18
5.19 UPR-300-44 (URANIUM-BEARING WASTE ACID ETCH SPILL) 5-18
5.20 UPR-300-45 (303-F BUILDING URANIUM BEARING ACID SPILL) 5-18
5.21 UPR-300-46 5-19
5.22 UPR-400-1 (400 AREA COOLANT SPILL) 5-19
5.23 UPR-600-1 5-20
5.24 UPR-600-2 5-21
5.25 UPR-600-3 5-21
5.26 UPR-600-4 5-22
5.27 UPR-600-5 5-22
5.28 UPR-600-6 5-23
5.29 UPR-600-7 5-23
5.30 UPR-600-8 5-23
5.31 UPR-600-9 5-24
5.32 UPR-600-10 5-24
5.33 UPR-600-11 5-25
5.34 UNPLANNED RELEASES: POLYCHLORINATED BIPHENYLS FROM FFTF TRANSFORMERS 5-25
5.35 UNPLANNED RELEASES: DICHLORODIFLUOROMETHANE 5-27

6.0 600 AREA WASTE SITES IN 300-FF-2 OPERABLE UNIT 6-1

CONTENTS (Continued)

6.0 600 AREA WASTE SITES IN 300-FF-2 OPERABLE UNIT 6-1
6.1 600-1, OR JA JONES #1 (LIQUID DUMP SITE) 6-1
6.2 600-21 (WPPSS "WINDROW" SITE) 6-2
6.3 600-22 (UFO LANDING SITE) 6-4
6.4 600-23 (GRAVEL PIT 2 SOUTH) 6-7
6.5 618-1 (SOLID WASTE BURIAL GROUND NO. 1) 6-7
6.6 618-2 (SOLID WASTE BURIAL GROUND NO. 2) 6-9
6.7 618-3 (SOLID WASTE BURIAL GROUND NO. 3) 6-10
6.8 618-6 (SOLID WASTE BURIAL GROUND NO. 6) 6-12
6.9 618-7 (BURIAL GROUND NO. 7) 6-14
6.10 618-8 (SOLID WASTE BURIAL GROUND NO. 8) 6-17
6.11 618-9 (300 WEST BURIAL GROUND) 6-18
6.12 618-10 (300 NORTH SOLID WASTE BURIAL GROUND) 6-25
6.13 618-11 (300 WYE BURIAL GROUND) 6-27
6.14 618-13 (303 BUILDING AREA CONTAMINATED SOIL BURIAL SITE 6-31
6.15 JA JONES 31 BURIAL GROUND 6-34

7.0 DIRECTORY OF 300 AREA BUILDINGS, FACILITIES, AND STRUCTURES 7-1

8.0 REFERENCES 8-1

9.0 BIBLIOGRAPHY 9-1

10.0 HANFORD SITE DRAWINGS REFERENCED IN TEXT 10-1

11.0 PHOTOGRAPHS REFERENCED IN TEXT 11-1

APPENDIXES:

A. MISCELLANEOUS REFERENCE MATERIALS . . . . . A-i
B. MAPS AND DRAWINGS . . . . . B-i
C. MISCELLANEOUS REFERENCE MATERIALS FOR CHAPTER 4.0 . . . . . C-i

FIGURES

3-1. Aerial Photograph of the 300 Area, April 1955 3-2
3-2. Facilities in the 300 Area 3-3
3-3A. 300 Area Operating Plan: Process Sewer Lines 3-13
3-3B. 300 Area Operating Plan: Process Sewer Lines 3-15
3-4. The 300 Area Radioactive Liquid Waste System 3-22
3-5. Contamination on the 340 Tank Underground Vault Floor 3-23
3-6. Typical Rail Car Loadout Facility, Similar to 340 Complex 3-24
3-7. 300 Area Solvent Evaporator 3-27
3-8. 1988 Photograph of Solvent Evaporator Closure Site 3-30
3-9. Terra-Vit Melter at the 300 Area Vitrification Test Site 3-33
3-10. 300 Area Vitrification Test Site 3-33
3-11. Plan View of the 303-K Facility Showing the Years in Which Sections of the Facility Were Installed 3-35
3-12. 303-K Storage Facility 3-37
3-13. 303-K Storage Facility 3-38
3-14. 303-M Outdoor Storage Area Drum Location (on Left) and 303-M Uranium Oxide Building 3-40
3-15. 303-M Uranium Oxide Facility Incinerator 3-41
3-16. 304 Concretion Facility Building and Storage Area 3-42
3-17. 304 Concretion Unit 3-43
3-18. Burned Billets in the 304 Facility 3-45
3-19. Retention Process Sewer 3-47
3-20. Transfer 307 Basins Contents to Vault Tanks Schematic Diagram . . 3-48
3-21. Portion of the 300 Area Containing the 307 Disposal Trenches (316-3) and the 307 Retention Basin 3-49
3-22. 309-WS-2 Rupture Loop Ion Exchange Vault 3-55
3-23. 311 Methanol Tanks 1 (Left) and 2 (Right) Being Removed in August 1989 3-56
3-24. The 311-TK-40 Neutralized Waste Tank (Horizontal) and the 311-TK-50 Waste Acid Tank (Vertical) 3-57
3-25. 311 Tank Farm, 333 Tank Farm, and 313 Building Chemical Area . . . 3-59
3-26. 313 Centrifuge in the 313 Building Chemical Area with Tank 11 . . 3-61
3-27. 313 Filter Press in the 313 Building Chemical Area 3-63
3-28. 313 Methanol Tank Removal, August 1989 3-65
3-29. 313 Waste Acid Neutralization Tank (313-TK-2) 3-66
3-30. Site of the 300 North Cribs (316-4) 3-70
3-31. Historical Photograph Showing the Installation of the 321 Building Waste Tanks, 1944 3-71
3-32. The 321 Building, the 329 Building, and 323 Tanks 1 Through 4 . . 3-73
3-33. The East Side of the 333 Building and the 333 East Side Hazardous Waste Storage Area, August 1969 3-79
3-34. The 333-TK-7 and 333-TK-11 Tanks in the 333 Building 3-81
3-35. The 334 Tank Farm Prior to Removal of the Waste Acid Tank 3-82
3-36. The 334-A Building, 1987 3-84
3-37. The inside of the Main Floor in the 334-A Building 3-84
3-38. 334-A Waste Acid Storage Tanks 1 and 2 (Horizontal on the Right Side of Photograph) 1989 3-85
3-39. The 350 Building Hazardous Waste Staging Area 3-87
3-40. The 3712 Building, Draining into a Below Grade Railroad Track after the 1979 Fire 3-88
3-41. 3712 Uranium Storage Area after 1979 Fire 3-89

FIGURES (Continued)

3-42. The 3718-F Alkali Metal Storage Facility Showing the Burn Shed and Fume Scrubber on the Right and Treatment Tanks 1 and 2 on the Pad in Front of them, 1991 3-91
3-43. Biological Treatment Technology Being Developed, 1988 3-95
3-44. Aerial Photograph of the Thermal Treatment Test Facility, 1986 . . 3-97
3-45. Waste Vitrification Prototype Equipment in the 324 Building, 1986 3-98
3-46. Aerial Photograph of the 300 Area, Showing the Early Burial ground, October 1950 3-101
3-47. Aerial Photograph of the 300 Area, Showing a Faint Outline of the Early Burial Ground, March 1954 3-102
3-48. Aerial Photograph of the 300 Area, Showing the Uranium-Contaminated Aluminum Recycling Area, Date Unknown 3-103
3-49. Aerial Photograph of the 331 Building, the 331 Building Animal Waste Tanks, and the 331 Building Trench 3-108
3-50. Two of the Preweld Etch Tanks Located in the 333 Building: "HF Nitric Acid" and "Tap Water Rinse 3-110
3-51. Two of the Final Etch Tanks Located in the 333 Building: "D-I-W Rinse" and "Tap Water Rinse." 3-111
3-52. Three of the Uranium Billet Cleaning Tanks Located in the 333 Building: "Degreaser," "Nitric Acid," and "Tap Water Rinse 3-112
3-53. Two of the Pre-Braze Etch Tanks Located in the 333 Building: "D-I-W Rinse" and "Tap Water Rinse." 3-113
3-54. 1985 Photograph Showing Zircaloy-2 and Cu-Si Component Cleaning Tanks being Used in the 333 Building 3-114
3-55. Copper Strip and Chemical Milling Tanks Located in the 333 Building: "Nitric Acid," "Static Water Rinse," "Nitric-Sulfuric Acid," and "Tap Water Rinse." 3-115
3-56. DOE 351 Substation 3-117
3-57. Benton Switch Substation 3-118
3-58. Insulating Oil Leakage Below Tank 3-119
3-59. Insulating Oil Leakage Below Tank Valve 3-119
3-60. H. J. Ashe Substation Switchyard 3-120
3-61. H. J. Ashe Substation Switchyard 3-121
3-62. H. J. Ashe Substation Storage Area Building 3-124
3-63. H. J. Ashe Substation Storage Area, Sump Under Grated Floor . . 3-124
3-64. Aerial Photograph of the 300 Area Showing the Aluminum Recycle Staging Area 3-126
3-65. Underground Radioactive Contamination Along Ginko 3-128
4-1. Buildings, Facilities, and Structures That Have Been Located in the 400 Area 4-3
4-2. Buildings, Facilities, and Structures Located in the 400 Area . . 4-5
4-3. Aerial Photograph of the 400 Area 4-7
4-4. Historical Photograph of the Fast Flux Test Facility Under Construction 4-8
4-5. Photograph of the Fast Flux Test Facility, 1994 4-9
4-6. 408-C West Dump Heat Exchangers, 1994 4-13
4-7. Fuels and Materials Examination Facility 4-29
4-8. Flow Diagram for the 400 Area Water Supply 4-32
4-9. 482A/T-58 Water Storage Tank and Equipment Room, 1994 4-33

FIGURES (Continued)

4-10. Underground Fuel Oil Tank East of the 408-A East Dump Heat Exchangers, 1994 4-37
4-11. Underground Fuel Oil Tank South of the 4710 Building, 1994 4-38
4-12. Underground Fuel Oil Tank East of the T-58 and T-87 Water Tanks, 1994 4-39
4-13. Underground Fuel Oil Tank Southeast of the T-58 and T-87 Water Tanks, 1994 4-39
4-14. Underground Fuel Oil Tank South of the 408-B South Dump Heat Exchangers 4-40
4-15. 400 Area French Drain 2 (400 FD2), 1994 4-48
4-16. 400 Area French Drain 3 (400 FD3), 1994 4-49
4-17. 400 Area French Drain 4 (400 FD4), 1994 4-51
4-18. 400 Area French Drain 5 (400 FD5), 1994 4-52
4-19. Area French Drains 5, 6, and 11 (400 FD5, 400 FD6, and 400 FD11), 1994 4-53
4-20. 400 Area French Drain 6 (400 FD6), 1994 4-54
4-21. 400 Area French Drain 7 (400 FD7), 1994 4-56
4-22. Potential Site of 400 Area French Drain 8 (400 FD8), 1994 4-57
4-23. Potential Site of 400 Area French Drain 9 (400 FD9), 1994 4-59
4-24. 482A/T-58 Water Storage Tank Drain, Possibly 400 Area French Drain 10 (400 FD10), 1994 4-61
4-25. 400 Area Process Pond and Sewer System Control Structure, 1994. 4-65
4-26. 400 Area Process Pond and Sewer System (400 PPSS) 4-68
4-27. The 4608B and 4608C Percolation Ponds (400 PPSS) 4-70
4-28. Diversion Box and the 4608C Percolation Pond (400 PPSS), 1994 4-71
4-29. The Possible Location of a 400 Area Retired French Drain (400 RFD), 1994 4-72
4-30. 400 Area Retired Septic Tanks (400 RST): First Tank Site, 1994 4-75
4-31. 400 Area Retired Septic Tanks (400 RST): Second Tank Site, 1994 4-76
4-32. 400 Area Retired Septic Tanks (400 RST): Probable Third Tank Site, 1994 4-76
4-33. Cooling Tower Overflow Trench, 1994 4-33
4-34. Cooling Tower Overflow Trench, 1994 4-79
4-35. 400-1 Dump Site, 1994 4-80
4-36. Drain From the 403 Building (403 FD), 1994 4-82
4-37. The Reusable Oil and Empty Drum Storage Area, 1994 4-84
4-38. 437 Maintenance and Storage Facility (437 MASF) 4-85
4-39. 4608 Sanitary Sewer Septic Tank and Tile Drain Field (4608 SS and 4608 STF), 1994 4-87
4-40. 4713-B French Drain (4713-B FD), 1994 4-89
4-41. 4713-B Hazardous Waste Staging Area (4713-B HWSA), North Portion, 1994 4-91
4-42. 4713-B Hazardous Waste Staging Area (4713-B HWSA), South Portion, 1994 4-91

FIGURES (Continued)

4-43. 4722 Paint Shop Hazardous Waste Staging Area (4722 PSHWSA), 1994 4-93
4-44. 4722-C French Drain (4722-C FD), 1994 4-96
4-45. 4843 Alkali Metal Storage Facility (4843 AMSF): Dangerous Alkali Metal Storage Area 4-98
4-46. 4843 Alkali Metal Storage Facility (4843 AMSF): Mixed Alkali Metal Storage Area 4-98
4-47. The 4843 Alkali Metal Storage Facility (4843 AMSF) Floor Plan 4-99
4-48. 4843 Alkali Metal Storage Facility (4843 AMSF), Looking Southwest, 1987 4-101
4-49. 4843 Alkali Metal Storage Facility (4843 AMSF), Looking Northwest, 1994 4-101
4-50. Burn Pit, 1994 4-104
4-51. Construction Material Dumping Area, 1994 4-105
4-52. Excavated Soil at the Site of the Diesel Fuel Tank Fitting Leak, May 1994 4-107
4-53. Bioremediation Trench Being Dug Northeast of the Diesel Fuel Tank Fitting Leak Site, May 1994 4-107
4-55. Material Dumping Area and Building Foundation, 1994 4-108
4-55. Sanitary Waste Tie-Line from the 400 Area to the Washington Public Power Supply System, 1994 4-111
4-56. Septic Tank or Cistern, 1994 4-112
4-57. Suspected Burial Ground, 1994 4-113
4-58. Formerly Fenced Area at the Waste Dumping Site, 1994 4-114
4-59. Miscellaneous Waste at the Waste Dumping Site, 1994 4-114
4-60. Sagebrush and a Garbage Bag of Leaves at the Waste Dumping Site, 1994 4-115
4-61. 400 Area Drainage Trench, 1994 4-117
4-62. 4607 Sanitary Sewer (4607 SS) Septic Tank Inlet, 1994 4-121
4-63. 4607 Sanitary Sewer (4607 SS) Septic Tank, 1994 4-121
4-64. 4607 Sanitary Sewer Lagoon (4607 SSL), 1994 4-127
4-65. 4831 Flammable Storage Facility 4-132
(4831 FSF), 1994.
5-1. Unplanned Releases UPR-300-1, UPR-300-2, UPR-300-5, UPR-300-10, UPR-300-11, UPR-300-12, and UPR-300-41 5-3
5-2. Unplanned Releases UPR-300-4 and UPR-300-43 5-5
5-3. Unplanned Releases UPR-300-38, UPR-300-44, and UPR-300-46, and the DOE 351 Substation 5-11
5-4. The UPR-300-14 Site, March 1994 5-13
5-5. The UPR-300-39 at the 311 Tank Farm 5-16
5-6. WATS Pipe Trench at the UPR-300-40 Site Exposed, 1985 5-17
5-7. The UPR-400-1 Site, April 1994 5-20
6-1. The 600-1 or J. A. Jones #1 Liquid Dump Site in the Depression to the Left of the Sign, March 1994 6-2
6-2. The WPPSS "Windrow" Site (600-21) 6-3
6-3. The UFO Landing Site (600-22) 6-4
6-4. Aerial Photograph of the UFO Landing Site (600-22) 6-6
6-5. Aerial Photograph Showing the Location of the UFO Landing Site (600-22) in Relation to the 300 Area 6-8

FIGURES (Continued)

6-6. The 618-3 Burial Ground, Its Extension, and the 618-2 Burial Ground 6-11
6-7. Historical Photograph of Solid Waste Burial Ground No. 3 (618-6) 6-12
6-8. Aerial Photograph Showing the Location of Solid Waste Burial Ground No. 6 (618-6), October 1951 6-13
6-9. Burial Ground No. 7 (618-7) 6-15
6-10. 1994 Photograph of Burial Ground No. 7 (618-7) 6-17
6-11. Aerial Photograph Showing Solid Waste Burial Ground No. 8 (618-8), October 1952 6-19
6-12. Aerial Photograph Showing Solid Waste Burial Ground No. 8 (618-8), March 1954 6-20
6-13. Historical Photograph of the 300 West Burial Ground (618-9) Prior to Cleanup. 6-21
6-14. The 300 West Burial Ground (618-9) 6-22
6-15. Waste Disposal Sections of the 618-9 Burial Ground Prior to Cleanup 6-24
6-16. 300 North Solid Waste Burial Ground (618-10) 6-25
6-17. Oily Substance Uncovered During Surface Stabilization at the 300 North Solid Waste Burial Ground (618-10) 6-26
6-18. The 300 Wye Burial Ground (618-11) Prior to Surface Stabilization 6-27
6-19. The Construction of Pipe Units at the 300 Wye Burial Ground (618-11) 6-29
6-20. The Construction of Large-Diameter Caissons at the 300 Wye Burial Ground (618-11) 6-30
6-21. Aerial Photograph Showing the 618-13 Soil Disposal Site, June 1962 6-32
6-22. Aerial Photograph Showing the Earthen Mound and Building Foundation Remaining at the 618-13 Soil Disposal Site 6-33

TABLES

2-1. Operable Unit 300-FF-2 Waste Site Hazardous Ranking System Migration Scores 2-2
2-2. Summary of 300-FF-2 Operable Unit Waste Sites 2-3
3-1. Facilities Connected to the 300 Area Process Sewer System (WHC 1990) 3-8
3-2. Underground Petroleum Storage Tanks in the 300 Area, 07/07/94 . . 3-19
3-3. Solvent Evaporator Inductively Coupled Plasma-Atomic Emission Spectroscopy Results 3-28
3-4. Chronology of the 300 Area Solvent Evaporator Closure Activities . 3-31
3-5. Materials Used or Stored in the 303-K Building, 1953 to 1977 . . . 3-36
3-6. Summary of the Operational History of the 303-K Building 3-38
3-7. Boron Ion Exchange Water Analysis Results 3-52
3-8. Lower Vault Water Sample Analytical Results 3-54
3-9. Hazardous Chemical Inventory for 316-3 (307 Process Trenches) . . 3-68
3-10. Wastes Disposed at the 3718-F Facility (DOE-RL 1992a) 3-91
3-11. Waste Stored at the 3718-F Facility (DOE-RL 1992a) 3-92
3-12. Releases to the Benton Switch Substation 3-118
3-13. Releases to the Switchyard 3-122
4-1. Synoptic Chronology of Fast Flux Test Facility Activities 4-10
4-2. Radiochemical Data from FFTF Sodium Coolant Sampling (Ci/g) . . . 4-14
4-3. 400 Area Process Water Chemical Additives 4-17
4-4. Constituents of the 400 Area Secondary Cooling Water 4-18
4-5. Annual Average Fast Flux Test Facility Airborne Release Rates for 1988. 4-21
4-6. 400 Area Radioactive Airborne Effluent Release Data for Calendar Year 1988. 4-22
4-7. Hazardous Substances Stored at FFTF, 1991 4-26
4-8. Inventory of Hazardous Substances Stored in FMEF 4-30
4-9. Active Underground Petroleum Storage Tanks in the 400 Area, May 1994 4-34
4-10. Inactive Underground Petroleum Storage Tanks in the 400 Area 4-35
4-11. 400 Area Process Sewer Analytical Summary for Calendar Year 1989. 4-67
4-12. List of 400 Area Facilities and Structures 4-133
5-1. Radiochemistry Results of the Contaminated Water 5-7
5-2. PCB-Containing Transformers at FFTF 5-26
6-1. Shipments to 618-10 (300 North) Burial Ground (September 1960 through June 1962) 6-27
6-2. Shipments to 618-11 Burial Ground, March 1962 through December 1967 6-31
7-1 300 Area Buildings, Facilities, and Structures 7-1

1.0 INTRODUCTION

This report has been prepared in support of the Environmental Restoration program at the U.S. Department of Energy's (DOE) Hanford Site near Richland, Washington. It provides a technical baseline and characterization of waste sites located in the 300-FF-2 Operable Unit and results from an environmental investigation undertaken by the Bechtel Hanford, Inc. (BHI) History Office in support of the Environmental Restoration Engineering Function. It is based upon the review and evaluation of numerous Hanford Site current and historical reports, drawings, and photographs, supplemented by site inspections and employee interviews. No intrusive field investigation or sampling was conducted specifically for this report.

The 300-FF-2 Operable Unit encompasses liquid and solid waste sites, both documented and undocumented, in the 300, 400, and portions of the 600 Area of the Hanford Site. Waste sites described in this document include structures, contaminated equipment and facilities, waste distribution systems, french drains, solid waste burial grounds, septic tanks, drainfields, unplanned releases, trenches, and other types of sites. Each site is described separately, and photographs and drawings have been included when available.

A limited environmental summary for the 300 Area is provided in Chapter 2.0. Comprehensive environmental summaries have not been provided for the 300, 400, and 600 Areas. However, such summaries may be found in *Hanford Site National Environmental Policy Act (NEPA) Characterization* (Cushing 1988), which describes Hanford's geology and soils, meteorology, hydrology, land use, population, and air quality.

2.0 BACKGROUND

The 300-FF-2 Operable Unit encompasses 144 liquid and solid waste sites, both documented and undocumented, in the 300, 400, and portions of the 600 Area of the Hanford Site. Eighty of these waste sites are addressed in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement, Ecology et al. 1989). Waste sites described here include structures, decommissioned facilities, contaminated equipment and facilities, waste distribution systems, french drains, solid waste burial grounds, septic tanks, drainfields, unplanned releases, trenches, and other types of sites. Figure B-1 in Appendix B shows the waste sites located in the 300-FF-2 Operable Unit.

Chapter 3.0 characterizes the 300-FF-2 documented and previously undocumented waste sites found in the 300 Area of the Hanford Site. Chapter 4.0 covers those located in the 400 Area. Chapter 5.0 contains characterizations of unplanned releases (spills), and Chapter 6.0 covers the documented and previously undocumented waste sites located in the 600 Area. Each waste site is described separately, and photographs and drawings have been included when available.

All Hanford coordinates listed in this document are approximate and have been taken from several different operable unit maps and drawings. Coordinates typically represent the location of the center of the facility or waste site, except where noted. Units of measure have been reported as they appear in reference documents and have not been converted to or from the metric system.

Some of the 300-FF-2 waste sites have been evaluated as part of the preliminary assessment/site inspection (PA/SI) activities performed at DOE. They have been assigned Hazardous Ranking System (HRS) migration scores under the hazard ranking system evaluation procedures spelled out under the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) in 40 CFR 300. The HRS migration scores for these sites are summarized in Table 2-1.

Nine of the fifteen waste sites listed in Chapter 3.0 have been awarded HRS migration scores of 0.0. These include the following, which are reported in Stenner et al. (1988):

JAJ-1	618-1	618-2
618-3	618-8	618-9
618-10	618-11	618-13

It should be noted that since the HRS migration scores were published in 1988, additional information has been accumulated on some of the waste sites that includes larger and better characterized radiological inventories and evidence of unplanned releases to the environment. Higher ranking scores might have resulted if the new data had been available to the HRS evaluators. The reader is cautioned that an HRS migration score of 0.0 does not suggest the absence of hazard.

Table 2-2 provides a summary of documented and previously undocumented waste sites in the 300-FF-2 Operable Unit. More detailed information, including references, is included in later sections of this report.

Table 2-1. 300-FF-2 Operable Unit Waste Site Hazardous Ranking System Migration Scores. (Stenner et al. 1988)

Waste Site Number	HRS Score	Waste Site Number	HRS Score
316-3	79.28	UPR-300-5	14.66
316-4	16.60	UPR-300-11	17.43
618-1	0.00	UPR-300-12	62.88
618-2	0.00	UPR-300-13	59.74
618-3	0.00	UPR-300-14	9.22
618-8	0.00	UPR-300-17	22.59
618-9	0.00	UPR-300-38	62.88
618-10	0.00	UPR-300-39	44.02
618-11	0.00	UPR-300-40	59.74
618-13	0.00	UPR-600-1	13.23
OJA Jones 1	0.00	UPR-600-2	17.07
UPR-300-1	26.60	UPR-600-3	16.17
UPR-300-2	18.27	UPR-600-10	11.88
UPR-300-4	22.12	UPR-600-11	20.45

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
300 AREA FACILITIES										
Process Sewer System	1943-present, Active	Liquid and particulates in solution disposed to the process sewer included all of the metallic and chemical components of the fuel fabrication process and all of the separations process chemicals and solutions used in the bismuth phosphate, REDOX, Metal Recovery, PUREX, and RECUPLEX processes. Every process drain, pipe, pipe trench and sewer manhole in the 300 Area may be expected to contain some degree of process waste buildup.	300	Unknown	Sewer	Mixed	Liquid	Will be connected to TEDF in the future	Acids, metals, solvents, rad, and fission products	No
Potential Other 300-FF-2 Contamination	1943-Now, Active and Inactive	This "waste site" is intended to include the potential 300-FF-2 Operable Unit contamination not included in the formally identified waste sites. As such, it includes soils beneath and between buildings and other facilities throughout the operable unit.	300 400 600	Unknown	Primarily soils between and beneath buildings	All	All	Unknown	All	Yes/No, Unknown until specific waste sites are identified
300 Area Interim Filter Backwash Disposal	January 7,1987 to April 14, 1987, Inactive	In the inactive gravel pit west of the 300 Area, the unit received 650,000 gal of water and nonhazardous alum from backwashing filters used to filter water for sanitary and process use. Analysis of the backwash has shown it to be nonhazardous.	300	650 gal water, unknown quantity of alum	Neutrali-zation Unit	Nonhaz-Nonrad	Liquid	Unknown	Alum, filter backwash solids, nonhaz	Yes
300 Area Powerhouse HWSA	1940s - present, Active	This area is no longer used to stage hazardous wastes. The outside area typically contains nonregulated waste oils.	300	Unknown	Satellite Area	Nonhaz-Nonrad	Liquid	Unknown	Non-regulated waste oils	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
300 Area Radioactive Liquid Waste System (RLWS) and 340 Bldg. Complex	1954 to present, Active	Piping is double-walled with leak detection systems between the inner and outer pipes. Waste is accumulated in stainless steel tanks at the 340 Complex. An underground vault houses two 15,000-gal neutralization tanks. The 340 Bldg. provides a control room and decontamination (decon) facility. The 340-A Bldg. contains six aboveground liquid radioactive waste storage tanks. The unit receives radioactive wastes from various 300 Area labs. The waste is stored for less than 90 days and is then transported to the 200 West Area. The site consists of 43 individual facilities. Underground tanks are enclosed in concrete vaults and have leak detection systems. Aboveground tanks are enclosed in a building and located in a concrete catch basin. Tanks are continuously monitored for leaks.	300	Unknown	Sewer	Mixed	Liquid	Unknown	Radioactive, Acids, Bases	No
300 Area Retired RLWS	1954 to 1975, Inactive	The pipes are buried 10 ft below ground surface (BGS). The unit received radioactive wastes from various 300 Area facilities. Approximately 100,000 gal/yr were received by the sewer. The pipe contains residual radioactive contamination. The pipe is stainless steel and is not expected to corrode significantly in the alkaline soils of the 300 Area. System had history of leakage beginning in 1958-1959 during the west addition to the 327 Building. Several trucks of contaminated soils measuring up to 500 mrad/hr were removed and buried in the 300 Area burial grounds.	300	~4062 ft L	Sewer	Mixed	Liquid	Pipes were drained and left in-place	Radioactive and chemical wastes from Research and Development (R&D) Laboratories	No

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
300 Area Solvent Evaporator	1975 to November 1985, Inactive	The facilities located behind the 333 Bldg. at the east end of the 334 Bldg. The unit was a treatment tank for radioactively contaminated spent solvents generated in the fuel fabrication process in the 300 Area. Treatment of the wastes occurred by evaporation in a Brooks Load Lugger tank. The unit received ~600 gal/yr solvents and steam condensate. The solvents consisted mainly of spent TCE, PCE, 1,1,1-TCA, and an ethyl acetate bromine solution. Paint shop solvents that were potentially treated include MEK, methylene chloride, and petroleum naphtha. Treatment tank was located on top of the 618-1 Burial Ground.	300	Tank 96 in. L, 65 in. W (top), 50 in. W (bottom), and 35 in. D	Evaporator	Mixed	Liquid	Part A Permit, Interim Closure Plan, evaporator buried in 200 W Burial Ground in 1986	Uranium contaminated solvents	No?
300 Area Vitrification Test Site (VTS)	1983 to 1986, Inactive	The site is west of the 300 Area. Vitrification was performed from 1983 to 1986 on wastes containing various fission product radionuclides. The site was decontaminated to background levels, so no release due to past activities is possible. A large-scale melter known as the Terra-Vit was constructed at this site in 1993 for the vitrification of slightly contaminated soil particles. It remains inactive, and a start date for operation has not been determined.	300	340 ft by 280 ft	Test treatment or support facility	Mixed	Solid	All contaminated soil and equip have been removed from the site. Field rad surveys verify background levels.	Wastes vitrified in the 1980's included ^{241}Am, ^{239}Pu, ^{238}Pu, ^{137}Cs, ^{106}Ru, ^{90}Sr, and ^{60}Co. Now removed	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessibility
300-1 (Auto Maintenance Yard)	Inactive	~1,000 ft S of the 300 Area Pig Yard, 400 ft west of the River, just W of the Purge Water Satellite Accumulative Area. The unit consist of three open bulldozer cuts, 5 ft by 10 ft by 4 ft deep. A slab of asphalt 15 ft by 20 ft is also present. This area was used by local residents to conduct automotive repairs and recreational activities. No evidence exists of any rad contamination. Site is littered with debris including empty bottles, lumber, empty containers of auto oil, cans/buckets, oil filters, etc.	300	3 cuts with bulldozer each 5 ft by 10 ft by 4 ft deep	Dumping Area	Hazardous ?/Nonrad	Solid, liquid	Surface garbage removed November 1993 by PNL. Site of recently discovered Indian Burial Grounds (originally selected EMSL Site)	Automotive oils. etc	Yes
303-K Contaminated Waste Storage	1943 to present, Active	The liquid wastes are stored on a pad in a 600 ft^2 area within the building. The solid wastes are stored outside the building on an asphalt and concrete pad of 3,500 ft^2. Area surrounded by chain link fence. The area is used for the storage of containers of small quantity of misc waste oils, cutting lubricants, etc. that are potentially contaminated with uranium, the occasional storage of concreted waste from the 304 Facility, heat treated salts, and solids from the 313 recovery operations. ~ 50 to 100 55 gal-drums/yr.	300	Storage area is 3,500 ft^2	Storage Facility	Mixed	Solid	Part A Permit, Interim Closure plan	Misc. waste oils, cutting lubricants, potentially uranium contaminated	Yes
303-M Storage Area	May 1983 to ?, Inactive	Located west of the 303-M facility. The area was used for storage of uranium metal chips and fines (ignitable) awaiting treatment in the 303-M Oxidation facility. Waste quantities were estimated at 31 ton/yr. The drums were inspected each day for leakage, etc. The liquid level in the drums is maintained above the level of chips and fines to prevent ignition. Containers are stored on a fenced concrete pad.	300	Unknown	Storage Facility	Mixed	Solid	Unknown	Uranium fines, zirconium, and trace quantities of metals	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
303-M Uranium Oxide Facility	May 1983 to March 1987, Inactive	The oxidation feed material was uranium-containing zircaloy-2 metal chips and fines (ignitable). ~31 ton/yr were converted to a non-ignitable oxide via incineration. Liquids have been poured from drums into the process sewer drain during processing. Sump screens are used to collect the fines. Liquid discharges are continuously monitored for pH; weekly composite sample is analyzed for uranium. Airborne monitoring.	300	Unknown	Test Treatment or Support Facility	Mixed	Solid	Part A Permit	Uranium fines, zirconium, and trace quantities of metals	Yes
304 Concretion Facility	1952 to 1994, Inactive	Ignitable, depleted uranium metal fines and turnings are stored in water-filled drums prior to concretion. Liquids have been poured from drums into the 300 Area process trenches during processing. A screened sump is used to collect the fines. The unit is covered by the 300 Area process trench groundwater monitoring system. Holes in the walls, cracks between the floor and the walls, and door openings likely allowed uranium-contaminated water from washing the floor and walls to escape the building and discharge to the soils outside the facility. Several layers of asphalt and paint have been used to fix uranium contamination outside the building. A Billet fire occurred in the building on August 8, 1977. Last campaign completed in April 1994 preparing final cleanup remains for burial. No releases to process sewer during last campaign.	300	Unknown	Test Treatment or Support Facility	Mixed	Solid	Part A Permit, Interim Closure Plan, several layers of asphalt and paint have been used to fix uranium contamination outside of the building	Depleted uranium chips and fines, uranium contaminated water	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
304 Storage Area	January 1972 to December 1986, Inactive	Outside the 304 Bldg. No wastes are stored at this facility currently. The area was used for storage of containers of varied potentially uranium-contaminated wastes, primarily heat treat salts, depleted uranium chips/fines, and Be/Zr/ chips/fines. Approx. 50 to 100 drums/yr were accumulated. The chips/fines were in storage awaiting concretion. Waste storage was in drums on an asphalt pad.	300	Unknown	Storage Facility	Mixed	Solid	Part A Permit	Heat treat salts, depleted uranium chips, scrap metal chips and fines	Yes
305-B Storage Facility	January 1978 to present, Active	The unit is a waste assembly area that services research and development (R&D) operations as a 300 Area satellite storage area. Wastes are brought to the facility for storage, repackaging, and/or waste consoli-dation. The storage design capacity is 30,000 gal. Facility was upgraded in March 1989 to house dangerous and radioactive mixed wastes. Radioactive mixed waste (RMW) is stored as received in storage cells located in the basement of the facility.	300	Unknown	Storage Facility	Mixed	Solid?	Part A and B Permit	Listed, nonspecific source, characteristic, state-only wastes, mixed wastes, and radioactive mixed wastes	No
307 Retention Basins	Active	The unit consists of 4-50,000-gal basins used for wastewater collection. Process water from the 300 area facilities is routed through the units before dis-charge to the 300 Area process trench. The flow is about 1 to 4 million gal/day.	300	50,000 gal basins	Retention basin	Mixed	Liquid	Unknown	Mixed liquid waste	No

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
309-TW-1, -2, -3	1960 to 1973, Inactive	The unit received liquid nonhazardous radioactive wastes from the Plutonium Recycle Test Reactor (PRTR). The tanks are empty. The carbon-steel pipe to the 340 Complex contains residual radioactive contamination. The capacity of the tanks is 5,026, 5,141, and 4,185 gal, respectively The tanks are in an underground concrete vault. The unit is covered in the 300 area process trench groundwater monitoring system.	300	Volume for tanks 1, 2, and 3 is 5,026, 4,141, and 4,185 respectively	Storage tanks	Low-level radioactive	Liquid	Unknown	Low-level non-haz radioactive waste	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
309-WS-1 (IX vault)	1963 to 1969, Inactive	The site consists of an underground vault with Ion Exchange (IX) columns inside. The vault consist of 2 levels, an upper level housing the columns, and the lower level for spent columns. The upper level is constructed of reinforced concrete with 2-ft thick walls and floor. There are two ~3-ft diam. holes with concrete plugs for access to the lower level. Three layers of concrete cover blocks, totalling 6 ft thick, are fitted in a step-configuration at ground level. The columns were used to remove contamination from various cooling loops. Seven old columns were dropped into the lower vault in the 1960's. A radiation survey conducted on December 19, 1986 showed 100/50 mR/hr for IX-2, 75 mR/hr for IX-3, 75/30 mR/hr for IX-1, and 75 mR/hr for BIX-5, located in upper level. A radiation survey in March 1994 showed gamma field radiation of 40 mR/hr 12 in. above the south access plug. Contact radiation readings of 40 mR/hr and 60 mR/hr were obtained from BIX-5 and IX-1 columns respectively. The IX-2 and IX-3 columns could not be reached with the probe. A fifth column leaning against the east wall was discovered in March 1994 and had a contact radiation reading of 1.58 R/hr at the top of the column. The lower vault contains 10.3 ft of water and general field radiation measured <1 mR/hr at 1 ft above the water surface, 4 mR/hr at the water surface, and 34 mR/hr approximately 5 ft below the water surface. Maximum contact radiation reading of 2.5 mR/hr was taken from the sides of a column just below the access plugs.	300	Upper: 19 ft by 19 ft by 18 ft deep Lower: 15.5 ft diameter, 22 ft deep on a 20 ft octagonal base	Vault/ equipment	Mixed	Solid	Some of the exchangers were drained, 1 was relocated	Fission products, acidic and basic resins	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
309-WS-2 Rupture Loop Ion Exchange Pit	1961 to 1969, Inactive	The site consists of an underground vault sectioned into 5 bays. An ion exchange column existed in 4 of the 5 bays.	300	26.16 ft L, 15.83 ft W, 16 ft D	Vault/ equipment	Mixed	Solid	Unknown	Contaminants and fission products from light water coolant	Yes
3311 Methanol Tanks 1 & 2	1955 to 1971, Inactive	Located at the 311 tank farm, the tanks contained about 10,000 gal of a 4% methanol solution combined when operational. After the removal of the tanks and backfilling of the excavation, the site is now gravel.	300	4,000 and 6,000 gal respectively	Storage tanks	Hazardous	Liquid	Tanks emptied in 1987, and removed on August 30, 1989. Sampling and visual inspection indicated the soil was not contaminated with methanol, excavation backfilled.	Methanol	Yes
311 Neutralized Waste Tank 1 (311-TK-40)	1950 to present, Active	4,000-gal single-shell (SS) tank in the 311 tank farm. Unit currently empty. It received 420,000 gal/yr neutralized liquid from the nonrecoverable uranium stream and filtrate from processing of the uranium-bearing wastestream from the 313 Bldg. Unit is inside concrete containment.	300	Tank volume is 4,000 gal	Storage tank	Mixed	Liquid	Part A Permit, Interim Closure Plan	Wastes from uranium-fuel fabrication	Yes
311 Neutralized Waste Tank 2 (311-TK-50)	1985 to present, Active	5,000 gal SS tank in the 311 tank farm. It receives 420,000 gal/yr neutralized liquid from the nonrecoverable uranium stream and filtrate from processing of the uranium-bearing waste stream from the 313 Bldg. Unit is inside concrete containment. Tank currently contains 4,280 gal of nonhazardous solution with 40 ppm depleted uranium.	300	Tank volume is 5,000 gal	Storage tank	Mixed	Liquid	Part A Permit, Interim Closure Plan	Wastes from uranium-fuel fabrication	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
313 Centrifuge	November 1985 to 1988, Inactive	Part of the 300 Area Waste Acid Treatment System. Centrifuge was used to process neutralized slurry from the nonrecoverable uranium-bearing waste, separating the solids from the liquid phases. The centrifuge did not prove to be as effective as the filter press and is not planned for use during closure of the WATS system.	300	Unknown	Equipment	Mixed	Liquid	Part A Permit, Interim Closure Plan	uranium bearing acids and bases	No
313 Copper Remelt Operations	1968 to 1988, Inactive	Located in the 305 Bldg. from 1968 to 1973, then in the 313 Bldg. from 1973 to 1988. Copper-silicon alloy waste from the fuel fabrication process was melted, cast, and machined in preparation for re-use. The unit processed 600 lb/day of copper silicon alloy waste.	300	Unknown	Test treatment or support facility	Nonhaz/ nonrad	Solid	Unknown	Copper-silicon allow waste from the fuel fabrication process and uranium	Yes
313 East Side Storage pad	1940's to present, Active	Unit was used for storage of byproduct wastes from the fuels fabrication process, including neutralized solids (sodium fluoride, sodium nitrate, sodium sulfate; and metal precipitate, copper, uranium, and zirconium). Approximately 320,000 lb/yr was accumulated. Located on the east wall of original 313 Bldg. Currently the site has seven large storage containers--three of them containing radioactive materials.	300	Unknown	Storage pad	Mixed	Solid	Unknown	Neutralized solids from the 313 recovery operations, raw materials for fuels manufacturing.	Yes
313 Filter Press	1944 to present, Active	Part of the 300 Area Waste Acid Treatment System. The filter press is used to separate solid and liquid phases from the neutralized slurry of uranium-bearing and nonuranium-bearing waste acids.	300	Unknown	Equipment	Mixed	Solid	Part A Permit, Interim Closure Plan	uranium-bearing acids and bases	No

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
313 Methanol Tank	1955 to 1987, Inactive	The storage tank was located beneath the floor in the southern portion of the 313 Bldg. The tank has been removed and the cement floor in the 313 Bldg. replaced.	300	Volume of tank was 600 gal	Storage tank	Hazardous	Liquid	The unit was emptied in 87, and removed in 89. Sampling and visual inspection indicated that the area was not contaminated. The excavation was backfilled.	4.35% methanol	Yes
313-TK-2 Waste Acid Neutralization Tank	June 1975 to present, Active	Part of the 300 Area Waste Acid Treatment System. The vertical tank is 8.92 ft tall with a diameter of 5.66 ft and a capacity of 1,500 gal. UPR-300-38 involved uranium-bearing acids and may have originated from this tank.	300	Unknown	Neutraliza-tion tank	Mixed	Liquid	Part A Permit, Interim Closure Plan	uranium-bearing acids and bases	No
313 Uranium Recovery Operations	1944 to present, Active	Located at the south end of the 313 Bldg. The unit receives ~270,000 gal/yr of waste acids from fuels fabrication process. ~28 tons were recovered in 1986. Waste acids solutions and NaOH are contained in storage/processing tanks, etc. Previously spills would go to 313 Bldg. sewer and then to the 300 Area process trenches, but in 1987 the sumps that route to the process trenches were plugged.	300	Unknown	Test treatment or support facility	Mixed	Liquid	Some cleanup related to UPR-300-38	Radioactive and chemical wastes from fuels fabrication, uranium	No
315 Retired Sanitary Drainfield	1950 to 1978, Inactive	The unit is a nonhazardous, nonradio-active, septic tank and drainfield located northeast of the 315 Water Filter Plant. The site received sanitary wastes that originated in the 315 Water Filter Plant. The waste could have contained small amounts of chemicals used in the water treatment process. The site consists of a 500-gal steel septic tank and 50 ft of 4-in. tile drain-field. Site abandoned in place in 1978 when 315 Bldg. was connected to the sanitary sewer system.	300	50 ft Long	Drain field	Nonhaz/ nonrad	Liquid	Abandoned in place in 1978, no details	Sanitary wastes	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
316-3 (307 Trenches)	1953 to 1963, Inactive	Approximately 300 ft NE of the 324 Bldg. Two trenches running E-W, each approximately 500 ft long, 12 to 27 ft deep, 10 ft wide at west end, and 30 ft wide at east end. Each trench contained a 5-in. vitreous clay pipe running the entire length along the bottom of the trenches. The site received 1 billion L of uncontaminated and low-level liquid wastes from Works Laboratories (329, 327, 326, and 324 Bldgs). The 308 Bldg. was connected in 1960. Waste was first retained in the 307 Retention Basins before discharge to the unit. The trenches were backfilled in 1965 using 10,000 yd^3 of contaminated sediments from scraping the south process pond. The site has a Hazard Ranking Score of 79.28.	300	600 ft L, 80 ft W, 27 ft D	Trench	Mixed	Liquid	The unit was filled in 1965 with contaminated pond scrapings from the south process pond	Wastes from various labs & sludge from the 316-1 pond. Metals and uranium	Yes
316-4 Crib	1948 to 1955-1956? or 1962?, Inactive	Inactive liquid radioactive waste site located approximately 5 mi N-NE of the 300 Area. The site consists of two inverted bottomless stainless steel tanks that have concrete footings and sit on a bed of gravel. The tanks are 7 ft tall and 8 ft in diameter and are located approximately 10 ft below grade. The site received hexone-bearing uranium wastes and limited amounts of other uranium-bearing wastes. The unit received approx. 2,000 kg of uranium, 1,000 kg of nitrate, and 3,000 kg of methyl isobutyl ketone (hexone). The site's Hazardous Ranking Score is 16.60.	600	Unknown	Crib	Mixed	Liquid	Unknown	Hexone bearing uranium wastes, other uranium-bearing wastes	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
323 Tanks 1, 2, 3 & 4	1945 to 1952 or 1953 (Tanks 1, 2, & 3), Inactive 1945 to 1987 (Tank 4), Inactive	The 4 tanks measuring 48.5 ft long by 10 ft in diameter each are encased in concrete below the 323 Bldg. Each tank has a capacity of 20,000 gal and received uranium-contaminated water and acid solutions from reprocessing research. The current condition or contents of the tanks are unknown. The 1, 2, and 3 tanks were emptied in 1952/53. The 4 tank still contains liquid and sludge. Possible contamination in soil surrounding tanks.	300	Concrete around tanks measures 55 ft by 45.83 ft by 13 ft deep	Storage tanks	Mixed	Liquid	Unknown	Uranium contaminated water and acid solutions from reprocessing research wastes	Yes
324 Sodium Removal Pilot Plant	1979 to 1987, Inactive and decommissioned	The unit was a radioactive mixed waste (RMW) alkali metal treatment facility (no longer than 90-day storage). Treatment occurred in a steel tank that was used to circulate nitrogen or argon with water vapor to react with alkali metal on the component being processed. The Part A Permit will be withdrawn.	300	Unknown	Test treatment or support facility	Mixed	Solid	Part A and B Permits	Metals, uranium?	No
325 Waste Treatment Facility	1978 to present, Active	The facility treats small quantities of diverse chemical and RMW generated from R&D activities and serves as an R&D facility to test the effectiveness of thermal, physical/chemical, and/or biological treatment technology. Wastes handled include listed, nonspecific source, characteristic, and state-only.	300	Unknown	Test treatment or support facility	Mixed	Liquid	Part A Permit	Listed, nonspecific source, characteristic, and state-only wastes	No
331 LSL Drain-field	1970 to 1974, Inactive	East of the 331 Bldg., the unit received ~0.66 gal/h of sanitary wastewater.	300	Unknown	Drainfield	Nonhaz/ nonrad	Liquid	Unknown	Sanitary wastewater	Yes
331 LSL Trenches 1	1966 to 1969, Inactive	The unit received sanitary wastewater. The unit was partially removed to allow construction of the 331 Bldg. When operational, the trench received an average of 9 gal/min during operational life of unit.	300	Unknown	Trench	Nonhaz/ nonrad	Liquid	Unit partially removed to allow construction of the 331 bldg.	Sanitary wastewater	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
331 LSL Trenches 2	1969 to 1974, Inactive	The unit received sanitary wastewater. When operational, the trench received 8.33 gal/h of sanitary water.	300	Unknown	Trench	Nonhaz/ nonrad	Liquid	Unknown	Sanitary wastewater	Yes
331-C HWSA	1970 to present, Active	The area typically contains corrosives, ignitables, and regulated empty containers, ~600 gal/yr.	300	Unknown	Staging area	Hazardous	Liquid	Unknown	Corrosives, ignitables	No?
333 East Side HWSA	1964 to present, Active	The area contains miscellaneous small quantity of waste oils, lubricants, and solvents in containers. Previously the area was used for miscellaneous radioactive and hazardous waste storage. Approximately 25-50 55-gal drums/yr accumulated. For many years the fenced area behind the 333 Bldg. has been used for storage of miscellaneous drummed wastes. There are undocumented reports of past leakage. Previous storage was at a variety of locations including directly on the ground.	300	Unknown	Staging area	Hazardous	Liquid	Unknown	Oils/solvents/ miscellaneous radioactive and hazardous	No
333 East Side Heat Treat Salt Storage Area	1964 to 1983, Inactive	This area is no longer used for storing hazardous wastes. It has stored containers of solidified waste heat-treat salts from the Fuels Fabrication Facility that consist of NaCl, KCl, $NaNO_2$ NaNO3, and KNO3. Approximately 30-50 55-gal drums/yr accumulated. In the past, storage took place at a variety of locations E of the 333 Bldg., including some storage on the ground. Exact locations unknown.	300	Unknown	Storage facility	Mixed	Solid	Unknown	Solidified waste heat-treat salts from the Fuels Fab Facility.	Yes
333 Laydown HWSA	1971 to present, Active	The area typically contains corrosive and EP toxic (Cr) wastes. There have been several small spills. Spilled materials are probably oils from excess equipment stored at the laydown area.	300	Unknown	Staging area	Hazardous	Liquid	No cleanup actions have been taken	Corrosive and EP toxic (Cr) wastes	No

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
333 Chromium Tanks 1 and 2 (333-TK-7 and -11)	1963 to ?, Inactive	The units are empty. They were used for storage of spent etch acids (nitric and sulfuric acid with uranium in solution). Estimated accumulative rate of 60,000 gal/yr. Not all of this volume was routed to the storage tanks outdoors. Most was routed to a tank inside the facility. The unit is located within a concrete containment curbing that would allow recovery of any leakage. Each tank is an open-top 110-gal capacity steel construction tank located in the 333 Bldg. with many similar tanks.	300	110 gal capacity (each) open top steel tanks	Storage tanks	Mixed	Liquid	Part A Permit, Interim Closure Plan	Uranium contaminated acids	No
333 West Side Waste Oil Tank	August 1972 to 1988, inactive	The unit is used for storage of waste oil from the extrusion press sump. Waste oil is verified to be non-PCB. ~500 to 1,000 gal/yr is accumulated. The tank is located outside on the west side of the 333 Bldg. within a concrete barrier that would permit containment of any leakage.	300	Unknown	Storage tank	Nonhaz/ nonrad	Liquid	Unknown	Waste oil from extrusion press sump, non-PCB	No
334 Tank Farm Waste Acid Storage Tank	1971 to 1986, Inactive	The unit was occasionally used for storage of waste acids containing nonrecoverable uranium from the fuels fabrication process. In 1986, ~350 gal leaked from the tank as a result of corrosion near the top of the tank. 60 gal of 50% NaOH was added to the process sewer to neutralize the acid that had reached the process trenches. The tank was permanently removed from service after this spill and buried in the 200 Area in 1988.	300	Unknown	Storage tank	Mixed	Liquid	The tank has been permanently removed from service	Acids with non-recoverable uranium from fuels fab process	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
334-A Waste Acid Storage Tanks 1 & 2 (334-A-TK-B and 334-A-TK-C)	1973 to 1987, Inactive	The tanks are empty. They received 210,000 gal/yr each of waste acids from the fuels fabrication process. Spills have occurred. Liquids were discharged to the 300 Area process ponds or trenches through an open drain in the 334-A Pit. The drain is now plugged. Spills discharge from the tanks into a concrete pit.	300	Unknown	Storage tanks	Mixed	Liquid	Part A Permit, Interim Closure Plan	Waste acids with copper, zirconium, and uranium in solution	Yes
335 & 336 Retired Sanitary Drainfields	1973 to 1978, Inactive	The unit received unknown quantities of sanitary wastes from the 335 and 336 buildings.	300	Unknown	Drainfield	Nonhaz/ nonrad	Liquid	Abandoned in place in 1978, no details	Sanitary wastes	Yes
350 HWSA	1982 to present, Active	Typically, the unit contains ~600 gal/yr corrosives, 600 gal/yr used oils and PCB contaminated oils,, and 40 nonregulated empty containers per year. Used motor oil is stored in a 300-gal tank in containment pit with sump. Recent facility; no unplanned releases.	300	N/A	Staging area	Hazardous	Liquid	90-day storage pad	Corrosives, used oils, PCB-oils	Yes
3712 Uranium Storage Area	1961 to present, Active	The unit has been used to store uranium metal in the form of billets and fuel rods, component parts for fuel fabrication, and uranium scraps from fuel manufacturing. The building now stores ~1.5 yr supply of fuel assemblies for N-Reactor and uranium billets. A fire occurred in 1979 when concreted uranium billets ignited, and another fire occurred in 1985 when uranium fines in a scrap box ignited. During the 1979 fire, contamination drained into the ground.	300	Building is 90 ft by 108 ft	Storage facility	Mixed	Solid	Facility decontaminated after each fire	Uranium scrap, uranium-fines washed out of facility, fire suppressants	Yes
3713 Paint Shop Haz. Waste Satellite Area	1984 to 1987, Inactive	The site is a storage pad located outside the SE door of the 3713 Bldg. Hazardous wastes are no longer accumulated at this facility since the paint shop moved. The area contained miscellaneous small quantities of solvents and paint shop solids from paint shop operations. Approximately 55 gal/yr was accumulated at the site.	300	Concrete pad 30 ft by 20 ft	Staging area	Hazardous	Liquid	Unknown	Solvents, paints	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
3713 Sign Shop Haz. Waste Satellite Area	1984 to 1987, Inactive	Hazardous wastes are no longer accumulated at this facility. The area contained miscellaneous small quantities of waste solutions (nonsolvents) from sign shop operations. Less than 55 gal/yr was accumulated. Currently no evidence of storage area exists.	300	Unknown	Satellite area	Hazardous	Liquid	Unknown	Sign shop wastes (nonsolvents)	Yes
3718-F Burn Shed	1968 to ?, Inactive	This facility is part of the 3718-F Alkali Metal Treatment Facility used for treatment of materials contaminated with alkali metal wastes. The alkali metals were burned here. The burn shed is connected to the fume scrubber that discharged sodium hydroxide to the Process Sewer.	300	Building is 20 ft wide, 48 ft long, concrete pad on E side of bldg is 25 ft wide, 48 ft long	Test treatment facility	Hazardous	Solid	Part A and B Permits Closure Plan	Na, Li, sodium hydroxide, and sodium-potassium alloys	Yes
3718-F Alkali Metal Storage Facility	1968 to ?, Inactive	Part of the 3718-F Alkali Metal Treatment Facility used for storage of alkali metal wastes. Alkali metals are no longer stored here. Typically the largest single container was 55 gal. Waste was stored inside the building.	300	Building is 20 ft wide, 48 ft long	Storage facility	Hazardous	Solid	Part A and B Permits Closure Plan	Na, Li, and sodium alloys	Yes
3718-F Treatment Tanks 1 & 2	1968 to ?, Inactive	Part of the 3718-F Alkali Metal Treatment Facility used for treatment of materials contaminated with alkali metal wastes. Tank 1 is a reaction tank with a capacity of 135 gal. It contained alcohol solutions. Tank 2 is a 480-gal reaction tank that was used to contain water.	300	Tank 1, 2 volumes 135 and 480 gal respectively	Treatment tanks	Hazardous	Liquid	Part A and B Permits Closure Plan	Na, Li, and sodium-potassium alloys	Yes
3746-D Silver Recovery	1984 to present, Active	Corrosive silver-containing photochemicals (1,530 gal/yr) are processed for silver reclamation. From 1984 to 1988, effluent was disposed in the 3705 Bldg. Process Sewer drain. From 1988 to 1992, effluent was discharged to the sanitary sewer. Presently wastes are shipped offsite. No unplanned releases are associated with this site.	300	Unknown	Treatment facility	Hazardous	Liquid	Unknown	Corrosive silver, photo-chemicals	No

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Biological Treatment Facilities	1978 to present, Active	Technologies to treat mixed and hazardous waste constituents through various thermal processes, including in situ vitrification and waste vitrification.	300		Test treatment or support facility	Mixed	Solid	Part A Permit	Listed, nonspecific source, characteristic, and state-only wastes	No
Physical and Chemical Treat. Test Facilities	1979 to present, Active	Located at the 324, 325, 329, 331 and 3720 Bldgs. Technologies may also be used at other facilities and at remedial action locations. Technologies to treat mixed and hazardous waste constituents via various physical/chemical processes, including grout treatment and distillation.	300	None	Test treatment or support facility	Mixed	Liquid	Part A Permit, to be withdrawn	Listed, nonspecific source, characteristic, and state-only wastes	No
Thermal Treatment Test Facilities	1978 to present, Active	Technologies to treat mixed and hazardous waste constituents through various thermal processes, including in situ vitrification and waste vitrification.	300	None	Test treatment or support facility	Mixed	Solid	Part A Permit, to be withdrawn	Listed, nonspecific source, characteristic, and state-only wastes	No
Undocumented Waste Site, Solid Waste Burial Ground	1943 to 1944, Inactive	Uncovered accidentally in 1980 during excavation of holes for power distribution poles, it is unclear if it is a portion of the 618-8 Burial Ground. Ground-penetrating radar (GPR) indicates that construction type debris was buried here.	600	Unknown	Burial ground	Solid	Solid	Unknown, except GPR survey	Solid uranium wastes, construction debris	Yes
Undocumented Waste Site, 366 and 366A Fuel Oil Bunkers	Unknown, Active	The 366 Bldg. is an underground building with the roof at ground level. It is constructed of reinforced concrete and is 69 ft 8 in. long, 26 ft 6 in. wide, and 13 ft high. The 366 Bldg. contains a 144,000-gal fuel oil tank. The 366A Bldg. contains a 235,000-gal fuel oil tank. No information on unplanned releases is available.	300	Unknown	Storage tank	Hazardous	Liquid	Cleaned out in 1990, carbon steel liners removed	Fuel oil	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, Process Sewer System	Unknown, Active	All underground process sewer lines remain in place and should be assumed to be contaminated. Numerous instances of line deterioration have contributed to soil contamination, and all soils in the proximity of the process sewer system should be considered suspect.	300	Unknown	Process Sewer	Mixed	Liquid	See process sewer section	Nonsanitary liquid wastes	Yes
Undocumented Waste Site, Suspect Waste Site, 3705 Photography Building	1967 to 1985, Inactive	The 3705 Bldg. processes corrosive, silver-containing waste photochemicals for the reclamation of silver. Approximately 1,530 gal of waste photochemicals were processed each year to recover 1,119 troy ounces of silver. Effluent from the silver reclamation process is discharged to the 300 Area process trenches.	300	Unknown	Facility	Hazardous	Liquid	Unknown	Photo-chemicals	No
Undocumented Waste Site, 3730 Gamma Neutron Irradiation Facility	1949 to present	The 3730 Bldg. is currently used for gamma irradiation testing with a 350,000 Ci ^{60}Co source emplaced in a small liquid-filled pit in the building. A leak of the ^{60}Co source in the early 1970"s was detected in 1974 during an aerial survey using infrared photo-graphy. The leaking source contami-nated cooling water that was discharged to the process sewer and finally the process ponds. Gerber (1992) states that the sanitary sewer and the groundwater near the 3730 facility are contaminated from the cobalt source that leaked. To date no information has been collected supporting the conclusions on contamination presented in Gerber 1992.	300	Unknown	Gamma irradiation facility	Radioactive	Liquid	Unknown	Cobalt-60	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Solid Waste Burial Ground (Early Burial Ground)	1943 to 1944	The site is an early burial ground located adjacent to the north side of the rail spur to the 300 Area, just north of the 300 Area boundary. The site was discovered during a 1952 power pole excavation. The burial ground was not posted on closure. The site is crossed at the south end by a rail spur, near the midpoint by a gravel road, and in a traverse by a dirt road formed when a pipe was installed from the 300 Area to the new 300 Area liquid effluent retention facility (LERF). The site was previously used for staging uranium-contaminated scrap aluminum for recycling and is currently posted with surface contamination signs.	600	Unknown	Burial ground	Mixed?	Solid	5 ft on either side of rail spur was recently "cleaned up" of uranium contaminated Al	uranium fuels manufacturing, shavings contaminated with uranium, unknown	Yes
Undocumented Waste Site, 382 Pump House Underground Gasoline Tank	Unknown to 1992	The site consists of 3 gasoline underground storage tanks (UST) at the 382 Bldg. One of the three tanks failed a tank tightness test in 1992 with a leak rate of 0.171 gal/h. The leaking tank was 145-gal SS carbon steel tank. The leaking tank was removed in 1992 and the site was backfilled. The two remaining gasoline UST"s are scheduled for removal in 1994.	300	Unknown	Storage tanks	Hazardous	Liquid	1 tank removed, soil cleanup unknown, remaining 2 tanks scheduled for removal in 1994	Unleaded gasoline	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, 3709-A Fire Station	Unknown to August 1991	Refueling facilities at the 3709-A fire station consisted of two UST"s, associated piping, and delivery system. The UST"s failed a leak test in August 1991 and were later removed. During removal, field instruments detected hydrocarbon vapors present, indicating a release of diesel or gasoline to the soils. The contaminated soils were located beneath the pump island and it appears fittings or hoses under the pump island may have leaked an unknown quantity of fuels. Soil samples were taken for analysis, and additional excavation was performed (to 15 ft) to determine the extent of contamination. The excavation was lined with plastic and the original soils redeposited. Deep soil gas analysis was performed and indicated that vapor phase hydrocarbons may have reached groundwater. It appeared that no liquid hydrocarbons had reached groundwater.	300	Unknown	Storage tanks	Hazardous	Liquid	Tanks removed, soils excavated to 15 ft and redeposited into plastic lined excavation, soil gas survey was performed	Gasoline and/or diesel	Yes
Undocumented Waste Site, 325 Laboratory Diesel Fuel Tank	Unknown to October 14, 1992	325-gal diesel UST, located at the 325 Bldg., was removed on October 14, 1992. Tank removal was monitored with field instruments that did not detect any hydrocarbon-contaminated soils. Eight samples were taken and sent for analysis. The excavation was backfilled with native soils and the asphalt pad replaced.	300	Unknown	Storage tank	Hazardous	Liquid	Tank removed, excavation soils sampled, all of the samples were below action limits of 25 ppm for hydrocarbons	Diesel	Yes
Undocumented Waste Site 384 Powerhouse #6 Fuel Oil Spill	Unknown, 1991?	During refueling at the 384 fuel storage bunker, a siphon tube was left partly open, resulting in a release of fuel oil to the asphalt roadway and adjacent gravel areas. Fuel trucking vendor used absorbent materials and removed contaminated material.	300	Unknown	UPR	Hazardous	Liquid	Absorbent material used, and contaminated materials removed by vendor	Fuel oil	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, 350 Building Sanitary Sewer Lift Station	1993?	In routine surveillance of the 350 sanitary sewer lift station, personnel noticed a white, milky discoloration in the water. Samples of the water taken indicated no hazardous substances had been released. Investigation revealed source was latex paint cleanup by painters. Latex paint is considered nonhazardous.	300	Unknown	UPR	Non-hazardous	Liquid	Suspected contamination sanitary sewer sampled and results indicated no hazardous constituents	Latex paint	No
Undocumented Waste Site, 309 Building Glycol Spill	April 30, 1993	The number 3 water chiller in the 309 Bldg. expansion joint had failed and the system fluid drained through a floor drain to the process sewer. Release consisted of 795 gal of 38% by volume solution of water and glycol. Total volume of glycol release was 302 gal. System was repaired and no remedi-ation performed in the process sewer.	300	Spill drained to the process sewer, 795 gal	UPR	Hazardous	Liquid	None	Glycol discharged to the process sewer	No
Undocumented Waste Site, Hanford Grout Lysimeter Facility	1984 to present	The Hanford Grout Lysimeter Facility (HGLF) is located approximately 3 mi NW of the 300 Area. The site consists of six boreholes, 6 ft in diameter by 25 ft deep. In January 1991 it was discovered that drainage from a buried lysimeter had probably leaked into underlying sediments. The lysimeters contain radio-traced, simulated solidified neutralized cladding removal wastes. It is estimated over a 3-yr period that as much as 300 L of drainage may have occurred. The maximum concentration is estimated to be 6×10^{-5} μCi/mL to 1.3×10^{4} μCi/mL of ^{99}Tc.	600	300 liters of drainage occurred	Hanford Grout Lysimeter Facility	Radioactive	Liquid	Unknown	Tc-99	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, 329 Biophysics Laboratory	1952 to present	In August of 1991, radioactive contamination was found outside the 329 Bldg. during a routine survey. The survey reported contamination levels of approximately 40,000 disintegrations/min of beta-gamma in a 1 ft^2 area of soil. The source of the contamination is unknown. It is not reported if any cleanup activities were performed.	300	1 sq ft	Biophysics Laboratory	Radioactive	Solid	Unknown	Radioisotope unknown	Yes
Undocumented Waste Site, 314 Metal Extrusion Building	Unknown	Radioactive contamination was found outside the 314 Bldg.	300	Unknown	Extrusion facility	Radioactive	Solid	Unknown	Radioisotope unknown	Yes
Undocumented Waste Site, 324 Building	1960s to mid 1970s	In discussions with site personnel it is possible that radioactive liquids leaked through a cracked sump in the B-Cell (hot cell) and into the soils below. The quantity and description of the wastes are unknown. In the mid 1970's a stainless steel liner pan was installed below the cell floor and the cell bottom was reconstructed. None of the other hot cells have had liners installed to date; therefore, liquids have not been used in the other cells since the cracked sump was discovered in C-Cell. No evidence of leaking has been found in the other hot cells.	300	Unknown	UPR	Radioactive	Liquid	Unknown	Radioisotope unknown	No

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, 331 Building Animal Waste Tanks	Unknown	Concrete cradles for large waste tanks located SE of the 331 Bldg. were observed on a site tour of the 331 Bldg. and associated facilities. Cradles are located in an excavation with blanked piping visible on the northern side of the site. The tanks have been removed, but site personnel thought the tanks were used to store liquid sanitary wastes from the animals used for radiological experiments in the 331 Bldg. Due south of this site is a small 12- to 15-ft wide by 100-ft long trench that appears to be active at this time. Site personnel on the tour were unaware of what could be discharging currently to the small trench.	300	Unknown	Site of removed storage tanks and potentially operational trench	Unknown, possible radioactive? Sanitary?	Liquid	Unknown, although tanks have been removed	Unknown	Yes
Undocumented Waste Site, 333 Building	Unknown	From investigations of waste sites identified around the 333 Bldg., coupled with discussions with site personnel, it is likely that soils beneath the 333 Bldg. are also contaminated with uranium-fuels manufacturing wastes.	300	Unknown	Fuels manufacturi ng facility	Mixed	Liquid	Unknown	Unknown, but suspect U fuels manufacturing wastes	No
Undocumented Waste Site, 306-E, 306-W	1956 to present, Active	Originally completed as the Fuel Element Pilot Plant. Expanded in 1960 to contain the coextrusion fabrication processes for N-Reactor fuels multiple leaks and fires. Long-lived contamination, which can be recirculated today, settled in building sumps, crevices, and nearby soil. A lime tank and valve pit exist north of the east end of the building holding neutralizied nitric acid-bearing wastes. A 1990 PNL survey found hot particulates in the soil surrounding the 306-W Bldg.	300	Building is 40,000 sq ft	Fuel fabrication facility/ laboratory	Mixed	Solid	Radiation surveys are performed	Acids, uranium, thorium, heavy metals	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, Burial Trench West of Process Trenches	1950's?, Inactive	Located north of the 300 Area adjacent to the 316-5 Process Trenches is a rectangular area suspected to be an undocumented burial ground. This site is currently posted as a surface contamination area.	600	~135 ft L, 45 ft W	Burial trench	Radioactive, possible mixed	Unknown	Surface radiation surveys are permormed	Unknown	Yes
Undocumented Waste Site, DOE 351 Substation	? to October 1990, Inactive	4 capacitators were de-energized and removed in 1989 because of fluid leaks. PCBs were detected in the 1-3 ppm range in soils. All equipment except uranium-contaminated footings of the 24.3 MVAR Shunt Capacitor Group No. 1 has been removed from site. No indication of the residual PCB levels in soils.	300	Unknown	Equipment/ UPR	Hazardous	Solid?	Various capacitors removed from site. No indication of disposition of yellow cake uranium.	PCB-mineral oil, uranium, solvents	Yes
Undocumented Waste Site, Benton Switch Substation	1948 to present, Active	Site located ~0.5 mi NW of the N tip of Wooded I, ~2000 ft W of riverbank, at N end of utility access road. The site contains various electrical equipment, circuit breakers, transformers, etc. Primary concern is leaking transformer insulating oils. Four releases have been identified. No volume estimates were provided for these releases.	600	Unknown	Equipment/ UPR	Hazardous	Liquid	Soil samples collected	PCB insulating oil	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, H.J. Ashe Substation Switchyard	1976 to present, Active	Site located ~0.5 mi N of Washington Public Power Supply System 2 (Supply System), off Route 4 S, 2.75 mi W of the River. Facility consists of two large structures, a control house and maintenance building, yard areas, oil-filled circuit breaker, two underground gas tanks, four mineral oil storage tanks, oil/water separation. Drainage from the oil/water separator, with drainage from catch basins located S of maintenance facility, flows into a dry well. Also onsite are two grounding wells, ~360 ft deep, backfilled with sand. Various insulating oil spills exist. Gas tanks were replaced in 1989 and there is no evidence of leakage. Three dry wells and two grounding wells provide a means for contaminant movement to depth. RCRA-facility assessment recommended preventing infiltration to wells. Separate WIDS form for dry well, and chemical storage area.	600	Unknown	Storage tanks, drywell grounding wells	Hazardous	Liquid	Unknown, some soil samples were collected in 1986	Gasoline, mineral oil, insulating oil, PCBs	Yes, accessible with drill rig?
Undocumented Waste Site, H.J. Ashe Substation Oil/Water Separator and Dry Well, (BPA SWMU #13)	1976 to present, Active	The oil/water separator receives drainage from 8 floor drains in the maintenance shop and equipment storage area. Drainage from the separator and two catch basins located S of the Maintenance Bldg. flows into a dry well. The dry well is precast concrete with a bottom elevation at 15 ft BGS. The oil/water separator has not been cleaned out since its installation in 1988. Therefore, it is possible that oil-containing water has drained to the well. A separate WIDS form exists for the dry well and the switchyard facility.	600	Unknown	Well	Hazardous	Liquid	Unknown	Petroleum, oil, lubricants	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessibility
Undocumented Waste Site, H.J. Ashe Substation Storage Area, BPA SWMU #12	1976 to present, Active	The 20- by 15-ft generator storage area within the hazardous waste, flammable materials, and herbicide storage building contains a sump. The sump has no outlet. No evidence of release at the facility at the time of facility inspection. If sump is cracked or containers leak, there is the potential for contaminants to spread outside the facility.	600	Unknown	Storage area	Hazardous	Liquid	Unknown	Solvents, spent photographic fluids, battery acid	No
Undocumeted Waste Site, Cutup Oil Dump Site	Unknown, Inactive	The cutup oil dump site is a hazardous, nonradioactive solid waste site located along the west bank of the Columbia River just north of river mi 348. The site consists of approximately 1 yd^2 of oil-stained sand. Used diesel oil filters are scattered around the stained soil, an empty 55-gal drum is located at the bottom of the riverbank approximately 20 ft from the stained soil, and an empty can of starting fluid was found on the riverbank below the stained soil.	600	Unknown	Solid waste site	Hazardous, non-radioactive	Solid	Unknown	Petroleum hydrocarbons	Yes
Undocumented Waste Site, Solid Waste Site Near 303-G Bldg.	Unknown, Inactive	Underground radioactive contamination was encountered while installing new fiber optic cable phone system south of the 303-G Bldg. in the trench excavation. The contamination appeared to be confined to the soils just below the asphalt. Holes were dug every 50 ft along the planned trench route until no contamination could be found. Contamination appeared to end on the west side of the street adjacent to the 306-W Bldg.	300	Unknown	UPR	Radioactive, possible mixed	Solid	Unknown	Radioisotopes unknown, presence of hazardous substances unknown	Yes
Undocumented Waste Site, Solid Waste Site Near 314 Bldg.	Unknown, Inactive	Underground radioactive contamination near the 314 Bldg. was discovered when a utility pole was replaced. When the broken pole was removed, "yellow cake" (a uranium sulfuric acid combination) was found attached to the subsurface portion of the pole.	300	Unknown	UPR	Mixed	Liquid/ solid	Unknown	Radioisotopes unknown, possible acids, caustics, solvents, and metals	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
400 Area French Drain 1A	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive water condensate from building air conditioning systems and janitorial solutions of water and detergents. Culligan demineralizer backwash and heating, ventilating, and air conditioning (HVAC) system condensate may also be received from the 4717 Bldg. The drain cannot be visually identified.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Water and detergents, HVAC system condensate, and Culligan demineralizer backwash (which may have chemical additives)	Uncertain, cannot be visually identified
400 Area French Drain 1B	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive water condensate from building air cooling systems and janitorial solutions of water and detergents. It also may receive sump water and HVAC system condensate from the 4703 Facility. The drain cannot be visually identified.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Water and detergents, sump water, HVAC system condensate	Uncertain, cannot be visually identified
400 Area French Drain 2	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive water condensate from building air cooling systems, janitorial solutions of water and detergents, and rainwater and HVAC system condensate from the 4621-E Auxiliary Equipment Building.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Water and detergents	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
400 Area French Drain 3	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive rainwater from the 408-A East DHX structure and, potentially, other sources.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	None	Yes
400 Area French Drain 4	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive dilute sodium carbonate, floor drain effluents, and rainwater and HVAC condensate from the 491-E Bldg.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Dilute sodium carbonate, floor drain effluents, rainwater, HVAC condensate	Yes
400 Area French Drain 5	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive rainwater, HVAC condensate, janitorial solutions of water and detergents, effluent and rheostat water from the 408-B South DHX structure, and 2% sodium carbonate solution.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Water and detergents, rainwater, HVAC condensate, rheostat water, 2% sodium carbonate solution	Yes
400 Area French Drain 6	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive HVAC system condensate, floor drain effluents, and rainwater from the 408-C West DHX structure.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	HVAC system condensate, floor drain effluents, rainwater	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
400 Area French Drain 7	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive HVAC system condensate, janitorial solutions of water and detergents, and water from roof and floor drains in the 4621-W Building.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	HVAC condensate, water and detergents, and roof and floor drain water	Yes
400 Area French Drain 8	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive HVAC system condensate from the 4621-W Bldg. and perhaps other buildings. It also receives janitorial solutions of water and detergents.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	HVAC condensate, and water and detergents	Uncertain, cannot be visually identified
400 Area French Drain 9	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive janitorial solutions of water and detergents. It also may receive effluent from the 481 Pumphouse, including sanitary water from pump seal leaks and salt water from water softener regeneration.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Water and detergents, sanitary water, salt water	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
400 Area French Drain 10	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive runoff from the T-58 Water Storage Tank and Equipment Room, as well as water from leaking valves and other sources.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Rainwater, sanitary water	Yes
400 Area French Drain 10A	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. This french drain may receive runoff from the T-87 Water Storage Tank and Equipment Room as well as water from leaking valves and other sources.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Rainwater, sanitary water	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
400 Area Process Pond and Sewer System	1979 to present	Located within and N of the 400 Area. The process sewer system consists of underground piping, a control structure, and two percolation ponds. It receives cooling system water and effluents from nonsanitary drains and sumps, including rainwater, at a rate of approximately 10-15 gal/min. The 12-in. process sewer pipeline leads to a diversion box that controls effluent flow to the two unlined 4608 Percolation Ponds B and C. The ponds are used alternately. They are surrounded by an 8-ft chain link fence with barbed wire on top and an unlocked gate. A corrugated metal building within the fenced 4607 Sanitary Sewer septic tank site is the control structure for the process sewer pipeline. Environmental monitoring includes weekly inspections, sampling of sump contents, and monthly composite sampling of the process sewer.	400	Each pond measures 100 ft L and 4 ft D and is 50 ft W at the base	Pond	Nonhaz/ nonrad	Liquid	Environmental monitoring weekly	Cooling system water; effluent from non-sanitary 400 Area drains and sumps, including the Fast Flux Test Facility (FFTF)	Yes
4608 Percolation Ponds B and C	1979 to present, Active	4608 Percolation Ponds B and C are located northeast of the 400 area. These two ponds are part of the 400 Area Process Pond and Sewer System. The ponds are unlined.	400	Each 100 ft L and 50 ft W	Pond	Nonhaz/ nonrad	Liquid	Environmental monitoring weekly	Cooling system water; effluent from nonsanitary 400 area drains and sumps including FFTF	Yes
400 Area Retired French Drains	Prior to 1980, Inactive	These french drains are located throughout the 400 Area. They reportedly received water used for washing components prior to their installation.	400	Unknown	French drains	Nonhaz/ nonrad	Liquid	Unknown	Wastewater	Uncertain, cannot be visually identified

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
400 Area Retired Sanitary Pond	1972 to 1979, Inactive	Located immediately W of the 4706 Bldg. Received 12,000 gal/day of aqueous wastes from a portable sanitary sewage treatment plant that was located several hundred feet away from the pond. During operation, sludges were hauled offsite for disposal. The site cannot be visually identified.	400	500 ft L, 500 ft W	Pond	Nonhaz/ nonrad	Liquid	Portable treatment plant was removed from the site after retirement	Sanitary wastes	Uncertain; cannot be visually identified
400 Area Retired Septic Tanks	1979 to 1983, Inactive	These three tanks are located on the south and west sides of the 4702 Bldg. They received unknown amounts of sanitary wastes from buildings throughout the 400 Area.	400	Unknown	Septic tank	Nonhaz/ nonrad	Liquid	Unknown	Sanitary wastes	Yes
400 Area Sand Bottom Trench	Inactive, may not have existed; WIDS states that it operated prior to 1980	A 1987 report states that a concrete-lined, sand-bottomed trench is located north of the 483 Building and receives nonhazardous secondary cooling water blowdown from the 483 Cooling Towers. WIDS describes it as an inactive, nonhazardous and nonradioactive liquid waste site. The trench cannot be visually identified, and Site personnel state that it never existed. The reported description may be of the Cooling Tower Overflow Trench, which is not considered a waste site because it discharges to the process sewer.	400	Unknown	Trench	Nonhaz/ nonrad	Liquid	Unknown	Cooling tower blowdown	No

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
400-1 (dump area)	Active	Located near the NE corner of the FFTF perimeter fence, outside the protected area and ~75 yd from the fence corner. Mounds of materials have been dumped at the site, including visible piles of backfill material, chunks of concrete, metal piping, rebar, red volcanic landscaping rocks, chunks of asphalt, and signs. The mounds are 2 to 5 ft high. Documents also indicate the presence of concrete asbestos board and 6 1/2 barrels of 55-gal drums that have been cut in half. The entire area is raised ~5 ft from the perimeter road.	400	300 ft L, 100 ft W	Dumping area	Nonhaz/ Nonrad	Solid	Unknown	Miscellaneous debris	Yes
403 French Drain	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. It may receive janitorial solutions of water and detergents and air washer blowdown from the 403 Bldg. It has the potential to receive condensate water from the 403 Bldg. HVAC system. The french drain cannot be visually identified, and Site personnel report that it may not exist.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Water and detergents, air washer blowdown, and HVAC condensate	Uncertain; cannot be visually identified

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
427 HWSA	Unknown; documents report 1985 to present and active; the reusable oil and empty drum staging area is active	Several documents, including WIDS, describe the 427 HWSA as a staging area located on the north side of FMEF. One document describes it as a staging area for oils and lubricants. The hazardous waste engineer for FMEF reports that no site known as the 427 HWSA exists, but notes that FMEF has five other hazardous waste satellite storage areas. However, the engineer also reports that a fenced-off pad known as the Reusable Oil and Empty Drum Storage Area is located just north of FMEF. This may be the site described by WIDS and several other documents as the 427 HWSA.	400	(reusable oil and empty drum staging area)	Satellite area	Hazardous	Liquid	Unknown	Oils, lubricants, ethylene glycol, and ammonium hydroxide	Yes (Locked)
437 Maintenance and Storage Facility (MASF)	1982 to present; Inactive as a waste site, active as a facility	Located in the 400 Area at Hanford coordinates S400 W7780. Facility consists of a rust-colored main building and a two-story service wing. Because a dangerous waste permit application was submitted for MASF in 1987, the facility is required to be listed in WIDS as a waste site. However, MASF has never operated to treat dangerous wastes and, according to Site personnel, will never do so. MASF is currently used for the decontamination of FFTF equipment; the repair of contaminated manipulators from the FFTF Reactor Containment Building; the staging of large pieces of equipment to be stored, repaired, or tested; and the temporary storage of low-level radioactive solid and liquid wastes prior to shipment. Radioactive liquid waste generated in MASF is collected and sent via rail tank car to the 200 Areas.	400	3,022 m^2 of ground-level floor space	Test treatment or support facility	Mixed	Solid	Part A and B Permit	Low-level radioactive liquid and solid wastes	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
4607 Sanitary Sewer	1978 to present, Active	The septic tank is located north of the 400 Area, just west of the access road to the 4608 Percolation Ponds. It appears as a 15-ft by 150-ft concrete pad with six metal access doors. Approximately 23,100 gal/day of sanitary wastes from buildings throughout the 400 Area were received by the tank in 1993. The septic tank discharges liquid effluent to the 4607 Sanitary Sewer Lagoon.	400	Septic tank capacity 60,000 gal/day	Drainfield	Nonhaz/ Nonrad	Liquid	Inspected weekly	Sanitary wastes	Yes
4607 Sanitary Tile Fields	1978 to 1986, Inactive	Located north of the 400 Area, north of the 4607 Sanitary Sewer Lagoon, and approximately 100 ft west of the 4608 Percolation Ponds. The tile field received liquid effluent from the 4607 Sanitary Sewer septic tank. Site personnel report that there were two tile fields: one, installed in 1978, failed and was replaced around 1985; a second, installed in the same location around 1985, failed in 1986. the second was abandoned in place.	400	Unknown	Drainfield	Nonhaz/ Nonrad	Liquid	Unknown	Sanitary waste effluent	No
4713-B French Drain	1979 to ? Unknown	Documents provide conflicting information. The drain may be active or inactive. Documents reporting that the drain existed describe it as a concrete or vitrified clay pipe filled with gravel. They state that the pipe is a minimum of 5 ft in length and discharges into a gravel-filled drainage area.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Wastewater from lunchroom sinks	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
4713-B HWSA	1980 to present, Active	Located on the west side of the 4713-B Bldg. The site consists of a concrete pad that is used as a satellite accumulation area. Metal cabinets, drums, and wooden chests are used to store fluorescent bulbs, flammable materials, rags containing hazardous materials, solvents, carcinogenic waste, suspect-PCB ballasts and capacitors, non-suspect-PCB ballasts and capacitors, mercury vapor lamps, printed circuit boards, incandescent bulbs, and miscellaneous equipment.	400	20 ft L, 20 ft W	Staging area	Hazardous	Liquid	Unknown	Oils, solvents, carcinogens, PCBs and mercury, hazardous materials	Yes
4721 French Drain	1979 to present, Active	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. The drain may receive janitorial solutions of water and detergents as well as rainwater from the 4721 Bldg. It cannot be visually identified.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Water and detergents, and rainwater	Uncertain; cannot be visually identified
4722 Paint Shop HWSA	1980 to present, Active	Located on the N side of the 4722-C Bldg., just off the northeast corner. The site consists of two metal cabinets that are shielded by an open metal structure attached to the building. Wastes staged at the site include solvent-contaminated rags, antifreeze, and unspecified materials labeled "flammable" and "hazardous." Spill pans are in place under accumulation drums.	400	15 ft L, 5 ft W	Staging area	Hazardous	Liquid	Unknown	Paints, paint solvents, and antifreeze (ethylene glycol?)	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
4722-B French Drain	1979 to ?, Believed Inactive	Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. The drain received wastewater from lunchroom sinks in the 4722-B Bldg. Documents and Site personnel report that the lunchroom was remodeled a few years ago and the sinks were tied into the 4607 Sanitary Sewer system rather than the french drain. The drain is thus believed to be inactive. The drain cannot be visually identified at the site.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Wastewater from lunchroom sinks	Uncertain; cannot be visually identified
4722-C French Drain	1979 to ?, Unknown	Located on the S side of the 4722-C Bldg. Documents state that the french drain consists of a concrete or vitrified clay pipe filled with gravel. The pipe is a minimum of 5 ft long, has a diameter of 4 ft, and discharges into a gravel-filled drainage area. The drain has received wastewater from a sink used to wash soluble, nonhazardous latex paints from hands, brushes, and other equipment. Documents provide conflicting information about whether or not the drain remains active.	400	5 ft L, 4 ft D	French Drain	Nonhaz/ Nonrad	Liquid	Unknown	Wastewater from sink used to wash latex paint equipment, sodium dichromate	Yes
4831 Laydown HWSA	1984 to 1993, Inactive	This site consists of a concrete pad, approximately 50 ft long and 20 ft wide, with a 1-1/2 in. high berm around its edges. A metal building was installed on the pad to provide supply storage and sheltered workspace. The building is 18 ft long and 14 ft wide. This site is located in the northwest corner of the 400 Area, at the east end of Texas Street and directly behind the FMEF protected area fence.	400	20 ft W, 50 ft L	Staging area	Hazardous	Liquid	Unknown	Oils, solvents, ethylene glycol, and empty drums with Endcor 4690 residue	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
440 HWTSF (440 Hazardous Waste Temporary Storage Facility)	December 1993 to present, Active	This site is a less-than-90-day hazardous waste staging area that replaced the 4831 LHWSA. The north, west, and south walls of the tan-painted structure are steel siding; a chain-link fence borders its open east side. The fence has two locked gates. Drawings show the southeast corner of the facility to be a "Spill Cleanup Equipment Area," but this fenced area currently contains drums, and a white crate labeled "Spill Kit" is located in the main portion of the facility instead. The structure is on a concrete pad 60 ft long and 20 ft wide, and has a concrete berm along its east side.	400	12 ft T, 60 ft L, and 20 ft W	Staging area	Hazardous	Liquid	Unknown	Presumably the same constituents as for the 4831 LHWSA	Yes
4831 FSF (4831 Flammable Storage Facility)	Unknown, Active	This site consists of a corrugated metal building, known as the 4831 Building, and a concrete pad that is surrounded by a 6-ft-high chain-link fence. Approximately 80 drums were being staged in the fenced area as of May 1994. Additionally, two blue, 55-gal steel drums labeled "Nonregulated Waste" were in the fenced area.	400	20 ft W, 50 ft L (Pad); 20 ft H, 20 ft W, 50 ft L (Building)	Storage facility	Flammable	Unknown	Unknown	Unknown	Yes
Buried Construction Waste Area Number 1	About 1977 to 1979, Inactive	Hanford Site Drawing SK-4-81543 shows a buried construction waste area that is located northwest of the 451-B Substation and northwest of FMEF. It is currently covered by the 4843 Laydown Area; the 4843 Building; a vegetation-free, gravel-covered field; and paved roadways.	400	Covers an irregular area approx. 600 ft L and 467 ft W	Burial ground	Unknown	Unknown	Unknown	Construction waste	Yes
Buried Construction Waste Area Number 2	About 1972 to 1974, Inactive	Hanford Site Drawing SK-4-81543 shows a buried construction waste area that is located northeast of the 451-B Substation and northeast of FMEF. It is currently covered by a vegetation-free, gravel-covered field and the 4831 Flammable Storage Facility.	400	Covers an irregular area approx. 460 ft L and 308 ft W	Burial ground	Unknown	Unknown	Unknown	Construction waste	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
4843 AMSF (4843 Alkali Metal Storage Facility)	1986 to present, Active	The 4843 Bldg. is a fully insulated, bolted steel building that rests on a concrete slab. A rope barrier separates the building's interior into two sections: a dangerous alkali metal waste storage area and a mixed alkali metal waste storage area. Stored wastes include mixed sodium waste and contaminated sodium cleanup materials. Waste storage containers may include steel 5-, 30-, and 55-gal. drums, or sealed piping and components that have been welded closed.	400	40 ft by 40 ft	Storage facility	Alkali metal waste	Solid	Unknown	Mixed sodium waste, nonrad sodium waste, and nonrad lithium metal" (Note: the lithium metal is not waste)	No
Undocumented Waste Site, Altitude Valve Pit T-58 French Drain	Unknown, Believed Active	This french drain exists to receive rainwater from the 400 Area Altitude Valve Pit T-58. Its location is unknown. The drain is believed to be active, although it is possible that it is not. It reportedly receives intermittent discharges and has a normal flowrate of zero.	400	Unknown	French drain	Nonhaz/ nonrad	Liquid	Unknown	Rainwater	Unknown
Undocumented Waste Site, Altitude Valve Pit T-87 French Drain	Unknown, Believed Active	This french drain exists to receive rainwater from the 400 Area Altitude Valve Pit T-87. Its location is unknown. The drain is believed to be active, although the possibility exists that it is not. It reportedly receives only intermittent discharges and has a normal flowrate of zero.	400	Unknown	French drain	Nonhaz/ nonrad	Liquid	Unknown	Rainwater	Unknown
Undocumented Waste Site, Altitude Valve Pit T-330 French Drain	Unknown, Believed Active	This french drain exists to receive rainwater from the 400 Area Valve Pit T-330. Its location is unknown. The drain is believed to be active, although the possibility exists that it is not. It reportedly receives intermittent discharges and has a normal flowrate of zero.	400	Unknown	French drain	Nonhaz/ nonrad	Liquid	Unknown	Rainwater	Unknown

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, Burn Pit	Unknown, Believed Inactive	A burn pit is located approx. 3/4 mi northeast of the 400 Area, accessible by a dirt road that begins at the northeast end of the FFTF Visitor Center parking lot. Fire-scarred metal mesh screening, rags, wood scraps, and fire bricks are visible at the site. The pit appears to be inactive: unburnt tumbleweeds are piled within the pit and some natural vegetation has begun to grow on its walls. This burn pit is several hundred feet southeast of the undocumented waste dumping area.	600	100 ft L, 50 ft W, 15 ft D	Burn pit	Believed nonhaz/ nonrad	Solid	Unknown	Unknown	Yes
Undocumented Waste Site, Concrete Batch Plant	Unknown, Inactive	A batch plant for concrete mixing was located near the northeast corner of the 400 Area, just across the perimeter road and east of several railroad tracks. The batch plant operated during the construction boom of the 1970's, although its precise operating dates are unknown. A concrete and rebar building foundation and several uncovered concrete storage structures remain. The site is surrounded by a locked, 8-ft-high chain link fence with barbed wire on top.	600	Fenced area is 170 ft W, 280 ft L	Mixing plant	Nonhaz/ nonrad	Solid	Unknown	Concrete, rebar, concrete-mixing materials	Unknown
Undocumented Waste Site, Construction Material Dumping Area	Unknown, Inactive	Located several hundred feet NW of the Fuels and Materials Examination Facility (FMEF), just N of the perimeter road and W of the access road leading to the 4608 Percolation Ponds. Construction debris has been dumped at this site, including tires, concrete rubble, metal fencing, rebar, metal grating, sheet metal, piping, and metal scraps.	600	100 ft wide by 100 ft long	dumping area	Unknown	Solid	Unknown	Unknown	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Diesel Fuel Tank Fitting Leak	Reported May 10, 1994	One empty diesel fuel tank and one empty unleaded fuel tank were removed from an area near the 400 Area fire station on May 10, 1994. Fuel-contaminated soil was discovered under the tanks. The leaks appeared to be around the fittings, not from the tanks. The occurrence report states that 20 ft of soil was removed from the site but fuel-contaminated soil still remained. Site personnel state that the fuel that leaked was diesel and that more soil has been removed since the occurrence report was filed. As of August, 1994, the excavation site has been backfilled; diesel-contaminated soil is being treated in a plastic-lined bioremediation pit northeast of the excavation site.	400	Pit, 50 ft L, 30 ft W, and 32 ft D; four mounds 5 to 10 ft high	Unplanned release	Hazardous	Liquid	May 24, 1994 ACCI Bioremedia-tion pit is being dug	Diesel and possible unleaded fuel	Yes
Undocumented Waste Site, Material Dumping Area and Building Foundation	Unknown, Inactive	An area with a building foundation, sidewalks, and construction debris is located north of the 400 Area, approximately 100 ft N of the perimeter road and just east of the access road to the 4608 Percolation Ponds. Debris present includes wooden pallets, scraps of metal, concrete core samples, poured asphalt and concrete, and materials from the building that was decommissioned. Part of the building remains standing.	600	300 ft long by 200 ft wide	Dumping area	Nonhaz/ Nonrad	Solid	Unknown	Construction debris	Yes
Undocumented Waste Site, Sanitary Waste Tie-line from the 400 Area to the WPPSS	Inactive, Never Intentionally Used	The pipeline was installed in 1991 to connect the 400 Area sanitary sewer main to the WPPSS sewage treatment facility. The pipeline has never been intentionally used and may never be activated. A small amount of sanitary waste was inadvertantly allowed to discharge into the pipeline in late 1992.	600	8" diameter pipe	Pipeline	Nonhaz/ Nonrad	Liquid	Unknown	Sanitary Wastes	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, Septic Tank or Cistern	Unknown, Inactive	A 2-ft-diameter concrete pipe protrudes from the ground just north of another undocumented site, the Material Dumping Area and Building Foundation. The concrete pipe, which has a circular wooden cover, appears to drop approximately 15 ft into a concrete or concrete-lined circular vault. The vault is believed to be a septic tank or cistern that was used during the construction of FFTF and its support facilities in the 1970's.	600	Unknown	Concrete vault or cistern	Unknown	Liquid?	Unknown	Unknown	Yes
Undocumented Waste Site, Suspected Burial Ground	Unknown, Believed Inactive	A suspected burial ground is located approximately 3/4 mi northeast of the 400 Area, accessible by a dirt road that begins at the northeast end of the FFTF Visitor Center parking lot. This burial ground appears as an area that has been recently covered with soil and is raised 10 to 20 ft above surrounding terrain. It is just northeast of the undocumented material dumping area. Some wastes, such as cut electrical cable and a glove, are partially visible on the surface. A berm of soil runs across the north end of the site. Because it has been covered with soil, the burial ground is believed to be inactive.	600	100 ft L, 50 ft W	Burial Ground	Believed nonhaz/ nonrad	Solid	Unknown	Unknown	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, Waste Dumping Site	Unknown, Believed Active	A waste dumping site is located approximately 3/4 mi northeast of the 400 Area, accessible by a dirt road that begins at the northeast end of the FFTF Visitor Center parking lot. Tree limbs, bags of leaves, and other waste materials are scattered and piled along the southeast side of the dirt road. Further from the road are additional piles of wastes, including fire bricks, aluminum buckets, black rubber gloves, caulking guns, and metal scraps. The site is believed to be active because some items, such as the bags of leaves, appear to have been left recently.	600	3 acres	Dumpsite	Believed nonhaz/ nonrad	Solid	Unknown	Unknown	Yes
Undocumented Waste Site, Well Pump P-14 French Drain	Unknown, Believed Active	This french drain exists to receive pump packing leakage from the 480-A Pumphouse. The leakage consists of well water from well pump P-14. The drain's location is unknown. It is believed to be active, although the possibility exists that it is not. It reportedly has a normal flowrate of zero, presumably receiving only intermittent discharges.	400	Unknown	French drain	Nonhaz/ nonrad	Liquid	Unknown	Well water	Unknown
Undocumented Waste Site, Well Pump P-15 French Drain	Unknown, Believed Active	This french drain exists to receive pump packing leakage from the 480-B Pumphouse. The leakage consists of well water from well pump P-15. The drain's location is unknown. It is believed to be active, although the possibility exists that it is not. It reportedly has a normal flowrate of zero, presumably receiving only intermittent discharges.	400	Unknown	French drain	Nonhaz/ nonrad	Liquid	Effluent is monitored	Well water	Unknown

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, Well Pump P-16 French Drain	Unknown, Believed Active	This french drain exists to receive pump packing leakage from the 480-C Pumphouse. The leakage consists of well water from well pump P-16. The drain's location is unknown. It is believed to be active, although the possibility exists that it is not. It reportedly has a normal flowrate of zero, presumably receiving only intermittent discharges.	400	Unknown	French drain	Nonhaz/ nonrad	Liquid	Effluent is monitored	Well water	Unknown
Undocumented Waste Site, 400 Area Drainage Trench	Unknown, Active	A trench emerges just north of the perimeter road at the northeast corner of the 400 Area. It receives storm runoff from various drains throughout the 400 Area.	400	300 ft L, 30 ft W (top), 20 ft D	Trench	Nonhaz/ nonrad	Liquid	Unknown	Rainwater	Yes
Undocumented Waste Site, Retired Portable Sanitary Sewage Treatment Plant	1972 to 1979, Inactive	The portable treatment plant was located several hundred feet northeast of its sanitary pond and just E of the 4701-C Guard Station. It received sanitary wastes from buildings in the E and S portions of the 400 Area. Aqueous wastes from the plant were deposited in the 400 Area Retired Sanitary Pond, and sludges were hauled offsite for disposal. The sanitary pond received about 12,000 gal/day from the treatment plant. This plant was removed from the site after its use was discontinued.	400	See 400 Area Retired Sanitary Pond	Treatment facility	Nonhaz/ Nonrad	Liquid	Treatment plant has been removed from the site	Sanitary wastes	Uncertain; cannot be visually identified
Undocumented Waste Site, 451-A Substation and B/N Plant French Drain	Unknown, Believed Active	This french drain exists to receive rainwater from the 451-A Substation and the 400 Area B/N Plant. Its location is unknown. The drain is believed to be active, although the possibility exists that it is not. It reportedly receives only intermittent discharges and has a normal flowrate of zero.	400	Unknown	French drain	Nonhaz/ nonrad	Liquid	Unknown	Rainwater	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, 400 Area French Drain 11	Unknown, Active	Located S of the 408-C West DHX structure, SW of the Reactor Containment Building and southeast of 400 FD5. The french drain has received rainwater from the 453-B Switchgear pad. The drain is believed to be active, although the possibility exists that it is not.	400	Unknown	French drain	Nonhaz/ nonrad	Liquid	Unknown	Rainwater	Yes
Undocumented Waste Site, 4607 Sanitary Sewer Lagoon	1986 to Present, Active	The Sanitary Sewer Lagoon is located approximately 100 ft west of the 4608 Percolation Ponds outside the 400 Area fence. The unit has been in use for receiving sanitary effluent since the 400 Area Sanitary Tile Field clogged and failed. Approximately 42,000 to 49,200 L of effluent are discharged to the lagoon each day. The sanitary effluent has been monitored for ammonium, chloride, phosphate, lead, zinc, cadmium, mercury, and pH levels.	600	100 ft long by 100 ft wide	Lagoon	Nonhaz/ Nonrad	Liquid	Effluent is monitored	Sanitary wastes	Yes
Undocumented Waste Site, 4608 Sanitary Sewer	1983 to present, Active	The septic tank is located in the southwest corner of the 400 Area, just east of the 4608 Sanitary Tile Field. Receives approximately 750 gal/day of sanitary wastes from several trailers in the southwest corner of the 400 Area. Liquid effluent is discharged to the tile field.	400	120 ft by 100 ft	Septic tank	Nonhaz/ nonrad	Liquid/ sludge	Unknown	Sanitary wastes	Yes
Undocumented Waste Site, 4608 Sanitary Tile Field	1983 to present, Active	The unit is located in the southwest corner of the 400 Area, just inside the perimeter fence. The unit is a tile drainfield for sanitary effluent from the 4608 septic tank that serves several trailers in the southwest corner of the 400 area. The septic tank receives 750 gal of sanitary wastes each day.	400	Septic tank volume is 3,000 gal	Drainfield	Nonhaz/ nonrad	Liquid	Unknown	Sanitary wastes	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
Undocumented Waste Site, 4713-B Loading Dock French Drain	Unknown	This french drain exists to receive lunchroom sink wastewater and cooling water from welding torches at the 4713-B Loading Dock. Its location is unknown. The drain is believed to be active, although the possibility exists that it is not. It reportedly receives only intermittent discharges and has a normal flowrate of zero.	400	Unknown	French drain	Nonhaz/ nonrad	Liquid	Unknown	Lunchroom sink wastewater, welding torch cooling water	Unknown
Undocumented Waste Site, Buried Construction Waste Area Number 1	About 1977 to 1979, Inactive	A buried construction waste area is located northwest of the 451-B Substation and northwest of FMEF. The burial ground is located underneath the 4843 Laydown Area, the 4843 Building, roadways, and a gravel-covered area.	400	Unknown	Burial ground	Nonhaz/ nonrad	Solid	Unknown	Construction waste	Partial
Undocumented Waste Site, Buried Construction Waste Area Number 2	About 1972 to 1974, Inactive	A buried construction waste area is located northeast of the 451-B Substation and northeast of FMEF. A historical drawing indicates that the burial ground was located under the "future" site for the "4224 Flammable Storage Building." The site is currently under the 4831 Flammable Storage Facility and a gravel-covered area.	400	Unknown	Burial ground	Nonhaz/ nonrad	Solid	Unknown	Construction waste	Partial
Undocumented Waste Site, 440 Hazardous Waste Storage Pad	December 1993 to Present, Inactive	This pad replaces the 4831 LHWSA as a less-than-90-day hazardous waste storage pad. It is located along the south side of the 4831 Building and is surrounded by a locked chain-link fence. Unlabeled and apparently unused drums are stacked at the pad's east end. Also two drums labeled "Nonregulated Waste" were stored at the site in May 1994.	400	20 ft wide, 50 ft long	Staging area	Hazardous, nonrad	Liquid	Unknown	Unknown	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
UPR-300-1	December 9, 1969	Between the 307 Retention Basin (RB) and the 340 Bldg. A leak was discovered in the transfer line from the retention basins to the 340 Building. 90% of contamination is believed to be confined to ~12 ft diameter by ~25 ft deep area. Hazard Ranking Score: 26.60. Soil samples were collected and analyzed. A groundwater monitoring well and four exploratory holes were drilled.	300	25 ft deep, 12 ft diameter	UPR	Mixed	Liquid	Top 2 ft of soil placed in drums and removed. Further removal of soil considered a threat to adjacent structures	900 Ci of relatively short-lived radionuclides mainly ^{147}Pm and 10 curies of ^{90}Sr and ^{137}Cs	Yes
UPR-300-2	January 1, 1954	Within 10-20 ft N, E and S of the 340 Bldg. Hazard ranking score: 18.27.	300	100 ft L, 100 ft W, 20 ft D	UPR	Mixed	Liquid	Unknown	^{137}Cs at ~10 mCi	Yes
UPR-300-4	1945 to 1955	Beneath and S of the 321 Bldg. Leaks from equipment during the development of REDOX and PUREX processes. Hazard Ranking Score: 22.12. Includes several spills and accidents.	300	100 ft L, 100 ft W, 20 ft D	UPR	Mixed	Liquid	Removal of soil considered a threat to the 321 Bldg.	Uranyl nitrate, uranium	No
UPR-300-5	August 31, 1973	~4 ft from the 309 Bldg. and extending the full width of the truck ramp. The 309 Storage Basin fill line was left open, pouring water into the basin and causing it to overflow. Hazard Ranking Score: 14.66.	300	Unknown amount released, but pumped 7-10,000 gal to the process sewer	UPR	Low-level	Liquid	Contaminated area was decontaminated ~25 by 50 ft asphalt cement cover	Low-level rad water	No
UPR-300-7	August 7, 1972	Around the day tank behind the 384 Bldg. No. 6 fuel oil overflowed a full day tank behind the 384 Bldg. The spilled oil was retained in the concrete valve pits around the day tanks and in the soil between and around these tanks. ~30 gal oil flowed with waste water in the trench to a sewer system that empties into a sump in the SE basement of the 384 Bldg.	300	850 gal	UPR	Hazardous	Liquid	Recovered ~800 gl of oil, conduits through the 384 Bldg. foundation and the floor trench were flushed	No. 6 fuel oil	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessibility
UPR-300-10	Discovered 1977	Beneath the 325 Bldg. Waste from the RLWS from the 352-B Hot Cells, including waste from the dissolution of highly radioactive samples, such as irradiated fuel cells. Leak testing identified a leak in the RLWS between the west basement wall of Room 32 in the 325 Bldg. and the north foundation wall of Room 202.	300	Unknown	UPR	Mixed	Liquid	The line was capped and re-routed through the basement of the 325 Bldg.	uranium-Manuf., R & D waste, fission products, transuranics	No
UPR-300-11	August 21, 1977	Beside the 340 Bldg. Fission products found in soil samples, but no alpha emitters. Leaking flanges in the RLWS resulted in contamination of ~22 ft^3 of soil, extending to ~23 ft below grade. At that depth, contamination spread laterally at an interface between undisturbed soil/backfill. Evidence of contamination from a separate event was also found but not characterized. Hazard Ranking Score: 17.43.	300	2 ft L, 3 ft W, 15 ft D	UPR	Mixed	Liquid	Soil removed by hand excavation to ~8 ft, about 90% of the contamination removed, leaving ~1 Ci in-place	Fission products (no alpha emitters)	Yes
UPR-300-12	January 8, 1979	Beneath the 325 Bldg. Discharge of waste when a sewer valve was closed resulted in loss of radioactive rinse water to the basement floor and leakage to the ground through a crack. Contamination never characterized. NO^3 (but not radionuclides) detected in nearby well. Hazard Ranking Score: 62.88.	300	40 ft L, 1 ft W	UPR	Mixed	Liquid	Decon completed in the 50-A Room. Removal of soil considered a threat to the 325 Bldg.	Fission products, transuranics, ^{147}Pr, nitrate	No
UPR-300-13	July 31, 1973	Around and under the spent acid receiver tank. Tank located beneath the current location of 334-A Bldg. Spent process acid that included 4,432 lb NO3, 447 lb copper, and 3 lb (~0.005 Ci) uranium. Spent acid leaked to the ground through a hole in a steel tank wall. Extent of contamination unknown. Hazard Ranking Score: 59.74. Tank removed in 1973.	300	4,921 L	UPR	Mixed	Liquid	Caustic was added to neutralize the leak, and the tank was removed	Spent process acid (with Uranium)	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
UPR-300-14	July 18, 1975	A line break in the fill line from the number 3 hightank in the 334 Tank Farm caused the loss of 1200 gal of 93% sulfuric acid. The solution traveled through the concrete trench to a limestone pit. The open-bottomed limestone pit is located over the 618-1 Burial Ground. Hazard Ranking Score: 9.22.	300	1,200 gal	UPR	Mixed	Liquid	Limestone pit may have neutralized some of the acid	Sulfuric acid	Yes
UPR-300-17	September 2, 1979	At the SE corner of the 333 Bldg. Rain caused a box of uranium shavings to ignite. Contamination was limited to the ground surface around the can (radius of ~10 ft). Readings to 15,000 cpm 2 ft from the box. The asphalt around the site was replaced. Hazard Ranking Score: 22.59.	300	~10 foot diameter area	UPR	Mixed	Liquid	The contaminated area was removed and the area patched with new asphalt	uranium-fines	Yes
UPR-300-18	August 27, 1962	The site is located within the 321 Tank Farm. Solution squirted unexpectedly out of a drain hole when the drain plug was removed. Most of the liquid sprayed on employee, who immediately replaced plug. Unknown amount of release to the ground.	300	Unknown	UPR	Mixed	Liquid	Employee deconned, no mention of any soil cleanup	Low-level Cs waste	Yes
UPR-300-38	Approx. 1954	The ground beneath the floor at the Acid Waste Neutralization Tank and uranium Acid Neutralization Tank at the 313 Bldg. Uranium Recovery Area. During repair of a floor in the 313 Bldg. in the early 1970's, solution was found running into a hallway from beneath the floor brick. Hazard Ranking Score: 62.88.	300	Unknown	UPR	Mixed	Liquid	Seeping material was collected, some sub-floor material removed, but removal not complete	Acid with Uranium	No
UPR-300-39	1954	By the caustic storage tanks in the 311 Tank Farm. Leaking caustic storage tanks in the 311 Tank Farm contaminated the soil around the tanks. Hazard Ranking Score: 44.02.	300	Unknown	UPR	Hazardous	Liquid	Unknown	Caustic solution (NaOH)	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
UPR-300-40	1961	The ground around pipe trench between 311 Tank Farm and the 303-F Bldg. Broken drain connections for a long time between the pipe trench, the 303-F Bldg. and the process sewer resulted in spill. The volume of the release is unknown. The trench was replaced and the soils below are contaminated with uranium-bearing acid. Hazard Ranking Score: 59.74.	300	Unknown	UPR	Mixed	Liquid	Piping connections and the trench floor were repared, no removal soil conducted	Acid with uranium	Yes
UPR-300-41	June 3, 1986	~15 ft west of the 340 Bldg. 113.6 L. A 55-gal drum containing acid leaked onto an asphalt pad and an area of soil next to the pad. Release consisted on various acids with metals (chromium, manganese, iron, nickel).	300	113.6 L	UPR	Hazardous	Liquid	Soil samples were collected and analyzed	Acids with metals	Yes
UPR-300-42	October 12, 1983	At the No. 2 Day Tank adjacent to the Power House. 1135 L No. 6 fuel oil overflowed from a tank onto the ground.	300	1,135 L	UPR	Hazardous	Liquid	Sand was spread over the spill area to confine and absorb oil, oil-soaked sand was removed from the spill area	Fuel oil	Yes
UPR-300-43	July 1, 1986	Outside the 329 Bldg. 208.2 L. The spill was caused by container failure due to corrosion. The spill contained solvent-refined coal (light fraction and nonradioactive).	300	208 L	UPR	Hazardous	Liquid	All discolored soil was removed	Solvent-refined coal (non-radioactive)	Yes
UPR-300-44	January 1, 1985	While a new extrusion press was being installed, a leak was discoverd in a section of process sewer line. The leak resulted in a discharge to the ground. It is unknown when the leak started. Spills in the 313 Uranium Recovery Area could have entered this process line.	300	Unknown	UPR	Mixed	Liquid	Some contaminated soil was removed	uranium-bearing acid or waste etch acid, by-product waste material	No

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
UPR-300-45	February 1, 1985	The ground beneath the transfer piping, E of the 303-F Bldg., 37.9 L. A leak occurred from the uranium-bearing acid transfer line due to gasket failure. The leak contained uranium-bearing waste acid (3480 ppm NO^3, 6960 ppm SO^4, and 920 ppm uranium).	300	37.9 L	UPR	Mixed	Liquid	Some soil was exhumed for disposal, the effectiveness of the cleanup is undetermined	uranium-bearing waste acid	Yes
UPR-300-46	June 1, 1989	N of the 333 Bldg. at the N end of the yard inside the fence. Radioactive contamination was discovered during excavation of a pipe trench. The contamination appeared to be confined to a narrow band of soil ~1 to 2 in. thick. Date of the actual release is not known.	300	Unknown	UPR	Low-level	Unknown	~1 dump truck full contaminated soil was removed, suppose to add 4" of crushed stone over area and warning signs	Radioactive contamination	Yes
UPR-400-1	February 1, 1984	Located N of the 427 Bldg. (FMEF) and adjacent to its cooling towers. Approx. 189.3 L of a coolant solution containing 50% water and 50% ethylene glycol was spilled on the ground during construction. The area immediately E of the cooling towers is a vegetation-free, gravel-covered field surrounded by an asphalt roadway.	400	189 L	UPR	Hazardous	Liquid	Unknown	Ethylene glycol	Yes
UPR-600-1 (618-10)	July 1, 1961	Located at the 618-10 BG and an area extending to 300 yd outside the fence. A fire occurred in the 618-10 BG. Readings over 100,000 cpm for most particles, with up to 20 particles per 100 ft^2 at a distance of 50 to 75 ft from the BG fence. At 300 yd outside the fence, 3 particles per 100 ft^2 were detected ranging from 4,000 to 20,000 cpm. Hazard Ranking Score: 13.23.	600	Unknown	UPR	Mixed	Solid	Area covered with dirt. Not sure what the term "area" refers to	Radioactive	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessibility
UPR-600-2 (618-10)	February 1963	Inside the 618-10 BG. Spotty contamination during routine burial of a milk bucket. Contamination was limited to a 5-ft radius around the barrel where the bucket was placed, an area in front of the BG gate, and a spot in front of the powerhouse. Hazard Ranking Score: 17.07.	600	5 ft diameter	UPR	Mixed	Solid	618-10 BG surface stabilized in 1983	Airborne rad to 80,000 cpm	Yes
UPR-600-3 (618-10)	September 1963	Within the 618-10 BG. An improper container was used to dispose of waste. The lid came off and dust puffed out onto the ground. Readings to 400 mR/h at 2 in. Hazard Ranking Score: 16.17.	600	600 sq ft	UPR	Mixed	Solid	618-10 BG surface stabilized in 1983	Radioactive	Yes
UPR-600-4 (618-11)	March 1964	Radioactive material (from the High-level Radiochemistry Facility) blew out of a waste can as it was lowered into the 618-11 BG. Readings were up to 10,000 cpm.	600	1000 ft^2	UPR	Mixed	Liquid	618-11 BG surface stabilized in 1983	Radioactive	Yes
UPR-600-5 (618-11)	May 1964	Within the 618-11 BG. Employees were contaminated during routine burial operations at the 618-11 BG when a fine white powder escaped from the truck chute and spilled onto the ground.	600	1800 ft^2	UPR	Mixed	Solid	618-11 BG surface stabilized in 1983	Radioactive 500 cpm of beta/gamma gross fission products	Yes
UPR-600-6 (618-11)	February 1965	High winds blew waste from a truck, over an employee, and onto the ground, causing spotty contamination at the 618-11 BG.	600	1400 ft^2	UPR	Mixed	Solid	618-11 BG surface stabilized in 1983	^{103}Ru, zirconium-^{95}Nb with readings from 100 cpm to 200 mR/r	Yes
UPR-600-7 (618-11)	March 1965	At the 618-11 Burial Ground, an employee dropped a box from the back of a truck. Box contained a contaminated filter from 327 Bldg. Dust came out of the box, causing spotty contamination in the immediate vicinity.	600	Unknown, spotty contamination	UPR	Mixed	Solid	618-11 BG surface stabilized in 1983	Radioactive	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
UPR-600-8 (618-11)	April 1967	The release occurred during routine burial operations. UPR consisted of either air backup from a burial caisson chute or loose contamination blown from the release gate of a cask as it was operated.	600	30 ft^2	UPR	Mixed	Solid	618-11 BG surface stabilized in 1983	Radioactive, readings to 100,000 cpm	Yes
UPR-600-9 (618-11)	April 1967	During routine burial operations in the 618-11 Burial Ground, a piece of waste became lodged in the truck chute, causing an airborne release of contamination. Contamination was limited to a fan-shaped area extending from the dump chute. Contamination within the Burial Ground was covered with 3-6 in. of gravel. Outside the fence, soil was turned to bury contamination.	600	750' X 450'	UPR	Radiological	Solid	618-11 BG surface stabilized in 1983.	Radioactive, readings up to 450 mR/h at the chute	Yes
UPR-600-10 (618-11)	September 1963	Around barrel 327-2 at the 618-11 Burial Ground. During a routine burial operation, a container was externally contaminated with a significant quantity of loose, highly radioactive material, causing ground contamination. Hazard Ranking Score: 11.88. The 618-11 Burial Ground was surface stabilized in 1983.	600	400 sq ft	UPR	Mixed	Solid	Contamina-ted ground area was washed down w/ 6,000 gal water to control blowing. Some soil removed. Area then covered w/ clean sand.	Airborne radiation contaminant readings up to 1/4 R/h at 3 in of high-level beta/gamma.	Yes
UPR-600-11 (JA Jones #1/600-1)	May 1980	At the 305-B berm and the JA Jones #1 (600-1) Pit. Workers excavated 100 yd^3 of berm material and buried it in a clean landfill (JA Jones #1/600-1) before contamination was detected. The contamination is believed to have originated from discarded asphalt blacktop rubble at S end of berm.	600	100 cu yd of soil	UPR	Mixed	Solid	Contamina-ted soil was initially removed from the berm and buried in JA Jones #1, then re-excava-ted and placed in 200 Area BG. Pit is now free of residual contami-nants	Beta/gamma readings up to 4000 cpm in the dirt	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
600-1 (Dump Area)	1975 to 1979 Inactive	This site is the same as the JA Jones #1 construction landfill. The site is north of the 300 Area, east of the 400 Area, between Route 4S and the river. This site contains varied solid wastes from different construction sites, including wood scraps, concrete, and miscellaneous construction wastes. Radiologically contaminated soil was dumped here but reportedly moved.	600	100' X 50' X 10'	Dumping area/landfill	Hazardous	Liquid/ solid	Pit where paint was dumped has been filled w/ sand	Paints, misc construction debris, possible radiation	Yes
600-21 (WPPSS "Windrow" Site)	Inactive	The unit is adjacent to the 618-11 Burial Ground. Contamination from an unplanned release in the 618-11 Burial Ground was covered by scraping the affected ground into "windrows." The site consists of a series of small parallel berms approximately 18 in. tall, 3 ft wide, and 100 yd long. The berms are arranged to form a triangle approx. 150 yd by 100 yd long. Perimeter berms are approx. 3 ft tall.	600	A triangle ~150 yds by 100 yds long	UPR	Radioactive	Solid	Berms were surveyed in 1972, no beta or alpha contamination was detected above background	Radioactivity	Yes
600-22 (UFO Landing Site)	Pre-HEW, Inactive	The site is west of the 300 Area. It appears as a large asterisk on aerial photos. Ground inspection reveals minor vegetation disturbances, indicated by the range of vegetation types growing at the site that are different from surrounding terrain. This may be due to the application of herbicides. Bomb fragments have been found scattered about the site. It is believed that the site was an old military bombing area. Note: contact the Hanford Patrol training academy before visiting the UFO Landing Site because the site is at the edge of a live firing range.	600	~10 acres	Dumping area	Hazardous	Ordnance	Unknown	Bomb fragments	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
600-23 (Pit)	Inactive	The unit consists of a large rock pit some 30 acres in area and 60 ft deep. Most of the waste is located at the N portion of a middle terrace at the W end of the site. The terrace contains construction debris. Barrels are present at the face of the terrace. Asbestos is also present. No barrels or asbestos could be seen on a site visit.	600	~30 acres	Gravel pit	Mixed	Unknown	Unknown	Construction debris, empty barrels, asbestos, possible rad	Yes
618-1 Burial Ground	1944 to 1951, Inactive	Adjacent to the 333 Bldg. in the NE corner of the 300 Area near the exclusion fence. The unit consisted of at least two trenches running N-S, 16 ft wide (surface) by 200 ft long by 8 ft deep. Also, a series of pits 20 ft deep by 15 ft wide runs E-W. The site contains large quantities of uranium (~16 tn), and small quantities of plutonium and fission products from the 300 Area labs fuel fabrication, with incidental additional waste from a very small laboratory operation. Several buildings and the 334 Tank Farms were built on top of the 618-1 Burial Ground. UPR-300-14 involved a spill of acid that may have dissolved some waste in the 618-1 Burial Ground.	600	320 ft L, 150 ft W, 20 ft D. 465 m^3 contaminated soil, 621 m^3 overburden.	Burial Ground	Mixed	Solid	Unknown	U, Pu, fission products	Yes
618-2 Burial Ground	1951 to 1954, Inactive	Located northeast of the 333 Building on the N side of the 300 Area exclusion fence. The unit contains 4 trenches running E-W. Each trench is 51 ft wide (Top) by 150 ft long by 15 ft deep, with a bottom width of 6 ft. The unit was used for disposal of uranium-contaminated equipment and materials, plutonium, fission products, tin, lead, and automotive-type batteries. The uranium waste was typically solid metallic uranium oxides in the form of metal cuttings from Reactor Fuel Fabrication facilities in the 300 Area.	600	350' X 215' X 15'	Burial ground	Mixed	Solid	Interim stabilized in 1989.	uranium, plutonium fission products, tin, lead, and automotive batteries	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessibility
618-3 Burial Ground	1954 to 1955, Inactive	West of 618-2 and adjacent to the 300 Area exclusion fence. Reports state that the site had either one large trench running north-south or several pits. An extension was later added at the north end of the burial ground. The burial ground received uranium-contaminated waste, primarily building materials from the remodeling of the 313 Bldg. After the 50-ft-long extension was added, the burial ground had a total length of 400 ft. Hazard Ranking Score: 0.00.	600	350' X 165' X 15', lengthened 50 ft at N end for a total length of 400 ft 12,549 m^3 contaminated soil, 12,643 m^3 overburden	Burial ground	Mixed	Solid	Interim stabilized in 1989	Uranium	Yes
618-6 Burial Ground	1944 to 1946, Inactive	The unit apparently no longer exists. It was originally located in the vicinity of the 325 Bldg. (1944 to 1946) and was moved twice thereafter because of construction. It was later moved to the site of the 324 building, where it remained from 1951 to 1962. In 1962, the contents were moved to the 618-10 Burial Ground.	300	Unknown	Burial ground	Mixed	Solid	Unit moved several times. It is not known how effective the removal operations were at attaining cleanup.	Solid uranium waste	Yes
618-7 Burial Ground	1960 to 1973 (Believed), or 1955 to 1956, Inactive	Located approximately 1,500 ft NW of the 300 Area. Site contained two drive-in, E-W oriented trenches 160 ft in length, 100 ft wide, and 12 ft deep, and one V-shaped pit 140 ft long by 20 ft wide. The V-shaped pit was used for thorium disposal. The site contains low-level uranium- and thorium-bearing material from fuel manufacturing activities, drummed containers of solvent with moderate amounts of uranium, and hundreds of 30-gal. steel drums containing zircaloy chips slightly contaminated with beryllium. The drums containing zircaloy chips were filled with water due to the pyrophoric nature of the chips. Because the drums may have corroded and leaked and some may no longer contain water, there is the potential for an explosive reaction.	600	1120 ft L, 650 ft W, 12 ft D	Burial ground	Mixed	Solid	Trenches were closed, backfilled and covered with clean soil	Uranium contaminated solvents, zircaloy chips slightly contaminated with beryllium, and low-level uranium- and thorium-contaminated material	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
618-8 Burial Ground	1943? to 1944?, Inactive	The unit is reportedly located under the parking lot adjacent to the 300 Area north perimeter fence. The unit contains several burial trenches. A parking lot was constructed over the majority of the site. Subsequently, the radiation monuments were cut down to grade. Contamination has been found outside of the north, west, and east. The site was used mainly for the disposal of uranium-contaminated solid waste derived from reactor fuels manufacturing.	600	660' X 100' X 15'	Burial ground	Mixed	Solid	A parking lot exists over a majority of the site	uranium-fuels manufacturing	Yes
618-9 Burial Ground	1950 to 1956, Inactive	Located 3/4 mi NW of the 300 Area. Consisted of an open excavation with the excavated soil lining the N and S sides of the trench. After removal from service, the trench was backfilled, stabilized, and identified with markers. From February to May 1991, the site was exhumed and all waste was removed under an ERA. Approximately 700 gal of methyl isobutyl ketone, 900 gal of kerosene solvent, and 1400 ft^3 of debris was removed. The debris was disposed of at the Low-Level Burial Ground. The recovered solvent was originally stored at the site surrounded by a chain link fence, but it has since been removed. Relatively insignificant amounts of kerosene remain in soils at the site; hexone has not been detected. RA indicated negligible risk to human health and the environment. Hazard Ranking Score: 0.00.	600	180 ft L, 40 ft W, 15 ft D	Burial ground	Mixed	Solid	Unit was backfilled/ stabilized when removed from service. In 91, the site was exhumed and all waste removed under an ERA.	Uranium contaminated solvents from the 321 Building, including methyl isobutyl ketone and NPH/TBP, and ammonium nitrate fertilizer	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
618-10 Burial Ground	March 1954 to September 1963, Inactive	~4 mi NW of the 300 Area. The site consists of 12 trenches and 94 pipe facilities. The trenches range in size from 300 ft long by 75 ft wide by 25 ft deep to 50 ft long by 40 ft wide by 25 ft deep. The pipe facilities are 22-in. diameter, 15 ft long pipe made by welding together 55-gal drums, buried vertically. They have been backfilled and topped with concrete. Low-level wastes are in the trenches, and medium- to high-level wastes are in the pipes. An unknown number of early pipe units constructed from 14-in. diameter well casings also exist at the site.	600	500 ft L, 500 ft W, 25' D 27,854 m^3 contaminated soil, 12,773 m^3 overburden	Burial ground	Mixed, TRU	Solid/ liquid	Site was surface stabilized in 1982. No surface contaminant detected during October 1990 survey.	Fission products, Plutonium, low- to high-level dry wastes, petroleum liquids	Yes
618-11 Burial Ground	1962 to 1967, Inactive	~7.5 mi NW of the 300 Area. The site consists of 3 trenches, 50 pipe facilities, and 4 caissons. Written records conflict as to the total number of large-diameter caissons. The trenches are 900 ft long, 50 ft wide, 25 ft deep. The pipe facilities are 22-in. diameter by 15 ft long, buried vertically (made from 55-gal drums). The caissons are 8-ft-diameter corrugated metal pipe, 10-ft long, buried 15 ft below grade. Based on process knowledge, the site contains a vast spectrum of low- to high- level wastes.	600	1000 ft L, 375 ft W, 15 ft D 7,900 m^3 contaminated soil, 18,000 m^3 overburden	Burial ground	Pre-1970 TRU, mixed	Solid	Site was surface stabilized in 1983. No surface contaminant detected during October 1990 survey.	Fission products, Plutonium low- to high-level dry radioactive wastes, solvents, eutectics wastes	Yes

Table 2-2. Summary of 300-FF-2 Operable Unit Waste Sites (59 sheets).

300-FF-2 Operable Unit Waste Site	Dates Operational and Status	Description of Waste Site and/or Facility	Hanford Area	Approximate Area or Volume	Site Type	Waste Received	Waste Type	Permits/Plans Submitted/ Cleanup Acts	Potential Waste Constituents	Sample Accessi-bility
618-13 Burial Ground	1950 to 1950 or 1974?, Inactive	Approximately 1/2 to 3/4 mi NW of the 300 Area. The unit consists of a mound of soil, originally covered with 2 ft clean soil. The mound has been posted as a rad zone. This site received topsoil from the 303 Bldg. area. Total activity buried here is not known. Site was used for storage of depleted solvents in 55-gal drums prior to burial in the adjacent 618-9 burial ground. Site personnel suspect that berms may have been used as a blast shield for the stored solvent-filled drums.	600	125 ft L, 50 ft W, 15 ft, 20 ft	Burial ground	Mixed	Solid	Originally covered with 2 ft clean soil, mound added later as a blast shield, posted "Do Not Disturb Environmental Test Site"	Unknown radionuculide contaminated topsoil	Yes
Metal Shavings Area North of the 300 Area	1962 to 1972, Inactive	The site is located above the early burial ground and was used as a staging area for uranium-contaminated aluminum shavings. The site is currently within a posted surface contamination area. See the section on the undocumented Solid Waste Burial Ground (Early Burial Ground) for more information.	600	Unknown	Staging area	Radioactive	Solid	Unknown	Uranium-contaminated aluminum shavings and lead	No

3.0 300 AREA FACILITIES AND WASTE SITES IN OPERABLE UNIT 300-FF-2

3.1 300 AREA HISTORY AND BACKGROUND

In prehistoric and early historic times, the Hanford Reach of the Columbia River, which encompasses the 300 Area, was heavily populated by indigenous people of various tribal affiliations. The Wanapum and the Chamnapum band of the Yakama Nation dwelt along the Columbia River from south of Richland upstream to Vantage. The Palus people and the Walla Walla and Umatilla Tribes also made periodic visits to the area to fish.

Modern archaeological surveys in the 300 Area have been restricted to a narrow strip along the riverbank. Four archaeological sites are reported to be located partially within the 300 Area, and ten additional sites are within 2 km of the area perimeter. None of the archaeological sites on or adjacent to the 300 Area are considered eligible for the National Registry of Historic Places, but there is no record that any of them have been subjected to the formal evaluation process. Consequently, there is no information on the sites' ages and little information about their prehistoric uses. Sites have, however, been characterized according to their surface characteristics. Three of the sites in Benton County are housepit villages, including site 45BN105, reported to contain four or five housepits. The remaining Benton County sites are open camping/fishing stations (4) and shell middens (2). Remains of homesteads and irrigation facilities are seen on the heavily disturbed riverbank in and adjacent to this area. These have not been systematically investigated are not recorded as historic archaeological sites.

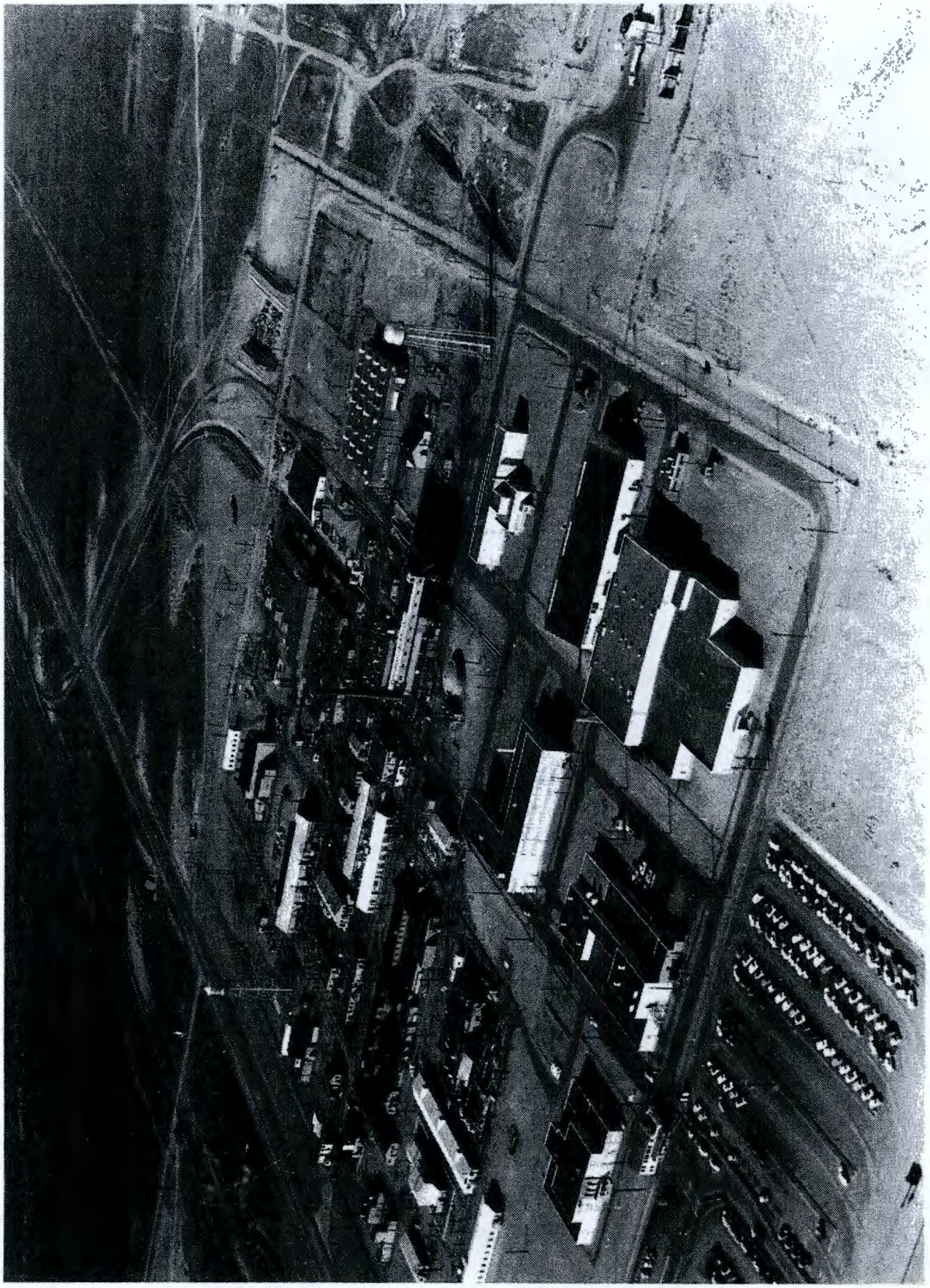
"One locality important to the historic Wanapum Indians is located near the 300 Area. Sekema, a favorite place for taking salmon, was located some 10 km north of Richland (Relander 1956), which would place it 2 to 3 km north of the 300 Area boundary. However, because Relander's descriptions of geographic locations are only approximate, it is possible that Sekema corresponds to any or all of the Benton County archaeological sites mentioned above" (Cushing 1988).

3.2 GENERAL DESCRIPTION OF THE 300 AREA

The Hanford Site was established in 1943 by the U.S. Army Corps of Engineers as an integral part of its Manhattan Engineering District (MED) mission to produce nuclear weapons for use in World War II. Referred to as the Hanford Engineering Works (HEW), Hanford's specific mission was to produce weapons-grade plutonium. This was successfully accomplished in a three-step process that employed manufacturing facilities in three widely separated Hanford plant locations. Fuels manufacturing took place in the 300 Area; fuel irradiation in the 100 Area; and plutonium extraction in the 200 Areas.

The 300 Area, on the west bank of the Columbia River near the southern limits of the Hanford Site and about 1 mi north of the Richland city limits, also became the primary location for research and development activities. Numerous laboratories were located there. Figure 3-1 is an aerial photograph taken of the 300 Area on April 7, 1955. Additionally, Figure 3-2 is a drawing of the 300 Area showing the area's current facilities and operable unit boundaries.

Figure 3-1. Aerial Photograph of the 300 Area, April 1955.



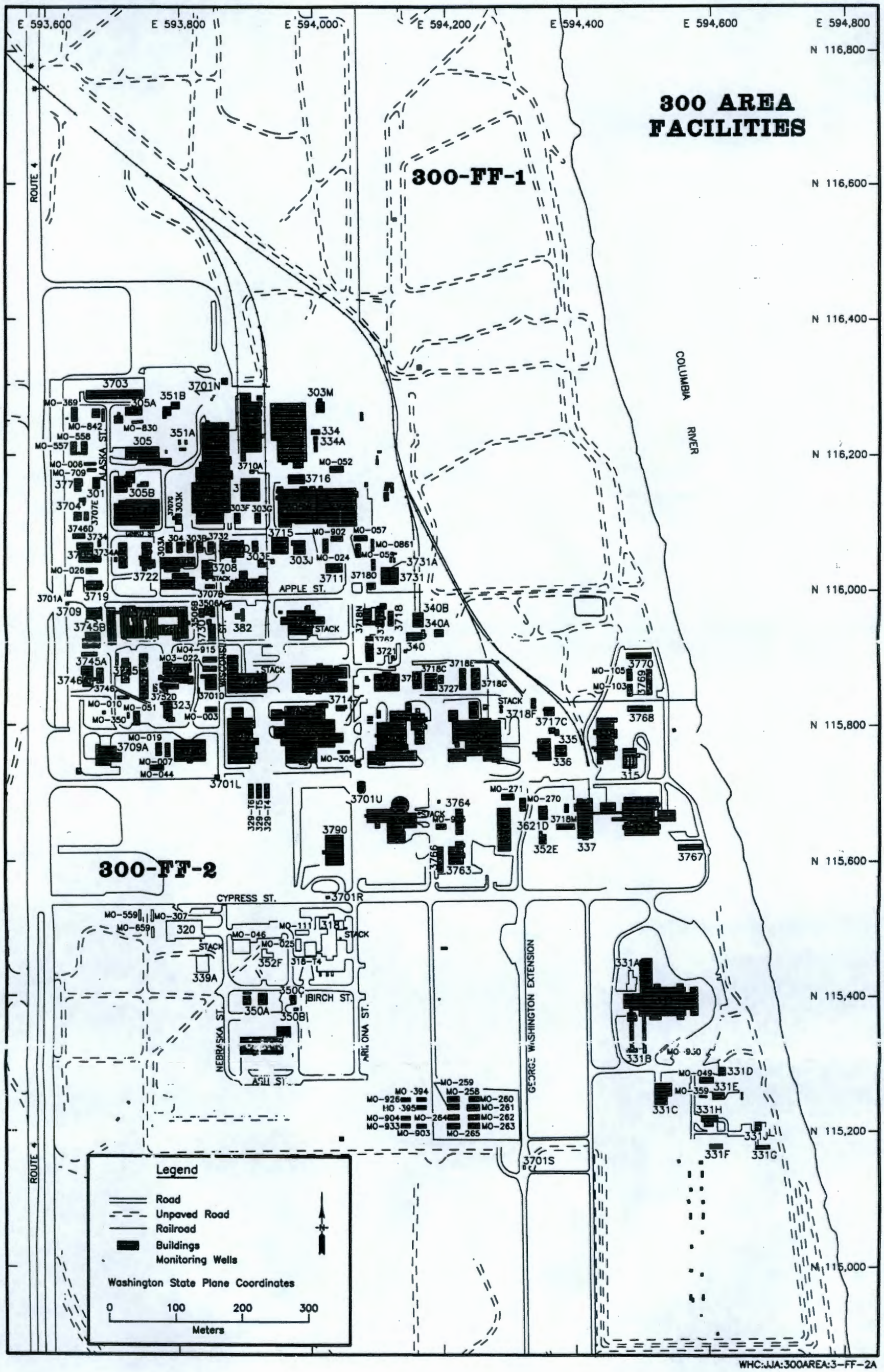


Figure 3-2. Facilities in the 300 Area.

Roughly rectangular in shape, the 300 Area covers about 370 acres. It is relatively flat and about 15 m (50 ft) above the average elevation of the adjacent river. The Hanford Site land surface surrounding the area is devoid of prominent surface features and slopes gently upward to the northwest.

"Surface sediments in the 300 Area are largely wind-transported sands and silts. These sediments, deposited in dunes up to 3 m (9.8 ft) in depth, have been largely stabilized by vegetation. Below this layer lie 20 to 25 m (66 to 82 ft) of coarse-grained glaciofluvial deposits known as the Pasco gravels; the permeability of the deposits is very high.

"The high porosity and permeability of the sands and gravels that underlie the area allow any precipitation to infiltrate rapidly. Flooding of any portion of the 300 Area by rainwater is therefore highly improbable. There are no natural streams or watercourses other than the Columbia River within or adjacent to the 300 Area.

"Ground water enters the 300 Area from the northwest, west, and southwest and flows into the Columbia River. Throughout most of the 300 Area, the groundwater flows toward the east and southeast. Only in the southern portion of the area does the ground water flow in a northeasterly direction. The water table generally slopes downward from west to east; depth to ground water is from 10 to 15 m (34 to 48 ft). Variations in river level, ground-water withdrawal from area wells, and discharge of waste water to the process ponds and leaching trenches causes variations in the level of the water table.

"The residence nearest the 300 Area is approximately 1.5 km (0.9 mi) east across the Columbia River. A number of irrigated farms are located just across the river from the 300 Area. The northern part of Richland, lying within about 4 km (2.5 mi) of the 300 Area, is an industrial park. The nearest residents in Richland are about 4.6 km (2.9 mi) from the 300 Area boundary. The nearest city water intake is the Richland pumping station, 6 km (3.7 mi) downstream" (Stenner et al. 1988).

The activities in the 300 Area have included many technical and service support functions such as fuel manufacturing. As the Hanford production reactors were shut down, fuel manufacturing activities decreased and other activities increased. For more than 20 years, research and development programs have constituted the major activities of the area. The newer facilities house laboratories and large test facilities in support of peaceful uses of plutonium, reactor fuels development, liquid metal technology, fast flux support, gas-cooled reactor programs, and life sciences programs.

The area also contains a number of support facilities, including a convertible oil/coal powerhouse for process steam production; raw water intake, treatment, and storage; and other facilities necessary to support fuels production, research, and development (Stenner et al. 1988).

Gerber (1992) provides an insight into the complex nature of the 300 Area facilities and their evolving missions over time.

"The Hanford Site's 300 Area was conceived by MED Project builders as a "process improvement" (research and development) and fuel fabrication area. Although it has grown over the years to encompass a fascinating array of projects, the basic 300 Area functions have not changed.

"Over 30 structures were built in the 300 Area during WWII; five were of particular significance. Fuel fabrication operations took place primarily in the 313 Metal Fabrication and 314 Press Buildings. Uranium first arrived at HEW [Hanford Engineering Works] as ingots, which were cut and lathed down to billets in the 313 Building. After the 314 Building's extrusion press arrived and became operational in January 1945, uranium was shipped to HEW as billets. Thereafter, the operations in 314 preceded those in 313. The billets were cropped, extruded into rods, straightened, and outgassed in 314, then sent to 313 for jacketing or 'canning.' Graphite, uranium, aluminum cans and process tubes were tested in a QA program in the 305 Test Pile (reactor).

"During these early years, experiments to improve the new and untried bismuth phosphate separations process also were conducted in the 3706 Technical Building (old radio chemistry laboratory) and the 321 Separation Building. Soon the need to develop an even more efficient, continuous solvent extraction process led to the piloting of the reduction oxidation, metal recovery (U-Plant), and plutonium-uranium extraction processes in the same two buildings.

"The large defense production expansions that increased the number of reactors, separation facilities and waste tanks at the Hanford Works in the early 1950's also led to growth in the 300 Area. In 1952-53, five large buildings, along with ancillary service structures, opened in the southern sector of the area.

"The 325 Radiochemistry Building, complete with eight 'hot' cells and a 'reverse flow' ventilation system designed for work with radioactive materials, assumed many of the developmental missions of the old 3706 Building. The 325 Building, along with three other new structures, was connected to a Radioactive Liquid Waste Sewer that led to the new 340 Retention and Neutralization Complex for holding radioactive wastes for transport and disposal in the 200 Areas.

"The 326 Physics and Metallurgy Building, known then as the Pile Technology Building, assumed the exponential pile physics studies that had been conducted in the 189-D Building. In 326, approach-to-critical, lattice design experiments were conducted that led to safer, more efficient lattice configurations in the KE, KW, and N Reactors. The 327 Radiometallurgy Building also opened in 1953, conducting both destructive and non-destructive examination of fuel rods and reactor process tubes. In the building's eight hot cells and two basins, failed fuel rods and corroded process tubes could be opened and probed to find clues to prevent future problems.

"The 328 Building, a large machine and fabrication shop that replaced four WWII shops, also was completed. That same year, the 329 Biophysics Laboratory opened to develop and use state-of-the-art radiation detection instruments for the pioneering Hanford Works environmental monitoring and bioassay programs. Later, the 329 Building would perform such exciting work as moon rock examination, fallout studies, oil shale, coal, and Mt. St. Helens ash examination.

"Soon after these buildings were completed, continuing defense production expansions brought major additions to many of them. The 325-A High-Level Radiochemistry Annex, finished in 1960 and containing three much larger hot

cells, plunged into multiple isotope separations campaigns for NASA programs in the 1960's, and into early waste vitrification work late in that decade.

"The 327 Building underwent four additions in the 25 years following its original construction. The most significant was the installation of the Special Environmental Radiometallurgy Facility cell, a large hot cell with an inert nitrogen atmosphere, electric manipulators, and the capacity to handle the heavy, eight-foot-long fuel rods used in the Fast Flux Test Facility (FFTF). The projected coming of N Reactor also led to construction of the 306 Metal Fabrication Development Lab (known as the Met Semi-Works) in 1956. This building doubled in size in 1960, the same year that the 333N Fuels Manufacturing Building (known as the Coextrusion Shop), constructed to house the unique fabrication processes needed for N Reactor fuel, was built" (Gerber 1992).

"The 1950's and 60's also saw major 300 Area expansion related to peaceful uses of atomic power. The 309 Plutonium Recycle Test Reactor (PRTR) and 308 Plutonium Fuels Pilot Plant (PFPP) were completed in 1960. PRTR was a heavy-water-moderated, 100-mW, experimental reactor. PFPP tested fuel configurations, including uranium oxides, mixed oxides, and plutonium and thorium blends.

"From 1968-72, the 318 High Temperature Lattice Test Reactor operated to test powdered, pelletized and other experimental fuels at high temperatures. A dry nitrogen gas cooled reactor, it operated at 1,000°C, but at only two kilowatts of nuclear power. The 324 Chemical Engineering Laboratory, completed in 1966 and planned to process and examine PRTR fuels, became a building without a mission as the PRTR's operations dwindled. In 1968, the four huge hot cells in the chemical sector of this building adopted an important new waste vitrification mission, and soon the metallurgical sector, known as the Shielded Materials Facility, became heavily involved in FFTF fuels examination. Over the years, major waste solidification missions and the processing of many Materials Open Test Assemblies for the FFTF have taken place in this building" (Gerber 1992).

FFTF activities commenced in 1970, and several 300 Area facilities were constructed for its support. "The 335 and 336 Sodium Test Facilities, the 337 High-Temperature Sodium Facility, and the 338 Liquid Metal Fast Breeder Reactor (LMFBR) Components Mock-Up and Maintenance Facility were among the most significant of the new buildings. In them, sodium loops tested various properties of sodium as a coolant, measured the behavior of mechanical components in a sodium environment, and fabricated, assembled and decontaminated equipment" (Gerber 1992).

"Today, like programs in other Hanford Site areas, 300 Area programs focus on the waste cleanup mission. Research and development directed at new remediation techniques, as well as at futuristic nuclear engineering applications, continues in many buildings" (Gerber 1992).

3.3 300 AREA PROCESS SEWER AND LIQUID WASTE DISPOSAL SYSTEM

3.3.1 Introduction and Physical Layout

"The 300 Area underground process sewer and liquid waste disposal system may be viewed as having four components. The largest, usually referred to as the Process Sewer System, is described in this section and in Section 3.6.3. The second is the Radioactive Liquid Waste System (RLWS) and 340 Building Complex, described in Section 3.6.3. The third is the Retired Radioactive Liquid Waste System (RRLWS) and is described in Section 3.6.4. The fourth is the Retention Process Sewer, a subsystem of the Process Sewer System, and is described in Section 3.3.5.

This section deals with the largest component, the Process Sewer System. Built by MED and du Pont de Nemours, Inc. during World War II, it was designated the 3904 System. It consisted primarily of 8-in. vitrified clay pipes with acidproof joints that connected the major 300 Area structures to an 18-in.-diameter vitrified clay pipe with acidproof joints that ran eastward to a single process pond. The 321 Building was connected to this pipe via a combination of 3-in. stainless steel pipes, 8-in. wrought-iron pipes, and 6-in. earthenware pipes. All manholes and pipe joints were of acidproof construction (Gerber 1992).

The current 300 Area Process Sewer physical layout includes more than 50 facilities. Table 3-1 provides a list of the facilities that are connected to the 300 Area Process Sewer System. Currently managed by BHI, it is an extensive system having over 6 mi of outside, underground utility piping and an estimated 25 mi of interior building waste piping. The distribution network is up to 49 years old. The materials of construction, in addition to vitrified clay, include cast iron, steel, concrete, polyvinyl chloride, and stainless steel (WHC 1990a).

Table 3-1. Facilities Connected to the 300 Area Process Sewer System (WHC 1990). (3 sheets)

	Building No.	Flow (gal/min)	Building Name	Contractor
1	303F	0	Pumphouse	WHC
2	303J	0	Material Storage Building	PNL
3	303M	0	Uranium Oxide Facility	WHC
4	304	0	Uranium Concretion Facility	WHC
5	305	2	Engineering Testing Facility	WHC
6	305B	3	Hazardous Waste Storage Facility	PNL
7	306E	145 (65)*	Fabrication, Examination, and Development	WHC
8	306W	Incl. Above	Materials Development Laboratory	PNL

Table 3-1. Facilities Connected to the 300 Area Process Sewer System (WHC 1990). (3 sheets)

	Building No.	Flow (gal/min)	Building Name	Contractor
9	308	16 (0)	Fuels Development Laboratory	RPS/WHC
10	309	304 (8)	Test Engineering Facility	WHC
11	311	0	Tank Farm	WHC
12	313	23.2 (0)	N Fuels Manufacturing Support Facility	WHC
13	314	40	Engineering Development Laboratory	PNL
14	318	10 (7)	Radiological Calibrations Laboratory	PNL
15	320	38 (2)	Physical Science Laboratory	PNL
16	321	0	Hydromechanical/Seismic Facility	PNL
17	323	N/A	Mechanical Properties Laboratory	PNL
18	324	120 (5)	Waste Technology Engineering Laboratory	PNL
19	325	80 (10)	Applied Chemistry Laboratory	PNL
20	326	97 (10)	Material Science Laboratory	PNL
21	327	17 (15)	Post Irradiation Test Laboratory	PNL
22	329	12 (4)	Chemical Science Laboratory	PNL
23	331	40 (0)	Life Science Laboratory 1	PNL
24	331D	N/A	Biomagnetic Laboratory	PNL
25	331E	N/A	Greenhouse	PNL
26	331J	N/A	Incinerator	PNL
27	333	0.1 (0)	N Fuels Fabrication Facility	WHC
28	334	0.3 (0)	Process Sewer Monitoring Facility	WHC
29	335	0	Sodium Testing Facility	WHC
30	336	0	High Bay Testing Facility	PNL
31	337	3 (0)	Technical Management Center	PNL
32	337	N/A	High-bay and Service Wing	WHC
33	338	0	Fabrication Shop	KEH
34	340	N/A	Waste Neutralization Facility	WHC
35	382	100	Pumphouse	WHC

Table 3-1. Facilities Connected to the 300 Area Process Sewer System (WHC 1990). (3 sheets)

	Building No.	Flow (gal/min)	Building Name	Contractor
36	382	N/A	A, B, C Water Storage Tanks	WHC
37	384	25	Powerhouse	WHC
**	3100	N/A	Future Facility	PNL
38	3706	3	Communication and Documentation Services	WHC
39	3707C	N/A	Safeguards and Security Maintenance Shop	WHC
40	3708	N/A	Radioanalytical Laboratory	PNL
41	3709	0	Pain Shop	WHC
42	3716	0	Storage	WHC
43	3717	N/A	Spare Parts Warehouse	WHC
44	3717B	6 (0)	Standards Laboratory	WHC
45	3718F	0	Sodium Storage	WHC
46	3720	1 (0)	Chemistry and Metal Sciences Laboratory	PNL
47	3722	0	Construction Shop	KEH
48	3730	0	Gamma Irradiation Facility	PNL
49	3732	0	Old Thoria Laboratory	PNL
50	3745A	3	Electron Accelerator Facility	PNL
51	3745B	0	Positive Ion Accelerator Facility	PNL
52	3746A	1	Radiological Physics Laboratory	PNL
53	3802A	0	Steam Pressure Reducing Valve Station	WHC
54	3902A	100 (0)	West Elevated Water Tank	WHC
55	3902B	100 (0)	East Elevated Water Tank	WHC

NOTES:

N/A - Not Available, these facilities with the exception of the 3707C and 3712 Buildings were taken from WHC (1993) Draft.

* Section 2.3.3 of WHC (1990) discusses plans to reduce flows to the levels shown in parentheses.

The 300 Area has two main sewer systems that service a majority of the buildings in the 300 Area. It is known that lines believed to be connected to one system were actually connected to the other sewer system. Several studies have been done to verify piping configurations (WHC 1993b). The 300 Area facilities are currently operated by three different contractors: WHC, Pacific Northwest Laboratory (PNL), and Kaiser Engineers Hanford (KEH).

The total flow rate of the system is measured at the trench inlet weir, located at the point where the waste water is discharged to the soil column. Flow rates were measured between 800 and 1200 gal/min with an average of 930 gal/min. Almost all the flow in the 300 Area Process Sewer is gravity flow, although there are some pump lift stations with associated sections of pressurized pipe in the system. The waste water discharges from the sewer system to the soil column via the 300 Area Process Trench (WHC 1990b).

A schematic of the 300 Area Process Sewer, as understood today, is provided in Figures 3-3A and 3-3B.

3.3.2 Contributors

There are three primary categories of contributors to the 300 Area Process Waste Water: purified or potable water, equipment cooling water, and contributors with some chemical contamination. The majority of the contributors have very low flow rates. Flows from a building or facility are combined to one or two main waste pipes before exiting the building. The flow rates from these main waste pipes are low for most of the facilities. More than three-fourths of the total flow of the 300 Area Process Waste Water comes from just seven facilities in the 300 Area (WHC 1990a). Estimated flow rates associated with a building or facility for the 300 Area Process Waste Water are given in the *300 Area Process Waste Water Stream-Specific Report*, WHC-EP-0342.

"Most of the waste water discharged to the soil column is made up of controlled spill (overflow) from potable water storage tanks and return equipment cooling water. These two contributors alone account for about 70% of the total flow. The 300 Area facilities are serviced by water from the Columbia River that is first purified (using alum clarification and chlorine addition) in the 300 Area Water Treatment Facility (Building 315 in Table 3-1). The treated water is stored either at the 382 Facility or in emergency high tanks (3902-A and 3902-B). The overflow of purified water from these supply water storage tanks for such routine service activities as freeze protection and maintaining residual chlorine levels is one of the major contributors to the 300 Area Process Waste Water. The kinds of contaminants in the potable water and the 300 Area cooling water are the usual trace ones found in ordinary municipal treated water. These are such things as traces of chlorine, alum, and separate from water purification processes" (WHC 1990a).

The equipment sources of 300 Area cooling waste water include once-through cooling processes such as those associated with building heating, ventilation, and air conditioning systems; mechanical pumps; air compressors; and engineering or research laboratory cooling jackets. Another incidental source for the waste water may be inflow from precipitation runoff via any point of entry into the piping system (WHC 1990a).

Steam production activities account for a significant part of the waste water produced. These activities produce not only large quantities of waste cooling water but also significant amounts of waste brine solution (sodium chloride with magnesium salts). The latter is generated on a batch basis during the activity of regenerating the zeolite water conditioner columns in the power plant (WHC 1990a).

A smaller part of the flow is from laboratory activities associated with disposals down sinks and drains connected to the sewer. These activities provide a potential pathway through which a wide variety of materials could enter the process sewer. Currently, however, administrative controls are in place to prevent such releases (WHC 1990a).

3.3.3 Environmental Controls

The stringency of environmental activities management in the 300 Area was increased in 1978, three years after the 3904 Trench opened. Administrative controls were established that required the end-of-pipe discharge to meet drinking water standards. From 1978 to 1984, the pH range requirement for the waste water was between 6.5 and 8.5. However, this pH range was not always maintained. The lowest value recorded for the pH was 3.0 and the highest was 9.7. In addition, there were eight violations of constituent requirements involving cadmium, mercury, chromium, and nitrate ions (WHC 1990a).

In February 1985, additional administrative controls were placed into effect to gain greater control of the waste water. These included discontinuing chemical discharges from chemical and biological laboratories, fuels fabrication, photographic processing, and many maintenance operations. Since 1985, there have been only three incidences of constituent concentrations outside regulatory requirements. Two involved secondary chloride ions, and one involved lead (WHC 1990a).

3.3.4 Past Activities

Past activities have contributed a wide range of constituents to the 300 Area Process Sewer. These activities include equipment cooling with water, water purification, steam production, nuclear fuel fabrication, and a wide range of testing and analytical laboratory research activities (WHC 1990a).

Fuel fabrication was conducted primarily in the 313 and 333 Buildings complex. Past disposals from this activity were the most significant sources for chromium, copper, uranium, nitrate, sulfate, and fluoride ions, as well as caustics and degreasing solvents (e.g., perchloroethylene and 1,1,1, trichloroethane) entering the process sewer. Since the fuel fabrication complex has been deactivated, there have been significant reductions in contaminants found in the waste water from these facilities (WHC 1990a).

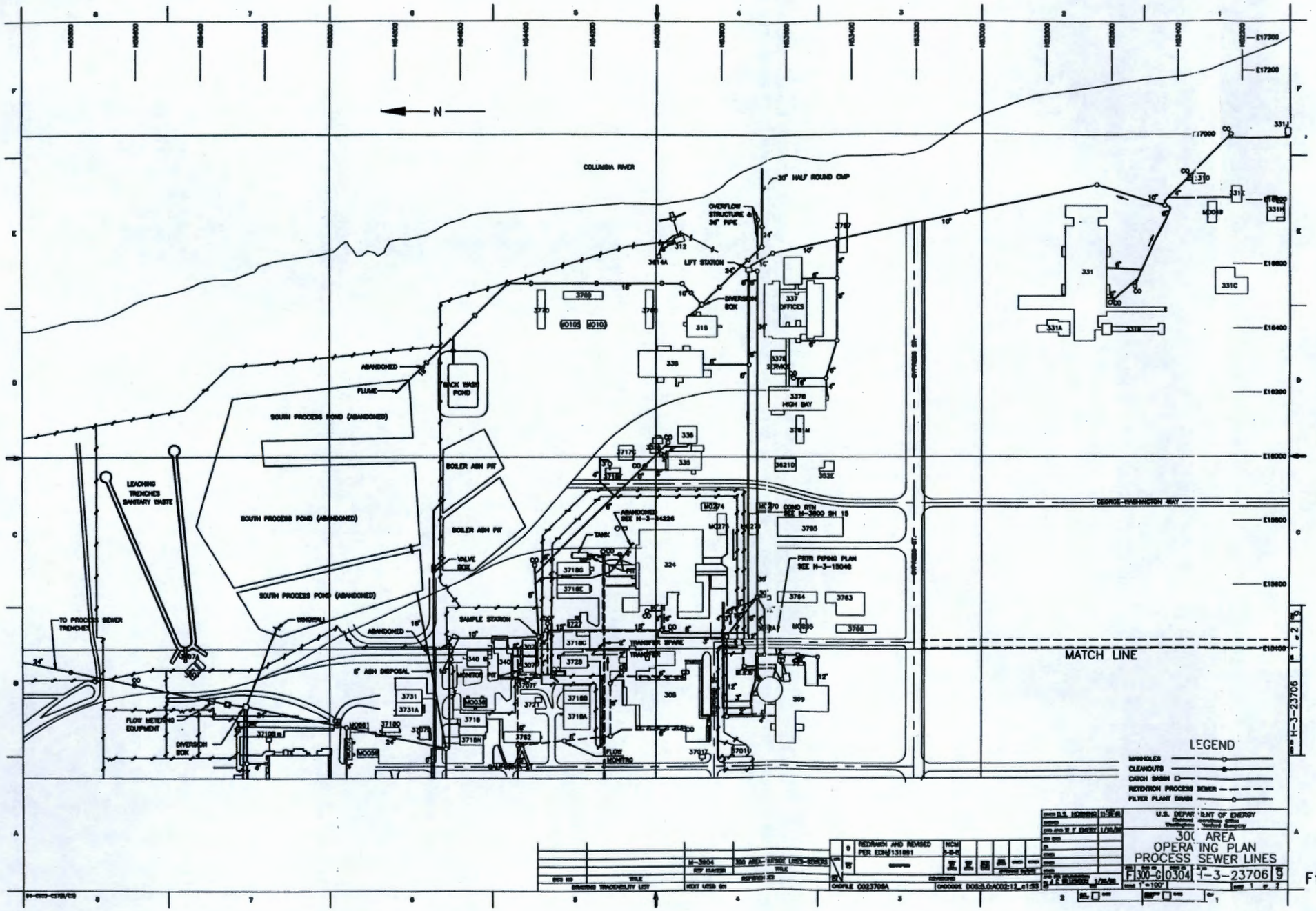


Figure 3-3A. 300 Area Operating Plan: Process Sewer Lines.

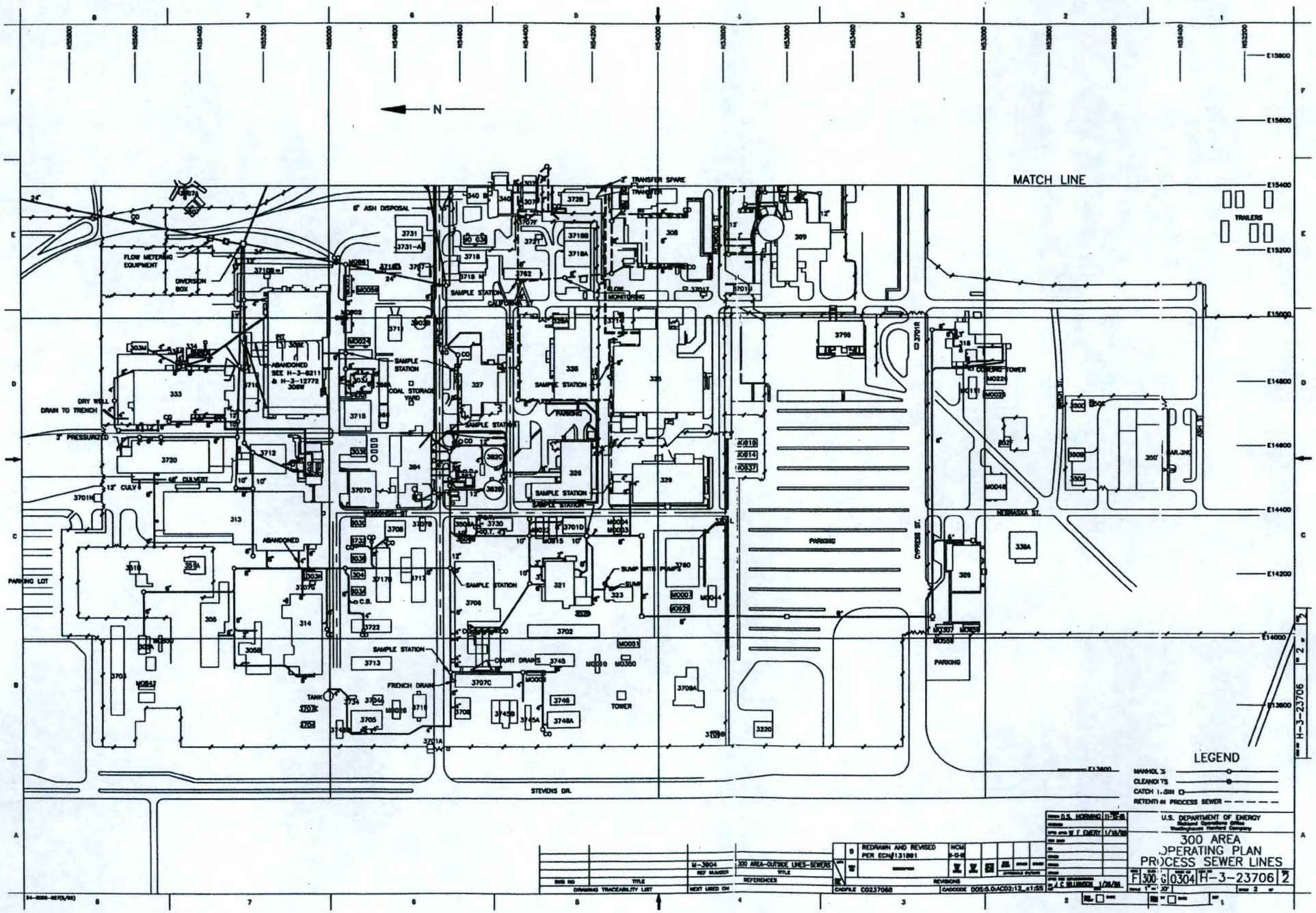


Figure 3-3B. 300 Area Operating Plan: Process Sewer Lines.

The current condition of the 300 Area Process Sewer varies by the age of the piping, the piping material, and the types of wastes disposed in it. In 1992, a "Pipe Crawler," a remote camera unit used to inspect pipes remotely, was used to inspect sections of the 300 Area Process Sewer. The *300 Area Process Sewer Final Report* (WHC 1990c) documents the methodology and results obtained for the 300 Area Process Sewer remote visual inspection. In six of the eight locations surveyed, different anomalies and conditions were observed. A video highlight of this survey is available.

3.3.5 Retention Process Sewer

The Retention Process Sewer is a subsystem of the 300 Area Process Sewer that is available for facilities having the potential for accidental radioactive releases into the waste water. The Retention Process Sewer system consists of monitoring and diversion stations (to a parallel, dedicated radioactive liquid collection system), as well as a retention basin for the final capture and monitoring of effluent. The contents of the retention basin can be diverted from the process sewer if radioactivity exceeds threshold levels (WHC 1990c). Figure 3-3 also shows the Retention Process Sewer.

3.3.6 Contamination

Gerber (1992) states that every process drain, pipe, pipe trench, and sewer manhole in the 300 Area must be expected to contain some degree of process waste buildup, the amounts varying depending on the age and type of the facility. Some such drains, pipes, and manholes contain radioactive contamination. For example, surveys conducted in the late 1980's found uranium and thorium contamination in a manhole southeast of the 321 Building and ^{60}Co contamination in a manhole west of the 3730 Building.

Figure 3-3 also shows sections of the process sewer that have been abandoned. These sections could have residual contamination in them. Event Fact Sheet SWU-89-023 (Appendix A) discusses a section of the pipe that is out of service but not shown as abandoned on Figure 3-3. During excavation to terminate the process sewer piping to the 311 Stillhouse, it was found that the lower half of this 8-in. main process sewer pipe was corroded away. See Section 3.6.3 for more details.

3.3.7 Sample Data

From October 1989 to April 1990, random samples were taken from the Process Sewer waste water. WHC (1990a) reports the sample locations and provides an extensive listing of chemical constituent data obtained from 22 sample locations.

Project X-E07, *300 Area Process Sewer Engineering Study to Identify Flow and Constituent Reductions* (WHC 1990b), characterizes the effluent streams by origin and flow rate, identifies constituents that were determined to be introduced into the process sewer while the study was being conducted, and recommends ways to reduce the flow rate and the constituents.

This study identifies some chemical constituents currently being discharged into the process sewer. Three constituents of particular interest are silver, cyanide, and lead. For those facilities in which constituents have been identified as being actively introduced, it has been recommended that the constituent be removed from the process sewer effluent. While silver recovery equipment is in place and functioning properly at 99% efficiency, it appears that the 1% of silver routinely enters the process sewer from 3705 Building photographic activities. Cyanide compounds have been detected in the process sewer downstream of the 384 Building. There are two possible sources of the cyanide: (1) 384 Building coal dust, which is anticipated to contain cyanide compounds, and (2) the regeneration salt or softening resin used in the water softener. Lead compounds currently detected downstream of the paint shop are believed to have entered the process sewer from prior 3709 Building (paint shop) activities. No lead compounds are currently entering the process sewer as building discharges. The lead detected is believed to be from a lead buildup in the piping (WHC 1990b).

3.4 300 AREA SANITARY SEWER

The 300 Area Sanitary Sewer is an active sanitary waste water system that utilizes gravity and pressure collection lines, septic tanks, and leaching trenches (WHC 1992d). This system is currently managed by WHC. 300 Area operational facilities are currently operated by PNL, WHC, and KEH.

"The original 300 Area sanitary sewer system built by MED and du Pont during World War II was designated as the 3903 system. Concrete and clay sanitary sewer pipes from all buildings, as well as one process line from the 313 Building, fed into a large septic tank near the northeast edge of the 300 Area. To allow for the percolation of liquid wastes into the soil, a tile field led out of this septic tank. In the summer of 1947, this system overflowed because of overuse and plugging. At that time, uranium contamination was found in the sanitary sludge and water. A new tile field and ditch were dug in 1947" (Gerber 1992).

"As many new buildings were constructed in the 300 Area, sanitary sewer facilities again became inadequate. In 1951, two more septic tanks were added. The three-tank septic capacity then reached approximately 100,000 gal. North and south leaching trenches replaced the old tile field. This three-tank, two-trench system, since renumbered the 3607 system, has continued in use in the 300 Area since 1951 unchanged" (Gerber 1992).

WHC has tested and analyzed the discharge from the septic tanks. These tests indicated that the septic tanks are providing little, if any, treatment. As a result, WHC has determined that the existing septic tanks and trenches must be replaced. As of February 1992, WHC was considering two replacement options: (1) constructing an onsite waste water treatment plant and (2) connecting the 300 Area sanitary waste water system to the City of Richland's sanitary waste water system (WHC 1992d). An engineering study has been completed comparing alternative routes to convey sanitary waste water from the 300 Area to the City of Richland's North collector system.

The 300 Area Sanitary Sewer services a majority of the buildings in the 300 Area, as does the 300 Area Process Sewer. Lines believed to be connected to one sewer are known to be actually connected to the other system. Several

studies have been done to try to verify piping configurations in the 300 Area (WHC 1993b).

"Materials handling procedures throughout the 1940's and 1950's, especially in fuel fabrication areas, introduced uranium, thorium, and other contaminants to the sanitary sewer system. These contaminants entered the system via the hair, shoes, hands, and clothing of workers who used 300 Area change houses, lunchrooms, sanitary restrooms, and the First Aid Station. Another pathway for fabrication and chemical wastes to enter the sanitary sewer system was from the 300 Area Process Pond (later Ponds). A spring 1948 H.I. report found 'highly significant increases' in uranium in 300 Area sanitary water 'as a result of seepage of uranium from the waste pond.' Residual contamination from earlier materials handling practices and from cross-contamination with other waste systems still persists in spotty deposits. Health Physics surveys taken in 1991 displayed readings of 25,000 c/m in pipes leading from the septic tank sludge pump. The plan to hook up to the City of Richland Water Treatment Plant will include contamination surveys performed with removal of the old septic tanks, contaminated pipes, sludge and soil deposits" (Gerber 1992).

Under the 300-FF-1 Remedial Investigation in April of 1993, three surface soil samples were obtained from the north sanitary trench. Contaminants detected that are considered contaminants of potential concern are aluminum, barium, cadmium, chromium, copper, mercury, silver, vanadium, zinc, and bis(2-ethylhexyl)phthalate. No analyses were conducted for radionuclides (DOE-RL 1992).

3.5 UNDERGROUND PETROLEUM STORAGE TANKS

There are several underground petroleum storage tanks located in the 300 Area. Many of these tanks are now inactive, and many remain active. Table 3-2 presents information about the active, inactive, and removed underground petroleum storage tanks in the 300 Area.

Table 3-2. Underground Petroleum Storage Tanks in the 300 Area, 07/07/94. (2 sheets)

Tank ID	Location	Substance stored	Status	Removal date
311-1	311	Methanol	Removed	08/30/89
311-2	311	Methanol	Removed	08/30/89
313	313	Methanol	Removed	08/30/89
300-FS-15	3709A	Unleaded	Removed	04/10/92
300-FS-16	3709A	Diesel	Removed	04/10/92
382-1	382	Unleaded	Removed	09/28/92
325-1	325	Diesel	Removed	10/14/92
301-1	301	N/A	Inactive	N/A

Table 3-2. Underground Petroleum Storage Tanks in the 300 Area, 07/07/94. (2 sheets)

Tank ID	Location	Substance stored	Status	Removal date
309-1	309	Diesel	Inactive	N/A
384-1	384	#6 Fuel Oil	Exempt	N/A
384-2	384	#6 Fuel Oil	Exempt	N/A
384-3	384	#6 Fuel Oil	Exempt	N/A
384-4	384	#6 Fuel Oil	Exempt	N/A
384-DT-1	384	#6 Fuel Oil	Exempt	N/A
384-DT-2	384	#6 Fuel Oil	Exempt	N/A
3621-C	3621-B/C	Diesel	Operational	N/A
3621-D	3621-D	Diesel	Operational	N/A
382-2	382	Unleaded	Operational	N/A
382-3	382	Unleaded	Operational	N/A

(WHC 1991)

3.6 DOCUMENTED 300 AREA WASTE SITES

3.6.1 300 IFBD (300 Area Interim Filter Backwash Disposal)

The 300 Area Interim Filter Backwash Disposal site is an inactive, nonhazardous, and nonradioactive liquid waste site that is located at Hanford coordinates N55260 W12860. It is an inactive burrow pit west of the 300 Area and is known simply as the 300 IFBD. The site was active from January 7, 1987, to April 14, 1987, to receive about 650,000 gal of filter backwash from filters in the 300 Area water treatment facility (Cramer 1987).

The filter backwash solution contains alum, water, and undefined solids filtered from Columbia River water. Analysis of the backwash solution indicates that it is nonhazardous (Cramer 1987). Environmental monitoring data is provided in the Hanford Site Annual Groundwater Report listing and is not included in this report.

3.6.2 300 PHWSA (300 Area Powerhouse HWSA)

The 300 Area Powerhouse HWSA (Hazardous Waste Storage Area) is an active hazardous, nonradioactive solid waste storage area located at approximate Hanford coordinates N54750 W14550 (WHC 1991). It began operation in the early 1940's and was used to store nonspecific waste materials for disposal. It was later used to stage hazardous wastes, also for disposal.

Currently, the site is used to stage nonregulated waste oils and empty drums (WHC 1991). The former exhaust stack base is also used as part of this storage area. The storage pad is contaminated with oil residues from at least one spill. On December 8, 1991, one of 16 empty barrels containing DE-SOLV-IT (a trademark of Orange-Sol, Inc., of Chandler, Arizona) and #6 fuel oil residue was blown over by strong winds. Some of the remaining DE-SOLV-IT and/or fuel oil residue leaked from the barrel bung (opening) to the concrete pad. The spill was contained on the pad, and absorbent materials were used to clean the site, leaving slight residue contamination (Appendix A, Occurrence Report RL--WHC-WHC300EM-1991-1026).

The hazardous waste materials generated in the powerhouse facility are stored in a metal storage cabinet near and adjacent to the west wall of the 384 Building. Site employees stated that plans have been made to move the hazardous waste storage container to a paved area adjacent to the south side of the 3707-D Building in the near future.

Weekly inspections are performed and documented at the facility (Cramer 1987).

3.6.3 300 RLWS 340 C (300 Area Radioactive Liquid Waste System and 340 Complex)

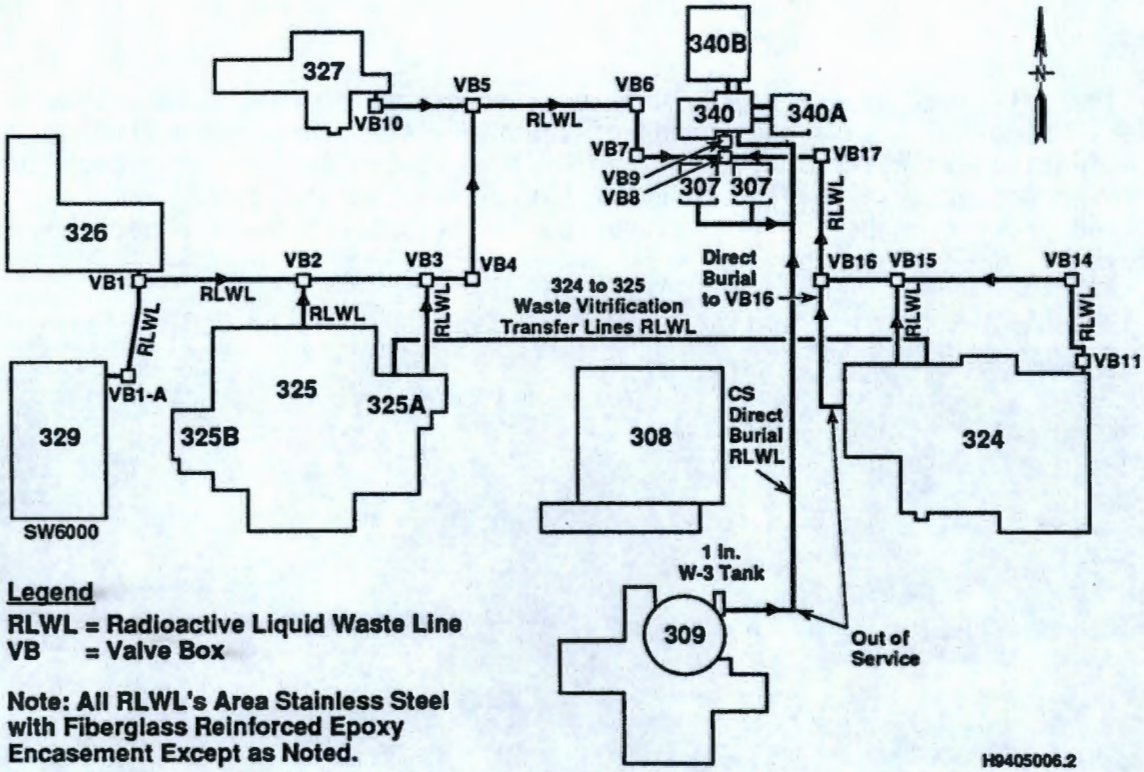
The 300 Area RLWS (Radioactive Liquid Waste Sewer) and 340 Complex is an active, radioactive liquid waste system that is located at Hanford coordinates N54470 E15350. This waste system began operation in 1954 to receive radioactive wastes from assorted 300 Area research and development laboratories (Figure 3-4). The wastes consist mostly of water and small volumes of chemicals, decontamination solutions, acids, and bases. These wastes are stored at the RLWS for a period of less than 90 days and are then transported to the 200 Areas for storage and disposal.

The system consists of the 340, 340-A, and 340-B Buildings; an underground vault; stainless steel tanks and piping; loadout and decontamination equipment; and instrumentation. Piping is encased in fiberglass or plastic and is equipped with continuous leak detection systems.

Wastes are collected from 43 individual facilities in five buildings (the 324, 325, 326, 327, and 329 Buildings) and accumulated in stainless steel tanks at the 340 complex (Cramer 1987). A sixth building (309) has been disconnected from the system (see Figure 3-4).

All underground tanks are enclosed in concrete vaults with leak detection systems. Aboveground tanks rest in a concrete catchment basin enclosed by a building. Rail car loading operations are conducted in an enclosed building with spill protection and containment systems. All tanks are monitored continuously for leakage (Cramer 1987).

Figure 3-4. The 300 Area Radioactive Liquid Waste System.



Legend

RLWL = Radioactive Liquid Waste Line
VB = Valve Box

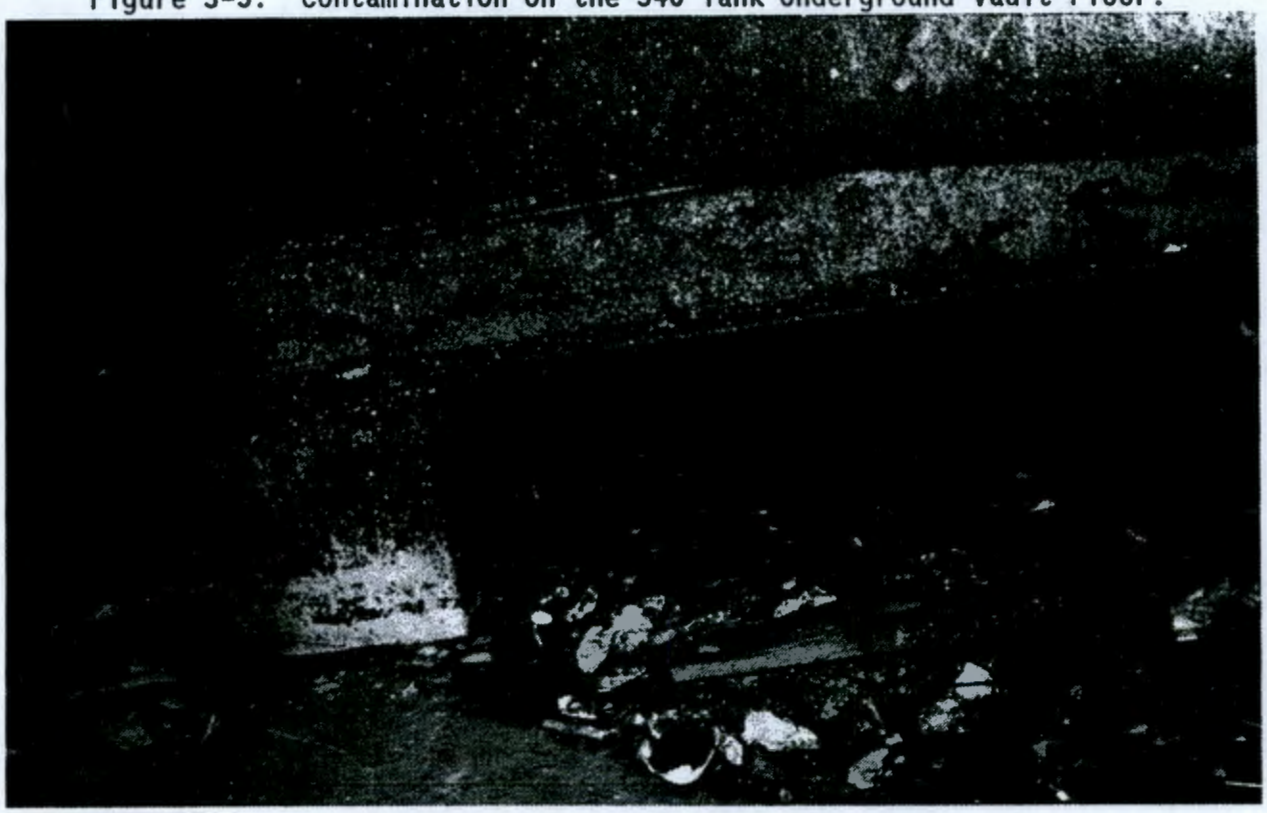
Note: All RLWL's Area Stainless Steel with Fiberglass Reinforced Epoxy Encasement Except as Noted.

Reference: Doc. SW-001-002, B-0, Pg. 47

An underground vault houses two 15,000-gal neutralization/holding tanks. Originally, the tanks were in an open concrete pit; the pit was later covered to reduce the potential release of airborne contamination during maintenance activities. The concrete cover blocks were further modified to provide access to the pumps through manhole covers. Airlocks for personnel entry were also added.

The pit floor became highly contaminated over time from maintenance activities. Figure 3-5 is a photograph of the floor structure. The floor contamination was covered with a layer of lead blocks and grout to provide shielding to workers required to enter the pit for maintenance. The layer of lead and grout brought the floor level up to the support beams under the tanks.

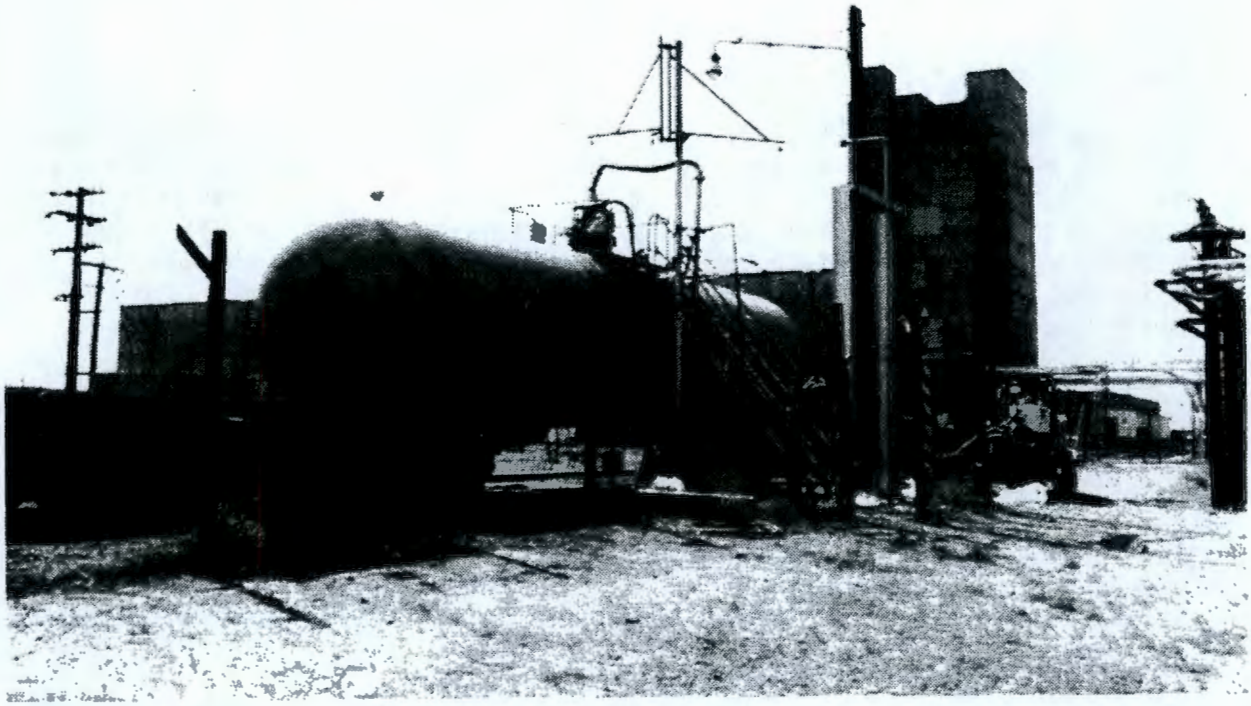
Figure 3-5. Contamination on the 340 Tank Underground Vault Floor.



The 340 Building houses a control room and decontamination facility. The 340-A Building houses six aboveground radioactive liquid waste storage tanks. The 340-B Building houses a waste storage area on the west side and a rail car loadout facility on the east. The east and west sides are separated lengthwise by a concrete shield wall (McCarthy 1990). Originally, the 340-B facility was an open-air facility with a loadout structure in the center between two rail spurs, so that rail cars could be unloaded from either rail spur. At that time, the ground beneath the loadout facilities was merely a graveled surface.

Figure 3-6 is a photograph of a typical loadout facility. The 340-B facility was constructed to provide a contamination control facility to perform rail car loadouts.

Figure 3-6. Typical Rail Car Loadout Facility, Similar to 340 Complex.



Total waste volumes passing through the RLWS are not documented, but volume for a sample year (7/54 to 6/55) is provided in Paas and Heid 1955, which reports total volume as 2.93 million liters of waste containing 6.02 g of plutonium and 148 Ci of beta emitters.

On August 14, 1975, an unusual occurrence took place when a technician left a water hose flowing into the west sump of the loadout facility. The hose had been used to rinse off a just-decontaminated rail car, and the operator placed the hose so that it flowed into the sump. (The sump is normally maintained with about 1 in. of water to avoid airborne contamination.) Because it was past the technician's normal time (about 4:00 p.m.) for return to his assigned building (the 325 Building), he promptly locked the facility and the exclusion area fence gate, forgetting to turn the decontamination water pump off, thus leaving the water flowing to the sump.

At 8:30 p.m., during routine surveillance, a radiation monitor discovered the water flow from the hose and observed that the filled sump was leaking through a crack in the concrete sump wall to the soils beneath the building. The sump had not overflowed to the concrete floor of the facility, and there was no apparent discharge to exposed soil around the facility. The crack began about 3 in. above the sump bottom and extended to the building floor. The monitor closed the hose valve, stopping the water flow. No one was notified of the occurrence until the following morning. A sample was taken that indicated significant radioactive contamination of the sump water. The sample showed that the water contained ^{90}Sr - ^{90}Y (3.5×10^{-4} μCi/mL) and ^{137}Cs (5.4×10^{-5} μCi/mL). At a maximum flow rate of 8 gal/min, it was estimated

that 1,650 gal was discharged to the soil (Appendix A, Unusual Occurrence Report 28-75).

After the Unusual Event, the west side was no longer used to unload rail cars. The tracks were removed, and the sump was filled with concrete. A concrete ramp was added to the exterior, and this section of the facility began operation as a hazardous waste storage area.

During excavation activities for Project V-659, which was the replacement of the single-wall piping system, contaminated soil was encountered below a "T" in the line just outside the 340 vault. Samples taken indicated that the radioactive material may have come from wastes generated in the 325-A Building about 10 years before the discovery of the contaminated soils. However, flow tests indicated that the "leak" had not come from the line under normal operating conditions, and the date of the contamination could not be determined.

It appeared that the contamination was confined to a 4-ft-diameter column to about 21 ft below the top of the 340 vault. At that point, the contamination spread laterally along the interface between backfill and undisturbed soils. The upper 4 ft of the soil column was removed by hand digging and placed in 55-gal drums for disposal. Radiation readings on the contaminated soil were as high as 1.5 rem/h. It was estimated that 99% of the contaminated soil was removed. The remaining contamination was estimated to be less than one curie (Appendix A, Unusual Occurrence Report 35-77).

The underground piping system, in its present state, was installed during the spring of 1978. This replacement of the old single-wall system, described in Section 5.4, included several (15) valve pits. These valve pits provided access to the system for integrity inspections and for the placement of continuous monitoring equipment.

On August 8, 1978, during a routine audit of the system, it was noted that water had collected in eleven of the valve pit sumps. In nine of these, the leak detection equipment had been moved from the sumps to the pit floor. In two of the pits (#2 and #5) the condensation water had caused discoloration of the painted wall and floor surfaces (see Figure 3-4).

The resulting investigation revealed that in May of that same year water collecting in the sumps had begun to cause problems and had activated alarms in the system. Each investigation resulting from the alarms indicated that the water was noncontaminated, and surveys of the pits indicated no radioactivity. To reduce the number of alarms, it was decided to move the detection devices to the pit floors temporarily, an increase in elevation of about 2 in. Operations personnel were instructed to remove moisture from the sumps periodically to avoid moisture collection and spurious alarms. It was noted that should a leak in the system occur, the continuous increase in water level would cause an alarm and initiate corrective actions.

As a result of the investigation, all 15 pits were examined, all of the detectors were placed in the sumps, and surveillance was scheduled to be performed twice weekly. It was determined that the water collection was a result of migration through the concrete walls of the pits by condensation from nearby steam leaks and atmospheric conditions. Waterproof high-efficiency filters were installed on all of the pits, decreasing the trapping

of saturated air and eliminating the moisture collection problem (see Appendix A, Unusual Occurrence Report 78-35).

Additionally, Site employees report that the line from the 329 Building to Valve Box 1 has been replaced at least three times due to leakage into the outer protective fiberglass/plastic pipe. Reportedly, the stainless steel line was finally replaced with a plastic line in the early- to mid-1980's, ending the corrosion problem and leakage within the line's outer casing.

3.6.4 300 RRLWS (300 Area Retired Radioactive Liquid Waste System)

The 300 Area Retired RLWS (Radioactive Liquid Waste System) is an inactive radioactive liquid waste system located at Hanford coordinates N54260 E16700 (WHC 1991). This system began operation in 1954 and was taken out of service in 1975. It was used to receive about 100,000 gal/yr of radioactive liquid wastes from assorted facilities and laboratories located in the 300 Area. Wastes consisted mostly of water and small quantities of chemicals, decontamination solutions, aqueous fuel fabrications solutions, acids, and bases (Cramer 1987).

The system consists of 4,062 ft of stainless steel piping buried 10 ft below grade. The outlet of the system is at the 340 Facility. No significant corrosion of the system is anticipated, and the entire system remains in place (Cramer 1987). The system was replaced with the current double encased pipe system described in Section 3.6.3.

A history of leakage of the system began during construction of the west addition of the 327 Building in 1958 and 1959. During 1976, the system was leak tested as part of the new upgrades being performed at the 327 Building. This leak test resulted in replacement of the entire system.

Excavation for the building foundation and basin uncovered contaminated soil that was traced to the system. The leak was determined to have been the result of the use of carbon steel transition pieces in the stainless steel system. This leak was located near the southwest corner of the building near Pecan Street. Briggs (1982) states, "Several truck loads of radioactive material that measured up to 500 mRad/h were removed to 300 Area burial ground." Briggs further reports that the location of the abandoned radioactive liquid waste can be determined by a series of brass plaques located at every cleanout plug. From the 327 Building tie-in, the 6-in. main line goes straight east to the 340 Complex along the north center of Pecan Street (Briggs 1982).

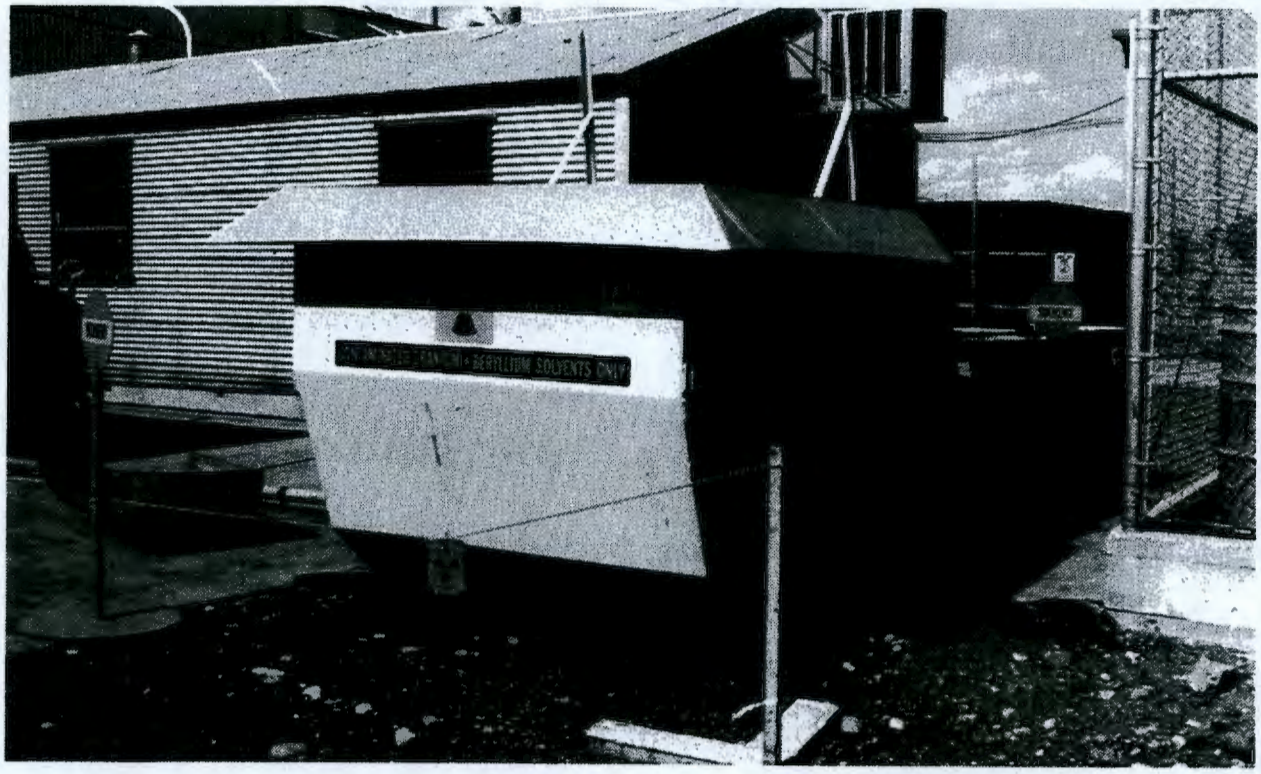
Upon retirement, liquids were drained and a cursory rinse of a weak sodium hydroxide solution was flushed through the system (Pedersen 1992). However, residual contamination remains. The residual contamination can clearly be seen on videotape summaries of inspections performed in May and February 1992. The videotapes also indicate that there may be mercury contamination and high radiation levels evidenced by flash radiation effects on the inspection camera video chip. They show as well that highly corrosive materials were transferred by this system, as the interior weld bead at joints in the piping appears to be washed away in the bottom section of the piping (*Engineering Surveillance and Testing 300 Area RLWS Inspection Highlights* Videotapes 1992).

3.6.5 300 Area Solvent Evaporator

The 300 Area Solvent Evaporator is an inactive, mixed liquid waste site that is located at Hanford coordinates N55570 E14860, east of the 333 Building and at the east end of the 334 Building. It is also known simply as the Solvent Evaporator. It was operated from 1975 to November 1985 to treat radioactively contaminated spent solvents that were generated in the 300 Area fuel fabrication process (Cramer 1987, WHC 1991).

Approximately 600 gal/yr (7,700 lb) of solvents and steam condensate was treated by evaporation in a Brooks Load Lugger tank, Type A82, Series 3F (DOE-RL 1988b). The tank was 96 in. long and 35 in. deep. It was 65 in. wide on top and 50 in. wide at the bottom and had a stainless steel sheet metal lid (WHC 1991) as shown in Figure 3-7.

Figure 3-7. 300 Area Solvent Evaporator.



The solvents consisted mainly of spent trichloroethylene, perchloroethylene, 1,1,1-trichloroethane, and a solution of ethyl acetate/ bromine. Paint shop solvents and used oil may also have been treated at this site. These included methyl ethyl ketone, methylene chloride, and petroleum naphtha. Treated solvents also contained small amounts of uranium, copper, zirconium, and possibly beryllium as particulate suspended in the solvents. Evaporation of the spent solvents was accelerated by the use of a steam coil within the load lugger. Steam from the heating coil discharged to the ground near the northwest corner of the evaporator (Hoover 1989, DOE-RL 1988b).

Solvents treated consisted of approximately 71% perchloroethylene, 9% 1,1,1 trichloroethane, and 11% trichloroethylene by volume. The remaining 9% was a mixture of ethyl acetate/bromine solution and other solvents such as

methyl ethyl ketone, methylene chloride, petroleum naphtha, and incidental amounts of oil. Insoluble materials accumulated as sludge on the evaporator bottom.

A sample of the solvent was collected in January 1985 for an inorganic analysis. The sample was submitted to PNL to be analyzed by x-ray fluorescence (XRF) and inductively coupled plasma-atomic emission spectroscopy (ICP-AES). The concentration of uranium in the solvent was below the detection limit (less than 10 μg/mL). The solvent was not tested for beryllium or total organic carbon because such testing was not required at the time. Table 3-3 shows the ICP-AES testing results.

Table 3-3. Solvent Evaporator Inductively Coupled Plasma-Atomic Emission Spectroscopy Results. (2 sheets)

Element	Detection[a] limit μg/mL	NaOH/Zr[b] μg/mL	KOH/Ni[c] μg/mL	Average μg/mL
Aluminum	0.03	6	10	8
Antimony	0.05			
Arsenic	0.08			
Barium	0.002			
Boron	0.01	5	2	4
Cadmium	0.004			
Calcium	0.01	46	52	48
Cerium	0.04			
Chromium	0.02			
Cobalt	0.01			
Copper	0.004			
Dysprosium	0.004			
Europium	0.002			
Gadolinium	0.10			
Iron	0.005	6	78	30
Lanthanum	0.008			
Lead	0.06			
Lithium	0.004	4	2	3
Magnesium	0.06			
Manganese	0.002			
Molybdenum	0.01			

Table 3-3. Solvent Evaporator Inductively Coupled Plasma-Atomic Emission Spectroscopy Results. (2 sheets)

Element	Detection[a] limit μg/mL	NaOH/Zr[b] μg/mL	KOH/Ni[c] μg/mL	Average μg/mL
Neodymium	0.02			
Nickel	0.02		ND[d]	
Phosphorus	0.10	18	25	20
Potassium	0.30		ND	
Ruthenium	0.05			
Silicon	0.02	20	28	24
Sodium	0.01	ND	46	46
Strontium	0.002			
Tellurium	0.06			
Titanium	0.02			
Zinc	0.02			
Zirconium	0.008	ND	2	2

[a] No results shown for concentrations below detection limit.
[b] Sodium hydroxide fusion in a zirconium crucible was performed to solubilize the sample.
[c] Potassium hydroxide fusion in a nickel crucible was performed to solubilize the sample.
[d] ND = not determined

(Hoover 1989)

Beryllium content calculation based on process knowledge concluded that the maximum amount of beryllium present was about 0.11 ppm. Additionally, the steam condensate discharged to soil contained trace amounts of Dearborne Steamate 2004 (a trademark of the Dearborne Division of W.R. Grace & Company, Lake Zurich, Il), which contains diethylaminoethanol, morpholine, and cyclohexlamine in concentration of less than 8% each. However, this treatment is a mixture of 1 to 12,000 gal of water and is, therefore, not a regulated waste (Hoover 1989).

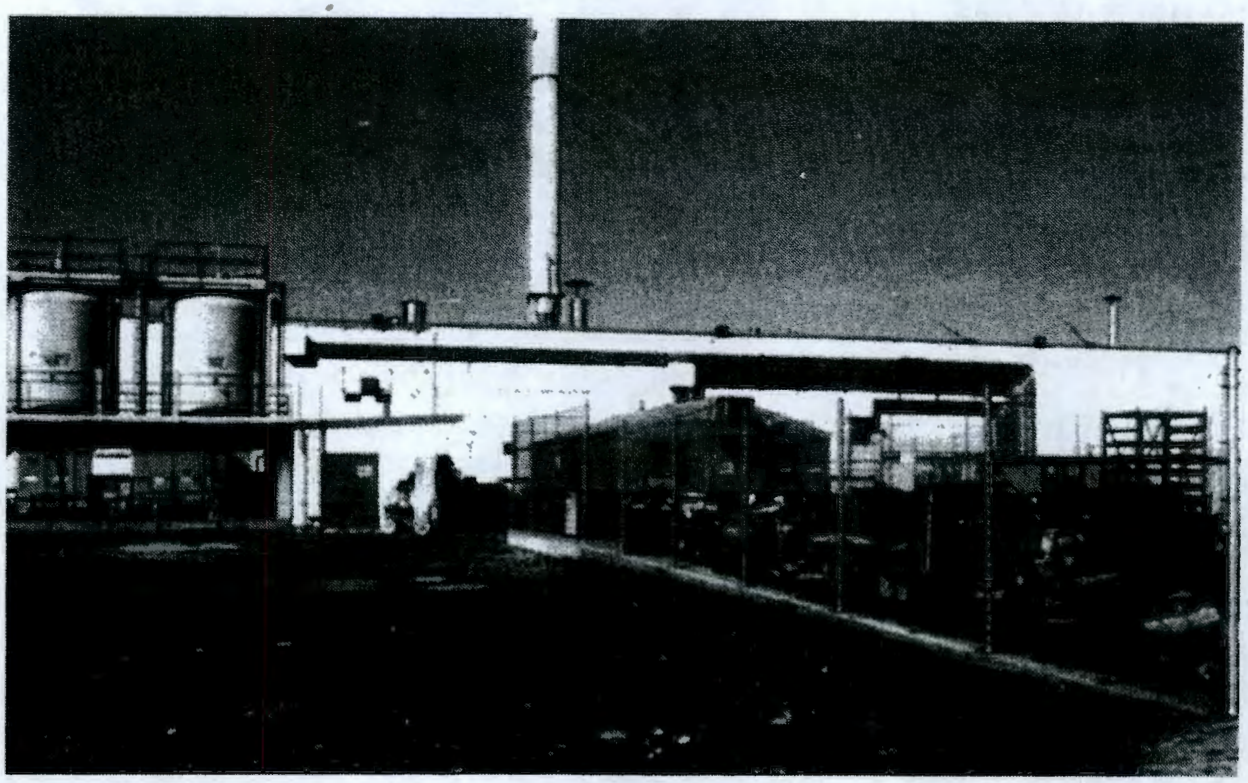
During the ten years of operation, approximately 6,000 gal (22,710 L) of regulated wastes were treated. The maximum treatment capacity was estimated at 220 gal/day. The maximum fill depth was 0.90 m; that allowed for a maximum storage capacity of 750 gal (2,839 L).

Although no formal spill report is known to exist, one spill is known to have occurred when a small hole developed in a fitting of the steam line. This allowed the steam condensate to accumulate in the evaporator until it overflowed. It is likely that the overflow spilled from the cutout side onto

the northern edge of the evaporator area. Currently, the exact location of the evaporator when the spill occurred is not known. It is estimated that very little, if any, solvent was released during this spill, as the bulk of the solvent being treated had a density greater than water and thus remained inside the evaporator.

Figure 3-8 shows the last location of the evaporator as well as the soil and concrete closure data included in the closure plan for this waste site.

Figure 3-8. 1988 Photograph of Solvent Evaporator Closure Site.



A worst-case scenario was developed to determine residual solvent retention in the soil as a result of a 100-gal spill. Most of the solvent is expected to have passed through the soil and into the underlying burial ground (618-1). Because of the high volatility of the solvent and the length of time since the actual spill, little or no solvent would be expected to remain in the soils (Hoover 1989).

A portion of the concrete pad adjacent to the east side of the 334-A Building was periodically used for the storage of the evaporator. It was also used to store Department of Transportation (DOT) specification 55-gal drums containing spent solvents to be added to the evaporator unit. No part of the current overlying concrete pad was used for the storage or treatment of the 300 Area Solvent Evaporator wastes (DOE-RL 1988b).

Airborne fume sampling and analyses were performed on a nonroutine basis (Cramer 1987). A Part A Permit Interim Closure Plan has been submitted.

Upon closure of the evaporator, about 1,900 L of solvent remained in the evaporator. These wastes were pumped into 30-gal drums contained within

55-gal drums. The void space was filled with an inert fill material, and water, an emulsifier, and cement were added. The sludge was treated in the same manner. The evaporator was thoroughly rinsed, and the rinse water was solidified and disposed of as low-level radioactive waste. The evaporator was then cut up using a torch and packaged in a standard wooden burial box. Both the box and 57 drums of solidified waste were buried in the 200 West Area burial grounds. Finally, soil samples were taken in the area of the evaporator for analysis (Hoover 1989).

Table 3-4 depicts the chronology of the Solvent Evaporator Closure Activities to date.

Table 3-4. Chronology of the 300 Area Solvent Evaporator Closure Activities.

Date	Activity
January 1985	Waste solvent sampled
March 1985	Analysis performed on the waste solvent
August 1985	Deliveries suspended, last solvent added
September 1985	Part A Application submitted to Washington State Department of Ecology (Ecology) and U.S. Environmental Protection Agency (EPA)
November 1985	Heating process terminated; final shutdown; solidification of the final waste inventory initiated; and demolition initiated. Interim Status Closure Plan submitted to Ecology and EPA
February 1986	Disposal of solidified waste inventory in the 200 West Area Low-Level Burial Grounds
March 1986	Demolition completed
April 1988	Submittal of revised Interim Status Closure Plan (Rev. 1) to Ecology
September 1988	Notice of Deficiency on Closure Plan (Rev. 1) received from Ecology
February 1989	Resubmittal of revised Closure Plan (Rev. 2) to Ecology

(Hoover 1989)

The 300 Area Solvent Evaporator site currently appears as a gravel parking lot. It is surrounded by a light-duty post-and-rope barricade.

3.6.6 300 VTS (300 Area Vitrification Test Site)

300 VTS is a mixed solid waste site located west of the 300 Area at Hanford coordinates N55870 E11950. Its access road is across Route 4 South from the 300 Area. This site is also known as the In Situ Vitrification Test

Site (WHC 1991). Between 1983 and 1986, in situ vitrification of radioactive and hazardous wastes was performed at this location (Cramer 1987). Although a new melter was constructed at the test site in late 1993, it has not yet been used. The site remains classified as inactive by WIDS (WHC 1991).

The site is approximately 340 ft long and 280 ft wide.

Wastes vitrified at this site in the 1980's contained 9.5×10^{-3} Ci of ^{241}Am, 5.3×10^{-3} Ci of ^{239}Pu, 1.8×10^{-3} Ci of ^{238}Pu, 2.0×10^{-2} Ci of ^{137}Cs, 2.1×10^{-2} Ci of ^{106}Ru, 6.8×10^{-1} Ci of ^{90}Sr, 1.0×10^{-2} Ci of ^{60}Co (Cramer 1987).

After the vitrification tests were conducted in the 1980's, all contaminated soil and equipment were removed from the site. Field radiation surveys were conducted to verify that all contaminated soil had been removed and the site had returned to background levels (Cramer 1987). Because this site had been successfully decontaminated, no release potential remained. Therefore, the site was not assigned an HRS migration score.

A large-scale melter, known as the Terra-Vit, was constructed at this site in the fall of 1993. The new melter has the capability to melt 25 tons of contaminated soil or other materials each day (PNL 1994). PNL (1994) states that the melter "was constructed to support Hanford's environmental remediation program by melting certain wastes into glass to destroy contaminants or prevent them from spreading into the environment. Westinghouse hopes to use the Terra-Vit melter technology to vitrify fine, slightly radioactive soil particles left over from a soilwashing process." No firm plans have been made for the use of the melter, however. Several potential missions, including the vitrification of coal fire ash, are being explored.

300 VTS currently appears as an area bounded by an 8-ft-high chain-link fence with three strands of barbed wire running along the top. The area within the fence is vegetation-free and covered with cobbles. A single, locked gate is located on the east side of the fenced area. Several trailers are located within the fenced area, along with the Terra-Vit melter and a large white scaffold-style structure that was used for vitrification work in the 1980's. Additionally, there are piles of gravel, piles of vitrified material and soil, miscellaneous pieces of equipment, crates, metal scaffolding, and a portable toilet located at the site. The fence is posted with signs that read "Controlled Area: Authorized Personnel Only" and "Danger: Hazard Area, No Unauthorized Personnel Beyond This Point." Figure 3-9 is a 1994 photograph showing the Terra-Vit melter, and Figure 3-10 is a 1994 photograph showing the older, scaffold-style melter and other equipment.

Figure 3-9. Terra-Vit Melter at the 300 Area Vitrification Test Site.

Figure 3-10. 300 Area Vitrification Test Site.

3.6.7 300-1 (Old North Richland Automotive Maintenance Yard)

The 300-1 Automotive Maintenance Yard is an inactive, nonhazardous, and nonradioactive solid waste site located about 1,000 ft south of the 300 Area Pig Yard and 400 ft west of the Columbia River. It is just west of the Purge Water Satellite Accumulation Area near the George Washington Way entrance to the 300 Area. The site consists of three 5-ft-wide, 10-ft-long, 4-ft-deep open bulldozer cuts and a 15-ft-wide by 20-ft-long asphalt slab (WHC 1991).

The site was used by north Richland residents for automotive repairs and recreational activities. Debris at the site consisted of bottles, lumber, empty oil cans, 5-gal cans and buckets, an 18-in. wooden wire spool, automotive oil filters and body parts, and miscellaneous refuse. No evidence could be found that would indicate radioactive contamination ever occurred at the site; however, the potential exists for hazardous constituents in unknowns.

The site was discovered during field investigation activities for the proposed DOE-RL Environmental Monitoring Support Laboratory (EMSL) (WHC 1991). Prior to the start of EMSL construction activities, PNL technicians collected surface garbage (five to six full garbage cans) in November of 1993 for disposal. PNL employees involved with the site report that no intrusive work was done and a few isolated spots of oil-contaminated soil and crushed oil filters remain at the site. The largest of the oil-contaminated soil spots measured about 2 m in diameter with the soils saturated to about 20 cm deep. It is located at the southeast corner of the EMSL construction site at approximate Hanford coordinates N50063 E17063.

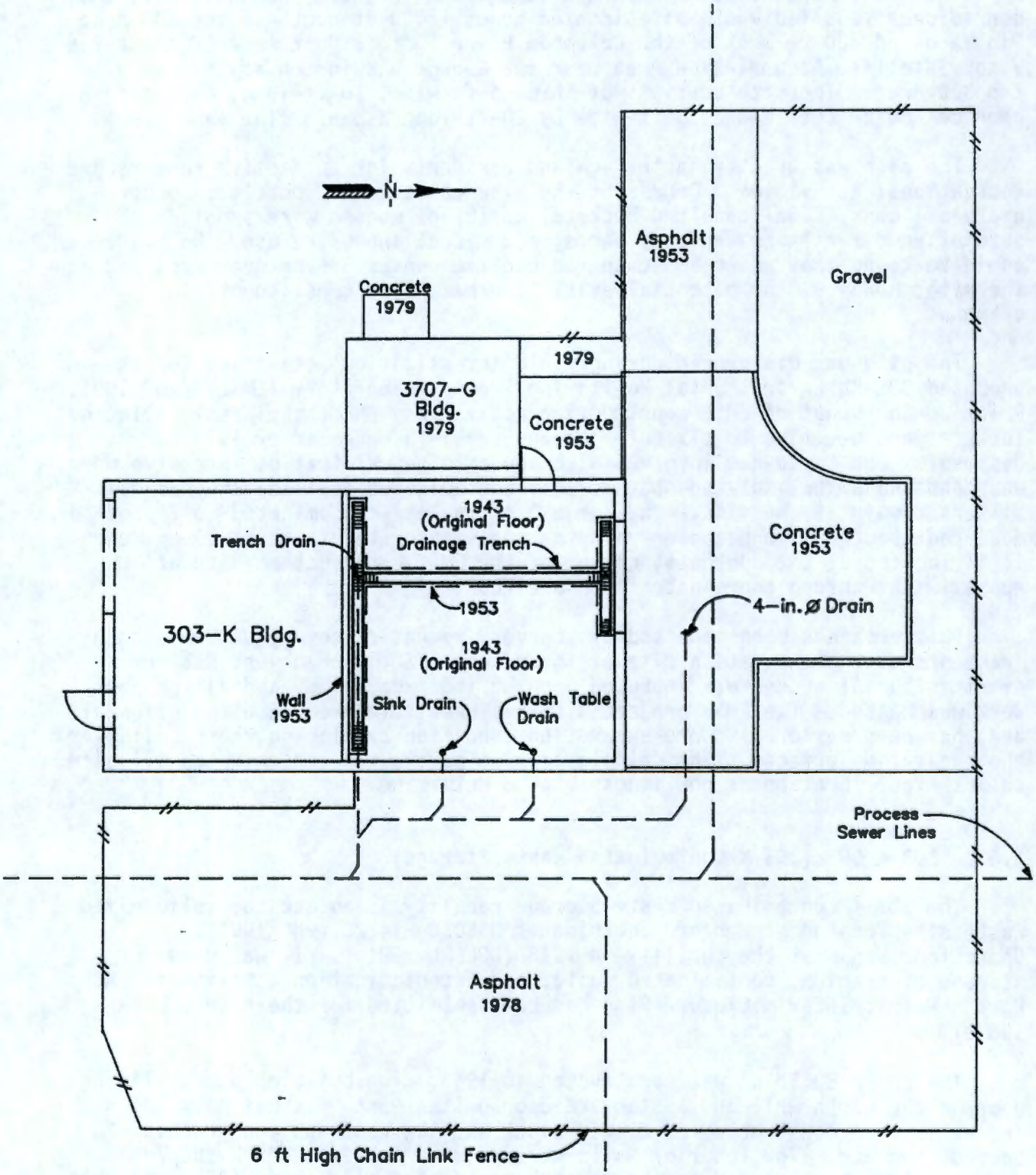
This area has been impacted by the very recent discovery of human bone fragments at the excavation site of the nearby EMSL. An ancient Native American burial ground was intruded upon during excavation, and all project work was halted. The EMSL project site has been relocated, and the original area has been restored to pre-excavation condition by placing fresh soil over the excavated surfaces. The soil layer also covers the contaminated oil site, so its exact location is now impossible to determine.

3.6.8 303-K CWS (303-K Contaminated Waste Storage)

The 303-K Contaminated Waste Storage facility is an active, solid mixed waste site located at Hanford coordinates N55050 E14220 (WHC 1991). Operations began at the facility in 1943 (DOE-RL 1991b). It was used for storage of uranium, contaminated waste, and decontamination activities. A Part A Permit Interim Closure Plan has been submitted for the site (DOE-RL 1988b).

The 303-K Building was constructed in 1943. The building has a sliding door on the north wall and a standard door on the west. It has no windows. The walls were constructed of cinder block and the roof was constructed of poured concrete. The interior walls were painted in 1977. An H-shaped drainage trench was added to the north half of the building in 1953. At that time, a cinder block wall was also added to divide the building into northern and southern halves (DOE-RL 1991b). The outside storage areas consist of two concrete pads, two asphalt pads, and a graveled area. Figure 3-11 depicts the facility floor plan and the date that additions or changes were made.

Figure 3-11. Plan View of the 303-K Facility Showing the Years in Which Sections of the Facility Were Installed.



Date Indicate Year of Installation of Surface Materials.

JMF\050291-C

Liquid wastes are stored on a 600 ft^2 pad within the building, while solid wastes are stored on a 3,500 ft^2 asphalt and concrete pad outside the building. The storage area is surrounded by a chain link fence.

Typically, the site is used for the storage of small quantities of miscellaneous wastes, such as waste oils and cutting lubricants that are potentially contaminated with uranium. Occasionally, concrete wastes from the 304 Facility, heat-treated salts, and other solids recovered from 313 Building operations have been stored at the site. The approximate rate of waste stored has been fifty to one hundred 55-gal drums per year. Visual inspections are performed daily (Cramer 1987).

Spills inside the building prior to 1988 could potentially result in a discharge to the process sewer system. Spills outside could result in discharges to soils around the facility.

The 3707-G Building, which is located adjacent to the facility, was a change room and is not part of the 303-K facility. An aboveground drain from a sink and a drinking fountain in the 3707-G Building drained into the west end of the 303-K Building trench until 1982.

Originally, the north room was ventilated by an electric fan that may have been used from 1953 to 1977 during the decontamination of aluminum spacers. This fan was replaced in 1977 with a High-Efficiency Particulate Air (HEPA) system. This exhaust system was only operated during the end of the curing operation of concreted billets of uranium and metal fines, chips, and scrap, or if hydrogen levels in the air indicated a billet fire had occurred. The exhaust system use was discontinued at the same time that the concrete curing operation was discontinued in 1982.

Liquid wastes generated during the decontamination of aluminum spacers, from 1953 to 1971, were drained to the process sewer. The flow rate of these effluents is unknown. Discharges were limited to two sinks, a wash table, and a floor drain trench. Table 3-5 lists materials used and stored at the facility from 1953 to 1977.

Table 3-5. Materials Used or Stored in the 303-K Building, 1953 to 1977.

Process	Materials Use and Disposal
Decontamination of Aluminum Spacers	Sodium hydroxide (NaOH), sodium nitrate ($NaNO_3$) Removal of radioactive contamination from aluminum spacers, all solutions and rinse water disposed of to the process sewer known to contain small amounts of ^{65}ZN, ^{95}Zr, ^{95}Nb, ^{46}Sc, ^{59}Fe, ^{60}Co and ^{58}Co.
Decontamination of Equipment	Steam, sodium aluminate solution ($NaAlO_2$), [a] Turco Aluminetch #2, American Equipment & Supply All Purpose Synthetic Cleaner, [b] Diversey RX-1288, Turco Alkaline Rust Remover, and drums of an unknown caustic material. All solutions and rinse water were discharged to the process sewer and known to contain small amounts of uranium and thorium. a- Turco is trademark of Turco Products Incorporated b- Diversey is a trademark of the Diversey Wyandotte Corporation

(DOE-RL 1991b)

From 1977 to 1982, the only known waste liquid discharged to the process sewer included steam condensate, 3707-G building discharges, and any potential cleanup water.

After 1982, the only known discharges were steam condensate and storm runoff. The steam was shut off and the floor trench drain was sealed in 1988.

Precipitation and other surface runoff entered the process sewer on the north concrete pad from 1953 until 1989, when the drain was sealed.

The outdoor storage pads have been in use since 1953 for the storage of radioactive and mixed wastes. The outside storage area is about 4,590 ft^2. In 1978, the present fence was installed to control access to the area. Figures 3-12 and 3-13 show photographs of the facility.

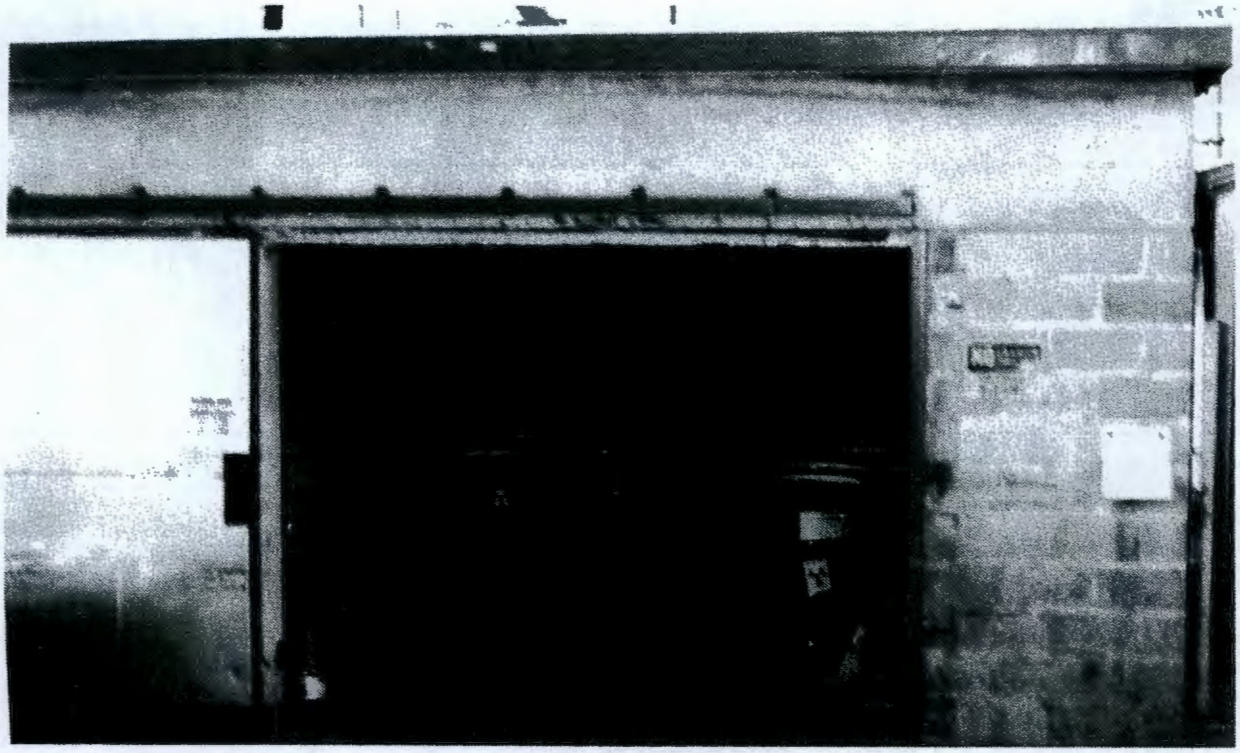
Figure 3-12. 303-K Storage Facility.

Although the building was constructed as a storage building, it has been used for several different missions and uses. Table 3-6 summarizes the operational history of the building.

Wastes received were normally in DOT-specification 85-, 55-, 30-, and 7.5-gal drums. Solvents received were in 17-H closed-head drums or 30-gal stainless steel drums. No wastes were received in bulk lots. Wastes determined to contain "de minimis" quantities of uranium were moved to the 333 East Pad for less than 90-day storage (DOE-RL 1991b).

Due to the varied history of the 303-K Building, the potential for contamination within the building and its drains is likely. There are no

Figure 3-13. 303-K Storage Facility.



records of spills or leaks at the facility. However, billet fires did occur in 1979, 1980, and 1982.

During testing in the north half of the building from fall 1979 to March 1980, a total of 14 billets burned. Another 12 billets burned on March 13, 1982. The 1982 fire required fire department assistance when the wooden pallets beneath the billets caught fire. After the fires burned out, the oxide and debris were collected and reconcreted. The facility walls, ceiling, and floors were decontaminated by washing with water that was then discharged to the process sewer. The water discharge contained uranium oxide and small amounts of copper oxide and zirconium oxide. Radiological survey and air sampling indicated that there were no atmospheric releases during these burn episodes (DOE-RL 1991b).

Table 3-6. Summary of the Operational History of the 303-K Building. (2 Sheets)

Date	Summary of Activities
1943 to 1953	Storage of uranium metal (in various shapes), and fuel elements (aluminum canned uranium)
1953 to 1971	The north end was used to remove radioactive contamination from aluminum spaces from Hanford reactors
1953 to Present	Outside pads used for the storage of radioactive mixed wastes

Table 3-6. Summary of the Operational History of the 303-K Building. (2 Sheets)

Date	Summary of Activities
1971 to 1977	The north room was used for the storage and decontamination of equipment
1977 to 1982	The north room was used to cure and test concreted billets (7.5 gal container of concreted material) of recyclable scrap uranium chips and fines from the 304 Facility. The doors were sealed with plastic during the curing cycles
1982 to 1986	Equipment storage and decontamination, using alkaline solutions, continued
After 1986	Low-Level Radioactive Mixed Waste (LLRMW) storage
	Neutralized waste solids from the nonrecoverable uranium stream of the 300 Area Waste Acid Treatment System
	Uranium contaminated metallic lead
	Salt and sludge drums from the beta and quench furnaces
	Uranium contaminated perchloroethylene; 1,1,1 trichloroethane; and ethyl acetate
	Beryllium/Zircaloy-2 alloy chips and fines generated at the stepcut lathe, before and after concretion at the 304 Facility
	Spent coolant from counterbore lathes in the 333 Building
	Waste oil/hydraulic fluids generated in the fuel fabrication facility that are known to be or suspected of being contaminated with uranium
	Salt crystals (copper fluorozirconate) from the bottom of waste storage tanks in the 334-A Building
	Acids (HNO_3, HF and H_2SO_4 mixtures) as solutions and absorbed in opal clay

(DOE-RL 1991b)

3.6.9 303-M SA (303-M Storage Area)

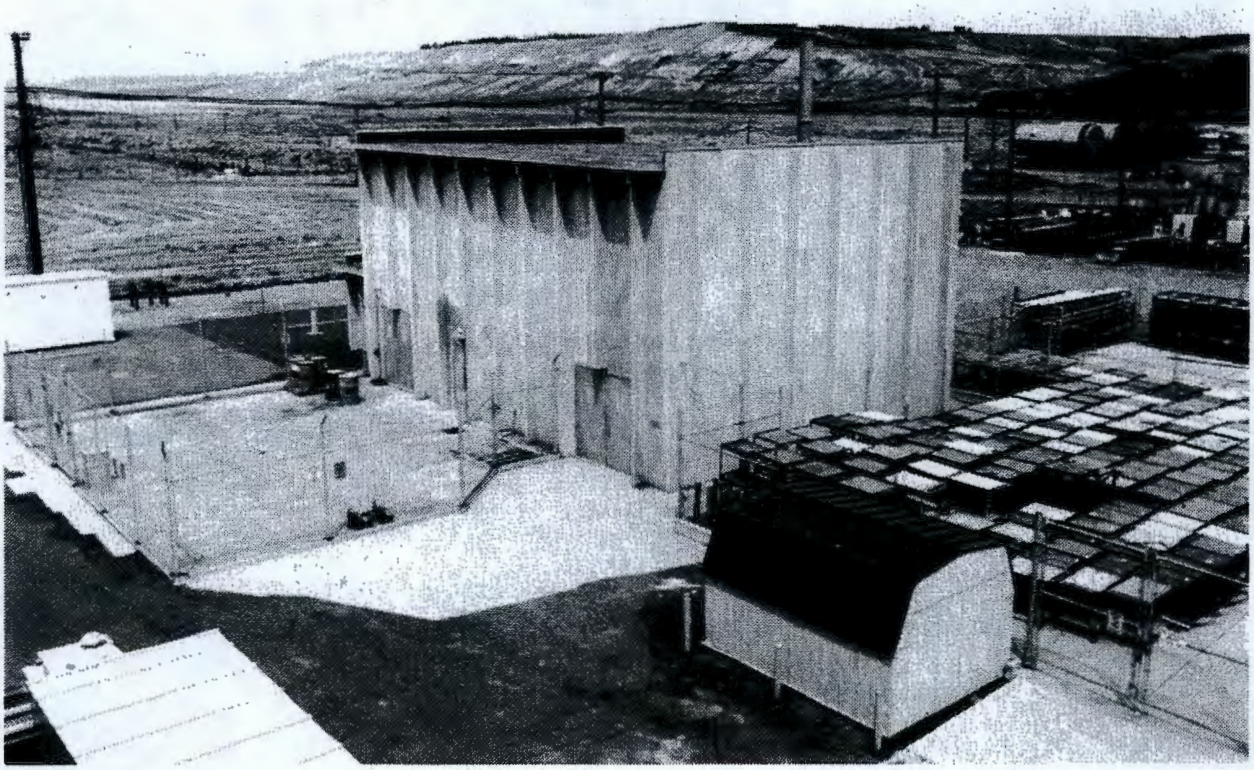
The 303-M Storage Area is an inactive, mixed solid waste facility that is located at Hanford coordinates N55570 E14890, west of the 303-M Building (Cramer 1987). Operations at the facility began in May 1983 for the storage of uranium metal chips and ignitable fines prior to treatment in the 303-M Oxidation Facility. It is estimated that waste quantities were 31 ton/yr (the FY 1986 generation rate) (Cramer 1987).

The site is a fenced concrete pad. Drums were inspected on a daily basis for leakage and liquid levels within the drums were maintained above the level of chips and fines to preclude auto-ignition of the chips. Space was maintained 360° around each drum for fire protection.

3.6.10 303-M UOR (303-M Uranium Oxide Facility)

The 303-M Uranium Oxide Facility is an inactive, mixed solid waste facility located at Hanford coordinates N55570 E14890 (Figure 3-14). It began operation in May 1983 to treat uranium and zircaloy-2 metal chips and fines by incineration, forming a non-ignitable oxide (WHC 1991). Operations ceased on February 11, 1987 (Mecca 1993 Letter). A Part A Permit has been submitted.

Figure 3-14. 303-M Outdoor Storage Area Drum Location (on Left) and 303-M Uranium Oxide Building.

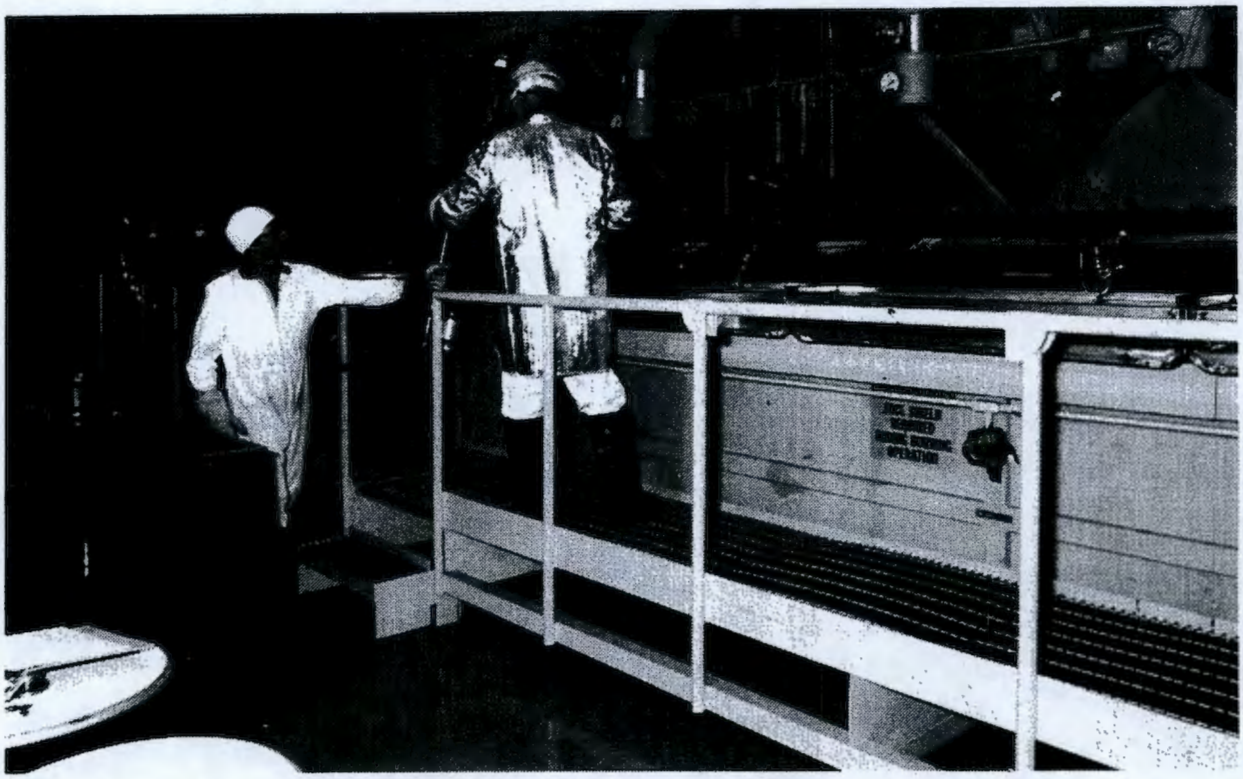


The feed material for the facility was drums of uranium and zircaloy-2 chips and fines resulting from fuel fabrication in the 333 Building. These chips and fines were collected in liquid-filled drums and stored at the 303-M Storage Pad adjacent to the facility. The liquids, mostly water with trace quantities of metals, were poured to the process sewer. Sump screens collected metal fines. Applicable Material Safety Data Sheets (MSDS) indicate that the liquids were nonhazardous. Analyses for verification are being conducted (WHC 1991).

The dry metal chips and fines were processed by incineration (oxidation) to form a uranium and zirconium oxide powder (Figure 3-15). The oxide powder

was collected in drums for storage and shipment to an offsite reclamation facility. During operations, various systems were employed to monitor airborne radioactive releases. This facility was also covered by the groundwater monitoring system for the 300 Area Process Sewer trenches (Cramer 1987).

Figure 3-15. 303-M Uranium Oxide Facility Incinerator.



One week after operations ceased, the facility was cleaned out by removing "all uranium and excess material from floor trenches, tanks, equipment, and sumps in accordance with ... Operating Procedure D-424" (See Appendix A [Mecca 1993]). Additionally, the building utilities were disconnected; floors, walls, equipment, and trenches were decontaminated; and the exhaust stack was covered.

The 303-M Facility is located over a portion of the 618-1 Burial Ground (See Appendix A [Mecca 1993]).

3.6.11 304 CF (304 Concretion Facility)

The 304 Concretion Facility is an active, mixed solid waste facility located at Hanford coordinates N54900 E14210 (WHC 1991). It operated from 1952 to 1988 (DOE-RL 1991c) for the treatment and disposal of scrap beryllium/zirconium alloy lathe chips and depleted (2.1%) uranium chips and fines (Cramer 1987).

The building was initially used to house pilot plant facilities for the lead dip fuel canning process and for electroplating uranium cores with nickel. Two furnaces were housed in the sump on the west side of the

building. These furnaces contained molten lead and aluminum-silicon alloy. From the mid 1960's to 1971, the building was used to store equipment and chemical products. In 1972, the treatment of recyclable uranium scrap and other fuels processing metals by concretion was begun at this facility (DOE-RL 1991c).

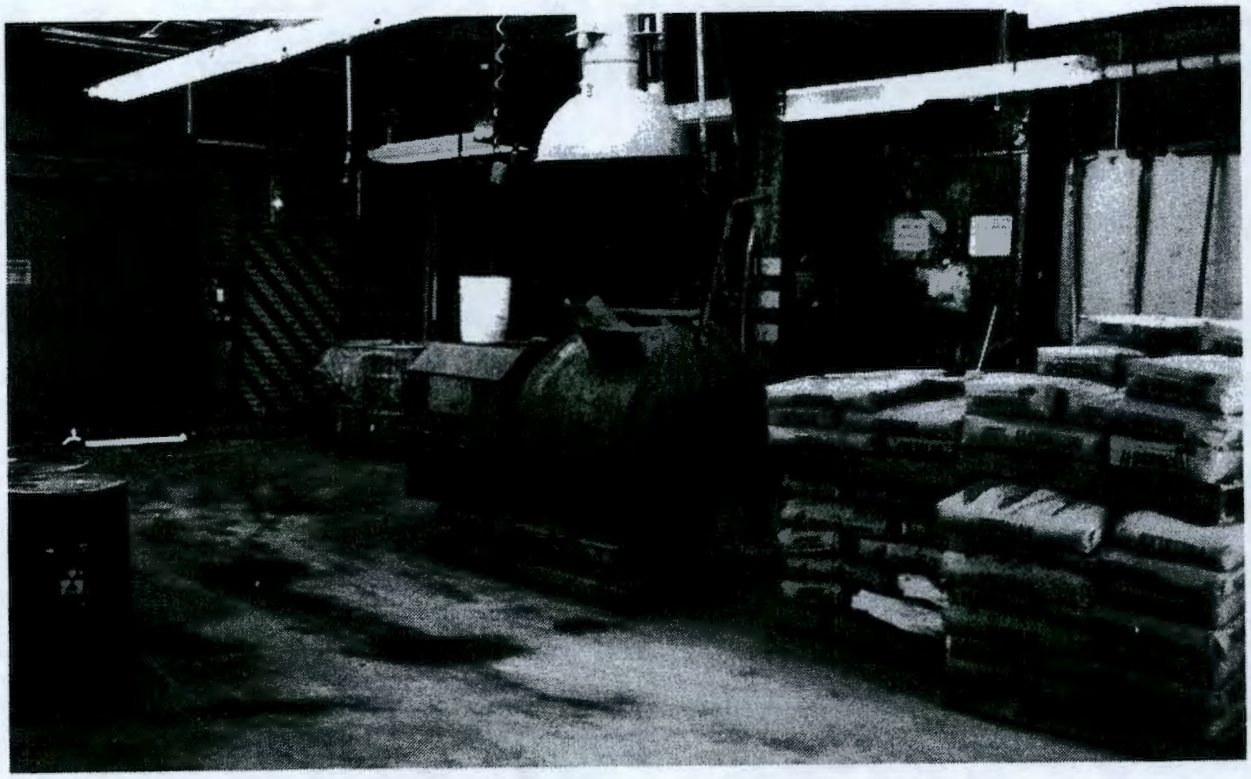
The facility consists of an outside concrete and asphalt container storage pad, described in Section 3.6.12 of this report, and an indoor concrete mixer and materials storage area (DOE-RL 1988b).

The facility was designed and constructed in 1952. In 1972, a change room was added. Constructed of metal on a concrete pad, its north and south ends have sliding doors and its east side has windows. The building has no insulation or wallboard. There is a drainage trench, floor drain, and sump in the floor. Doors are located on the north and west sides, and a window is located on the east side. The interior walls and ceiling of the change room are covered with wallboard and are insulated. Figures 3-16 and 3-17 are photographs of this facility.

Figure 3-16. 304 Concretion Facility Building and Storage Area.

Until 1989, the walls of the facility were not sealed to the concrete pad and "there were numerous small holes in the walls" (DOE-RL 1991c). During concretion operations, the floors and walls of the facility were washed down daily. This washing and splashing against the walls may have carried

Figure 3-17. 304 Concretion Unit.



contaminants out of the building. Additionally, there was no provision to contain this wash water at either of the large door openings. The fenced north pad also has no containment system for spills, wash water, or precipitation runoff. "In past years, several layers of asphalt have been placed over old asphalt and gravel areas to prevent the spread of uranium contamination" (DOE-RL 1991c). The latest addition of asphalt occurred in 1988.

In 1989, uranium-contaminated areas were covered with two layers of enamel paint. Two paint colors were specified: Safety Yellow and Dixie Gray. The yellow paint was applied to the surface first to act as a wear indicator.

The gray paint was applied as the top coat. In late 1989, all holes and joints in the building were sealed to prevent further contamination spread outside the building.

Over time, several different ventilation systems were used in the facility. The first was composed of three roof vents powered by 2,050-ft^3/min electric fans. This system was used during pilot plant activities from 1952 to the mid 1960's. The fans were disconnected in 1971. From 1952 to the late 1950's, the facility housed molten metal furnaces. Furnace cooling air was exhausted through a 6-in.-diameter pipe on the west side of the building. The pipe remains in place but is sealed in the sump that was formerly the furnace pit. From the late 1950's to the mid 1960's, the building housed nickel plating operations and a 1,900-ft^3/min fume exhaust system. The exhauster was used to remove acid and nitrous oxide fumes generated by plating operations. It had no provision for monitoring and was replaced in 1971. The present

system was installed in 1971 to replace the plating operations exhauster. It was used to remove cement dust from the work area during concretion. Air was passed through a cyclone precipitator and was discharged vertically 12 ft above the ground level. Discharges were monitored continuously for uranium during operation of the exhaust system. In addition to the exhaust systems, the facility was equipped with a 10,000-ft^3/min evaporative swamp cooler that was used during hot weather conditions until 1985.

The building contains four drains, all of which drain to the process sewer. The floor drain near the cement mixer drained to a sump with a removable, screened 16-in.-tall standpipe that drained to an underground process sewer line. A water line discharged directly to this drain pipe beneath the screen. The water line ran at an unknown flow rate to keep the P-trap clear of concrete. The remaining three drains drained directly to the process sewer. The first drain was a floor drain on the east side of the floor trench, the second was from a sink in the southwest corner of the building, and the third was from the outside quench sump (steam condensate) on the east side of the building. The floor drains were plugged in 1994.

Waste metals were collected in liquid-filled drums and stored for treatment at the facility. Applicable MSDS indicate that liquids were non-hazardous. The liquids were poured to the process sewer system, and the fines were collected in a screened sump. Airborne uranium release monitoring was performed during operations. Liquid wastes were monitored by the groundwater monitoring system for the 300 Area Process Sewer trenches. The chips and fines were mixed with concrete and stored in 30- or 55-gal drums after processing (Cramer 1987). Ten of these drums could be concreted at the facility per day (about 20,000 lbs annually [DOE-RL 1988b]).

On at least one occasion--August 8, 1977--billets of material housed within the facility burned (Figure 3-18).

Investigation revealed that the contamination spread was contained in a small area and that no apparent damage to the facility occurred. A Part A Permit and Interim Closure Plan have been submitted.

Figure 3-18. Burned Billets in the 304 Facility

3.6.12 304 SA (304 Storage Area)

The 304 Storage Area is an inactive, mixed solid waste storage facility located at Hanford coordinates N54900 E14220. The storage area is just outside the 304 Building (Cramer 1987). It operated from January 1972 to December 1986 (DOE-RL 1988b) for the storage of potentially contaminated wastes. It received about fifty to one hundred 55-gal drums per year during operations.

The site was used for the storage of miscellaneous wastes generated in the fuel fabrication process. These wastes consisted of heat treat salts (sodium chloride, potassium chloride, sodium nitrate, and potassium nitrate), depleted uranium chips and fines, and beryllium/zirconium chips and fines. The metal chips and fines (uranium, and beryllium/zirconium ignitable and ignitable/carcinogenic) were stored awaiting concretion in the 304 Concretion Facility described in Section 3.6.11. Drums were accumulated and stored mainly on the asphalt and concrete pad (Cramer 1987). See Figure 3-16 for a photograph of this facility. A Part A Permit has been submitted for the site.

3.6.13 305-B SF (305-B Storage Facility)

The 305-B Storage Facility is an active, radioactive mixed waste (RMW) and dangerous waste facility located at Hanford coordinates N55200 E14000 (WHC 1991). It began operation in January 1978 as a satellite storage facility for research and development operations in the 300 Area. It was

recently upgraded to house dangerous and RMW wastes in March of 1989. The design capacity is 30,000 gal.

Wastes are brought to the facility for storage, repackaging, and/or waste consolidation. These wastes consist of listed wastes, wastes from nonspecific sources, characteristic wastes, and state-only (special) wastes. RMW is stored as received in storage cells located in the basement of the facility. All other wastes are stored in four segregated cells in the "high bay area" (DOE-RL 1988b, DOE-RL 1990b). A Part A and Part B Permit have been submitted for the site.

3.6.14 307 RB (307 Retention Basin)

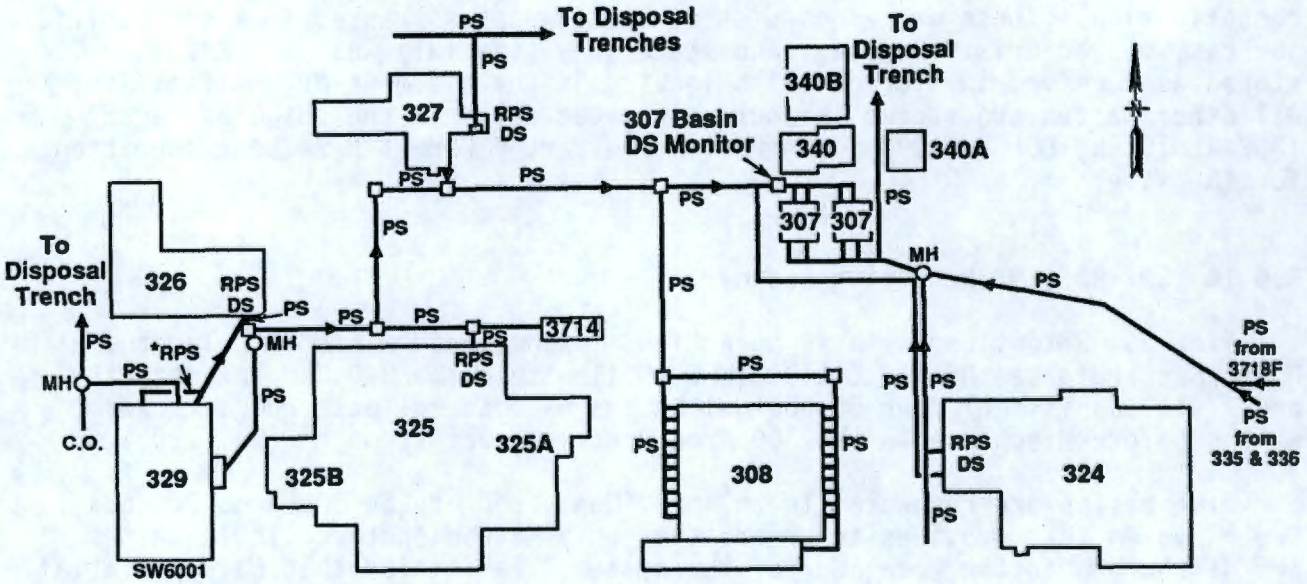
The 307 Retention Basin is an active, mixed liquid waste site located at Hanford coordinates N54370 E15430 (WHC 1991) within the 340 Complex security area. It consists of four 50,000-gal basins used to collect process sewer wastes before discharge to the 300 Area Process Sewer trenches (WHC 1991).

The basins are connected to an individual loop of the 300 Area Process Sewer system that provides assurance that only nonradioactive liquid wastes are discharged to the remainder of the system. Facilities that have potential for radioactive discharges are connected to this process sewer loop. There are ten such facilities: the 308, 324, 325, 326, 327, 329, 335, 336, 3714, and 3718-F Buildings. Figure 3-19 shows the Retention Process Sewer.

The basins are constructed of concrete. Two are lined with an epoxy-type coating. Currently, only the lined basins are used; of these two, only one is in use under normal flow conditions. Should radioactive contamination be detected, these basins would be utilized to contain the process sewer effluent until it could be transferred to the Radioactive Liquid waste System and return to normal flow conditions resumed. Estimated flow to the facility is 1 to 4 million gal/day (WHC 1991).

The basin effluent waters are monitored continuously for radioactive content. Originally, when the limit of 5 pCi/L was exceeded, the water was discharged to the 340 Complex holding tanks described in Section 3.5.3. Under normal conditions, the effluent water was discharged to two long leaching trenches, described in Section 3.4. Upon the retirement of the leaching trenches, the effluent water was rerouted to discharge to the 300 Area Process Sewer system. These facilities are shown in Figures 3-20 and 3-21.

Figure 3-19. Retention Process Sewer.



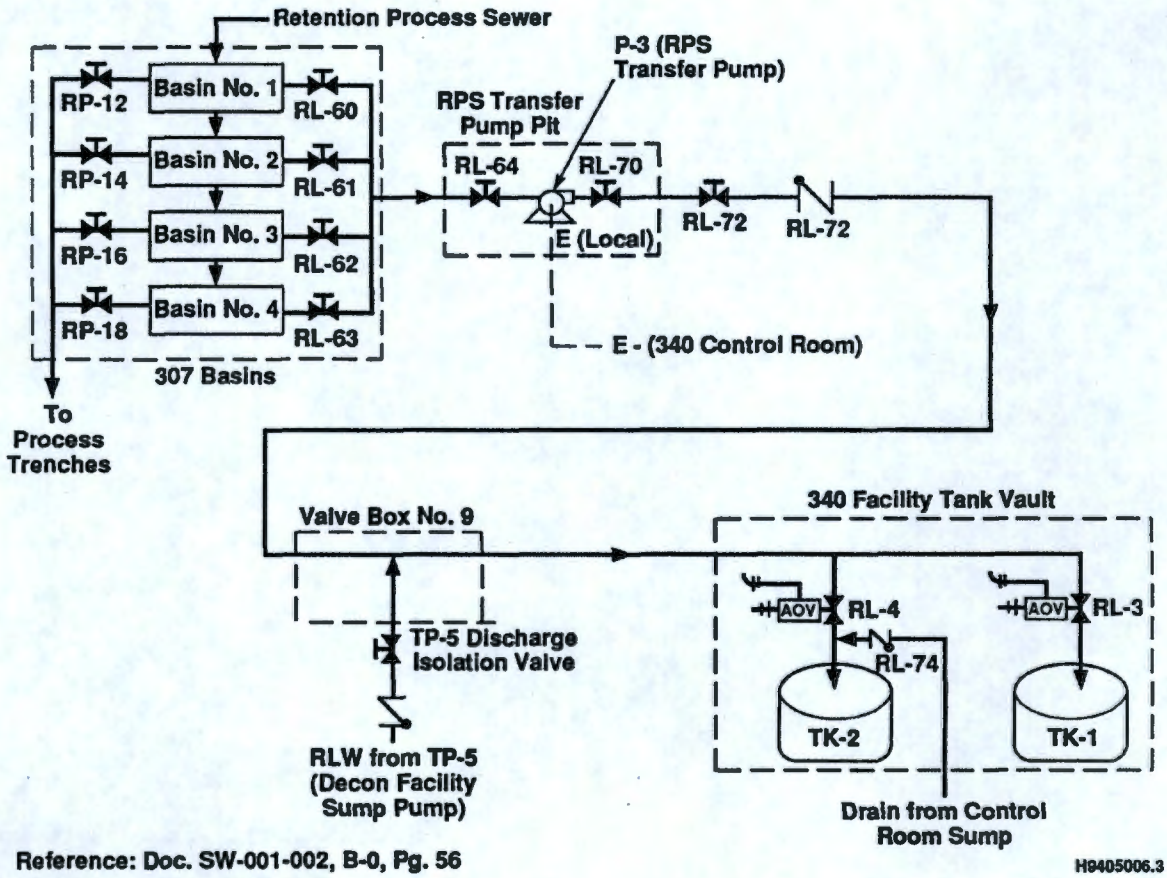
Legend

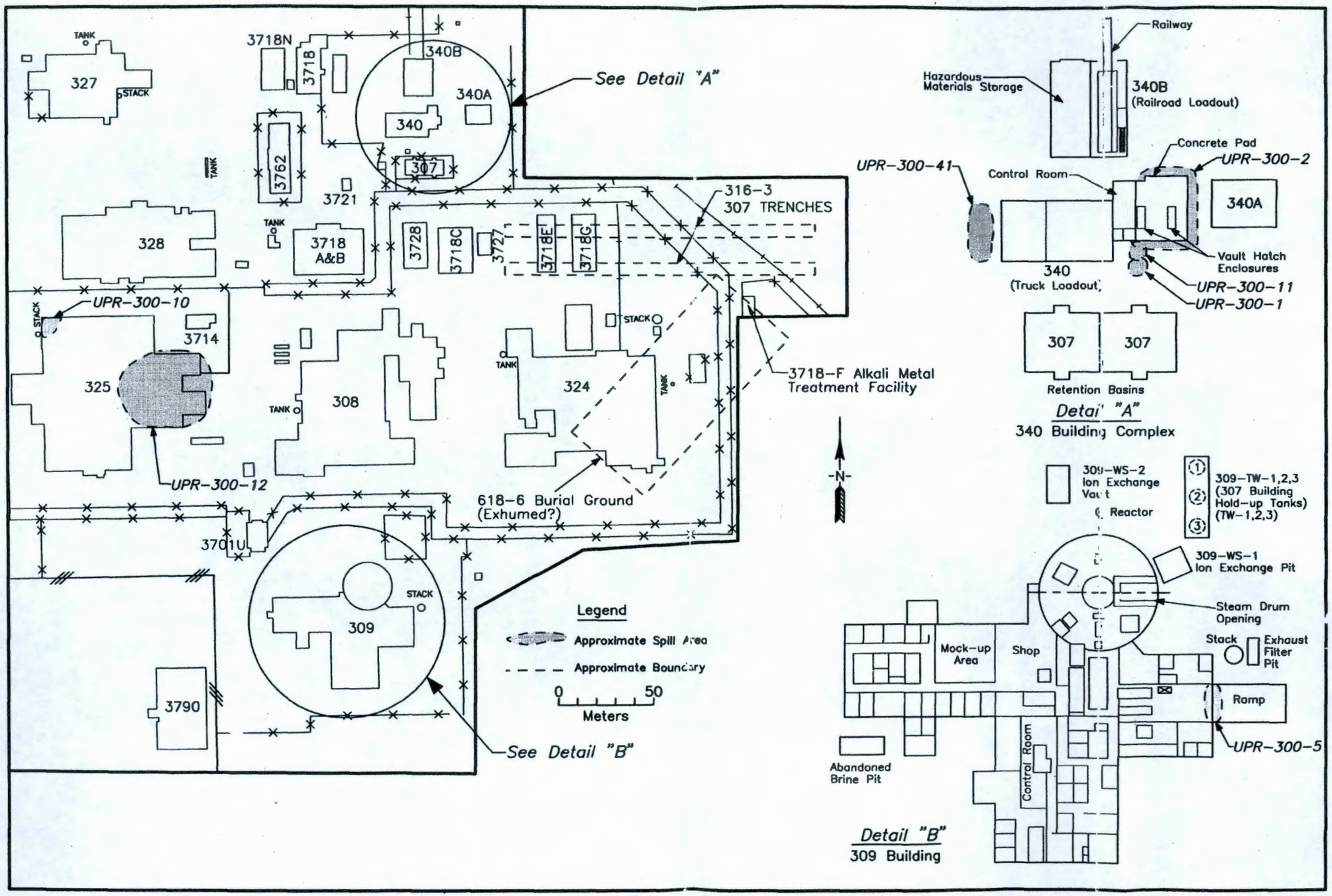
DS = Diverter Station
MH = Manhole
PS = Process Sewer
RPS = Retention Process Sewer

Note: * Direct Buried RPS Line

Reference: Doc. SW-001-002, B-0, Pg. 48

Figure 3-20. Transfer 307 Basins Contents to Vault Tanks Schematic Diagram.





WHC:UA:300AREA:GA-2

Figure 3-21. Portion of the 300 Area Containing the 307 Disposal Trenches (316-3) and the 307 Retention Basin.

3.6.15 309-TW-1 (309-TW Tank No. 1)

309-TW-1 is an inactive, low-level radioactive liquid waste tank located at Hanford coordinates N53650 E15300. It began operation in 1960 and was active until 1973. This 5,026-gal tank (WHC 1991) was used to receive aqueous, nonhazardous and radioactive wastes generated by the operation of the PRTR (Cramer 1987). It is one of three storage tanks in the system and includes a carbon steel pipe that terminates at the 340 Complex in the 300 Area (Cramer 1987). The tank is located in an underground concrete vault that houses all three of the tanks. They are enclosed in a 6 ft chain link fence that is posted with "surface contamination" and "underground radioactive materials" warning signs. Piping and vents are visible above grade within the fenced area, presumably above the tanks.

3.6.16 309-TW-2 (309-TW Tank No. 2)

309-TW-2 is an inactive, low-level radioactive liquid waste tank located at Hanford coordinates N53650 E15300. It began operation in 1960 and was active until 1973. This 5,141-gal tank (WHC 1991) was used to receive aqueous, nonhazardous and radioactive wastes generated by the operation of PRTR (Cramer 1987). It is one of three storage tanks in the system and includes a carbon steel pipe that terminates at the 340 Complex in the 300 Area (Cramer 1987). The tank is located in an underground concrete vault that houses all three of the tanks. They are enclosed in a 6 ft chain link fence that is posted with "surface contamination" and "underground radioactive materials" warning signs. Piping and vents are visible above grade within the fenced area, presumably above the tanks.

3.6.17 309-TW-3 (309-TW Tank No. 3)

309-TW-3 is an inactive, low-level radioactive liquid waste tank located at Hanford coordinates N53650 E15300. It began operation in 1960 and was active until 1973. This 4,185-gal tank (WHC 1991) was used to receive aqueous, nonhazardous and radioactive wastes generated by operation of PRTR (Cramer 1987). It is one of three storage tanks in the system and includes a carbon steel pipe that terminates at the 340 Complex in the 300 Area (Cramer 1987). The tank is located in an underground concrete vault that houses all three of the tanks. They are enclosed in a 6 ft chain link fence that is posed with "surface contamination" and "underground radioactive materials" warning signs. Piping and vents are visible above grade within the fenced area, presumably above the tanks.

3.6.18 309-WS-1 (Reactor Ion Exchange Pit)

309-WS-1 is an inactive, solid mixed waste site that is located approximately 5 ft northeast of the 309 Building dome at approximate Hanford coordinates N53582.82 E15346.55 (Hanford Drawing H-3-57400). The site is also known as the Reactor Ion Exchange Pit and the PRTR Ion Exchange Vault (WHC 1991). It operated from November 1961 to 1969.

The site consists of a two-story, concrete, underground vault that is 19 ft long, 19 ft wide, and 41.5 ft deep. The upper level, 19 ft^2 and 18 ft deep, houses the ion exchange columns, which are positioned vertically and welded in place. The site contains the following ion exchangers: IX-1 (Primary Loop Cleanup), IX-2 (Reflector Loop Cleanup, IX-3 (Moderator Loop

Cleanup), and BIX-5 (Boron Removal Exchanger). IX-4 (Top and Bottom Shield Cooling Loop) was relocated to the A-Cell of the 309 Building around 1965, then removed and disposed of during the SP-100 cleanup in the 1980's. The lower vault is accessed through two 2.83-ft concrete-plugged holes in the upper vault floor. The lower level was used for spent ion exchange column storage. The lower level has an inside diameter of 15.5 ft, is 22 ft deep, and has a 20-ft-diameter octagonal base. Three layers of concrete cover blocks, which together are 6 ft thick and are fitted in a step configuration at grade level (WHC 1991).

The ion exchange columns were used to remove contaminants from heavy water coolant and the shield cooling systems. The ion exchange columns range from 1.5 ft to 2.5 ft in diameter and are 8 ft to 10 ft long. They have volumes of 7.9 to 22 ft^3. Anion resins (Amberlite XE-78, a strong basic quaternary ammonium compound converted to hydroxide form) and cation resins (Amberlite XE-77, a highly acidic sulfonic acid type converted to hydrogen form) are used in the columns to remove the contaminants. Sometime in the 1960's, some of the columns were replaced; the old columns, with their resins, were dropped into the lower-level storage area (WHC 1991).

A radiation survey of the ion exchange columns conducted on December 19, 1986, showed radiation levels of 75/30 mR/h for IX-1, 100/50 mR/h for IX-2, 75 mR/h for IX-3, and 75 mR/h for BIX-5. It is reported that the four exchange columns were drained in 1986 for the SP-100 cleanout. Approximately 30 gal of a clear, slightly radioactive liquid was obtained.

A sample of the boron exchange water was analyzed on January 19, 1987. The results of this analysis are listed in Table 3-7 (Appendix A, Weiler 1987).

Table 3-7. Boron Ion Exchange Water Analysis Results.

Total Alpha	0.2 α/min/mL
Total Beta	1.7 β/min/mL, exclusive of ^3H
Tritium	5.2×10^5 β/min/mL
Gamma Spectral Analysis: No non-volatile gamma-emitting nuclide present in detectable amount	

(Appendix A, Weiler 1987)

The vault was recently entered on March 3, 1994, to investigate the vault contents and stability as part of the Surplus Facility Inventory and Assessment (SFIA) Project. The vault was investigated using a remote camera and probes.

The upper vault was damp and contained the four ion exchange columns along the west wall, discussed above, plus a fifth ion exchange column leaning against the east wall. The fifth column was not connected to the system and was apparently being stored for disposal in the lower vault. The upper vault did not contain any combustible gases, organic gases, or airborne contamination. Smears from the ion exchange columns, vault floor, and one of the lower vault access plugs showed no detectable surface contamination (Graves 1994).

General field radiation approximately 12 in. above the south access plug was 40-mR/h. Contact radiation readings of 40 mR/h and 60 mR/h were obtained from the BIX-5 and IX-1 columns, respectively. The IX-2 and IX-3 columns could not be reached by the probe. A maximum contact reading of 1.58 R/h was obtained at the top of the fifth column leaning against the wall. The total estimated activity in the columns in the upper vault is 0.6 Ci of ^{60}Co and 0.01 Ci of ^{137}Cs (Graves 1994).

No combustible or organic gases were detected in the lower vault. Additionally, no airborne contamination was present. The lower vault contains approximately 10.3 ft of water, which is assumed to be rainwater. The camera survey showed no evidence of a "bathtub ring" that would indicate the water level had been higher. There are seven ion exchange columns in the lower vault, four of which are standing and three of which are leaning or horizontal. The ion exchange column walls are intact, but the severed pipes of the columns are not capped. Resin beads have leaked from the columns and form small piles under the severed pipes. Lifting cables are still attached to some of the columns. Contrary to existing drawings, there is no gravel on the floor of the lower vault (Graves 1994).

A general field radiation reading 1 ft above the water surface of <1 mR/h was recorded, increasing to 4mR/h at the water surface. At approximately 5 ft below the water surface, the general field reading increased to 34 mR/h. The maximum contact reading taken from sides of the column directly below the access plug was 2.5 R/h. Due to probe access limitations, direct readings of all the columns were not obtained. The total estimated activity in the lower vault columns is 1.8 Ci ^{60}Co and 1.0 Ci of ^{137}Cs. It is expected that 1.0 Ci of ^{90}Sr is associated with the ^{137}Cs (Graves 1994).

The water in the vault is clear with a temperature of 56° F. Samples of the water were taken from the top, middle, and bottom of the pool. The bottom sample contained resin beads, which showed a high loading of ^{137}Cs. Gamma ray measurements showed very low activity of ^{60}Co and ^{137}Cs in nearly equal concentrations. Analytical results of the water samples are present in Table 3-8. The highest readings for each activity are presented in the table.

Currently, the vault is open and the greenhouse is sitting over the top of it. The vault will likely stay open until a decision is made concerning the disposition of the water and ion exchange columns.

Table 3-8. Lower Vault Water Sample Analytical Results.

Activity	Level
Total Alpha (α)	$<5x10^{-7}$ μCi/mL
Total Beta (β)	$<7x10^{-3}$ μCi/mL
^{60}Co	$<2x10^{-5}$ μCi/mL
^{137}Cs	$<3x10^{-5}$ μCi/mL
Tritium	$<1.4x10^{-2}$ μCi/mL
Aluminum, Boron, Calcium, Cadmium, Chromium, Iron, Potassium, Lithium, Sodium, and Silicon	<50 ppm each

(Graves 1994)

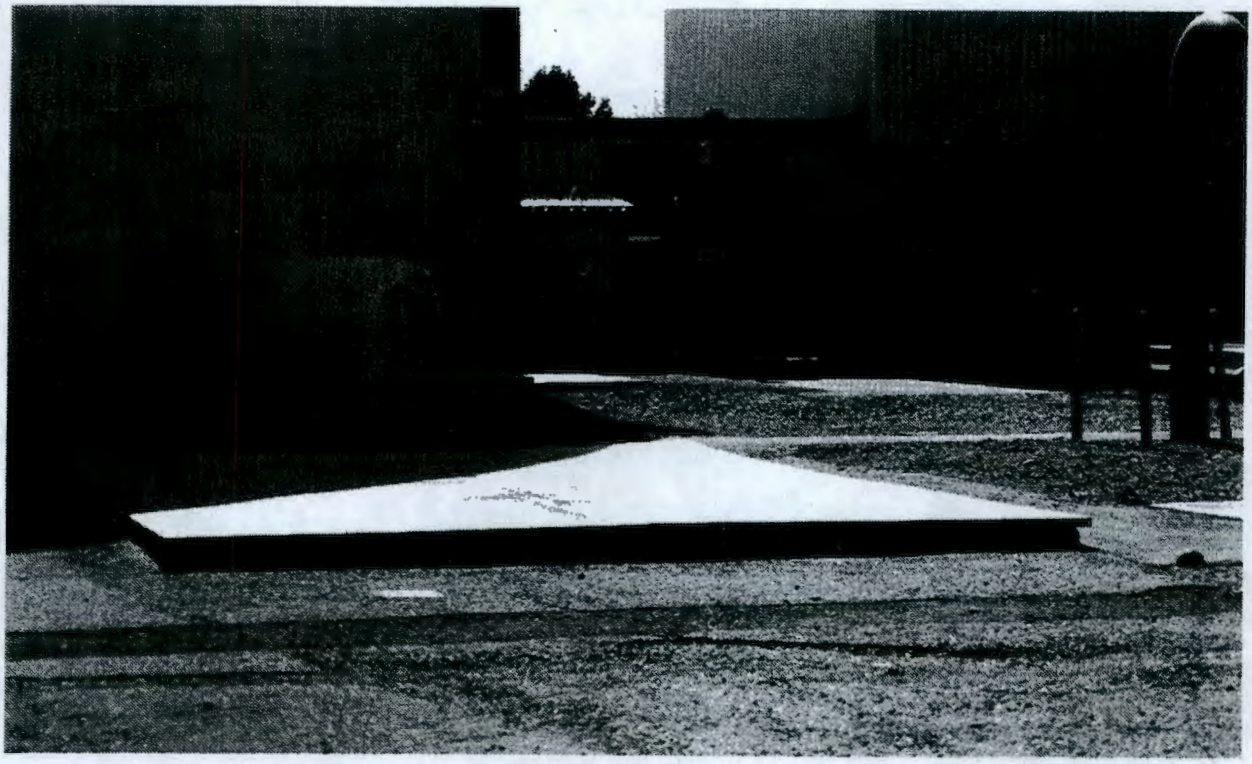
3.6.19 309-WS-2 (Rupture Loop Ion Exchanger)

309-WS-2 is an inactive, solid mixed waste site located approximately 26 ft north-northwest of the 309 Building dome at Hanford coordinates N53720 E15251. Figure 3-22 is a photograph of the site.

See detail B of Figure 3-21 for the site's location. The site is also known as the Rupture Loop Ion Exchange Pit and the Ion Exchange Vault. It operated from November 1961 to 1969 (WHC 1991).

The site consists of a reinforced concrete underground vault that is 26.16 ft long, 15.83 ft wide, and 16 ft deep. The vault is covered by 4 ft of concrete cover blocks. A rain cover has been installed over the cover blocks to prevent rainwater from entering the vault. The vault is sectioned into five bays. Four bays are for ion exchange columns, and one bay has 1-in. steel plating on the floor and a drain. The drain is connected to a sump in Room 20 of the 309 Building. The four ion exchange columns are the RLIX-1 (Cation Exchanger), RLIX-2 (Mixed Bed exchanger), RLIX-3 (Deoxygenator), and a boron exchanger. The boron exchanger was added in 1968 (WHC 1991). The ion exchange columns were used to remove contaminants and fission fragments from light water coolant. Ion exchange columns RLIX 1 through 3 have inside diameters of 2.33 ft and capacities of 27 ft^3. The boron exchanger has an outside diameter of 1.5 ft and is 6.25 ft long. The columns have never been replaced or removed from the vault. It is assumed that the columns are dry, since the sump in Room 20 is dry (WHC 1991). There is no radiation survey information for this site.

Figure 3-22. 309-WS-2 Rupture Loop Ion Exchange Vault.



Currently the vault has a weather cover installed over the cover blocks to keep out rain and snow. Along with the 309 Building, the vault is waiting to be turned over to DOE Environmental Management as a surplus facility for eventual decontamination and decommissioning.

3.6.20 311 MT1 (311 Methanol Tank 1)

311 MT1 was an underground storage tank for hazardous liquid that was located in the 311 Tank Farm at Hanford coordinates N55100 E14546.53 (Hanford Drawing H-3-17798). The underground storage tank is also known as 311 Methanol Tank 1, 311 Tank Farm Underground Methanol Tank #1, and 311-1. The tank was used from 1955 to 1971. Site personnel report that it was pumped out and filled with water in 1971. It was emptied in 1987 and removed on August 30, 1989 (WHC 1991). 311 MT1 was a horizontal, flat-ended, cylindrical tank that was 5.33 ft in diameter, 23.83 ft long, and had a capacity of 4,000 gal. The pure methanol was used as a final rinse of the aluminum end caps and cans in both the "triple dip" and "lead dip" fuel fabrication process in the 313 Building. The aluminum end caps and cans were rinsed in methanol to remove water from the components' final water rinse.

The tank had contained 4,000 gal of 4.35% methanol prior to 1971. Site personnel report that, in 1971, it was pumped out and filled with water. The tank was emptied in 1987 and removed on August 30, 1989. Sampling and visual inspection indicated that the area around the tank was not contaminated. The excavation was backfilled on completion of the tank removal activities (WHC 1991, Gerber 1992).

Currently, the former site of 311 MT1 is covered with gravel. There is no visible indication of the former location of the tank. Figure 3-23 shows Methanol Tanks 1 and 2 in August 1989.

Figure 3-23. 311 Methanol Tanks 1 (Left) and 2 (Right) Being Removed in August 1989.

3.6.21 311 MT2 (311 Methanol Tank 2)

311 MT2 was an underground storage tank for hazardous liquid that was located in the 311 Tank Farm at Hanford coordinates N55100 E14554.48 (Hanford Drawing H-3-17798). The underground storage tank is also known as 311 Methanol Tank 2, 311 Tank Farm Underground Methanol Tank #2, and 311-2. The tank was used from 1961 to 1971. Site personnel report that it was pumped out and filled with water in 1971. The tank was emptied in 1987 and removed on August 30, 1989 (WHC 1991).

311 MT2 was constructed of 3/16-in. carbon steel. It was a horizontal, flat-ended, cylindrical tank that was 6 ft in diameter and 24 ft long, with a capacity of 6,000 gal (see Figure 3-23). This tank stored used methanol solution from the 313 Building until the solution was de-watered in the still (located in the 311 Building) and added to the clean methanol in tank 311-MT-1 for reuse.

The tank had contained 6,000 gal of 1.43% methanol prior to 1971. Site personnel report that, in 1971, it was pumped out and filled with water. The tank was emptied in 1987 and removed on August 30, 1989. Sampling and visual inspection indicated that the area around the tank was not contaminated. The

excavation was backfilled on completion of the tank removal activities (WHC 1991, Gerber 1992).

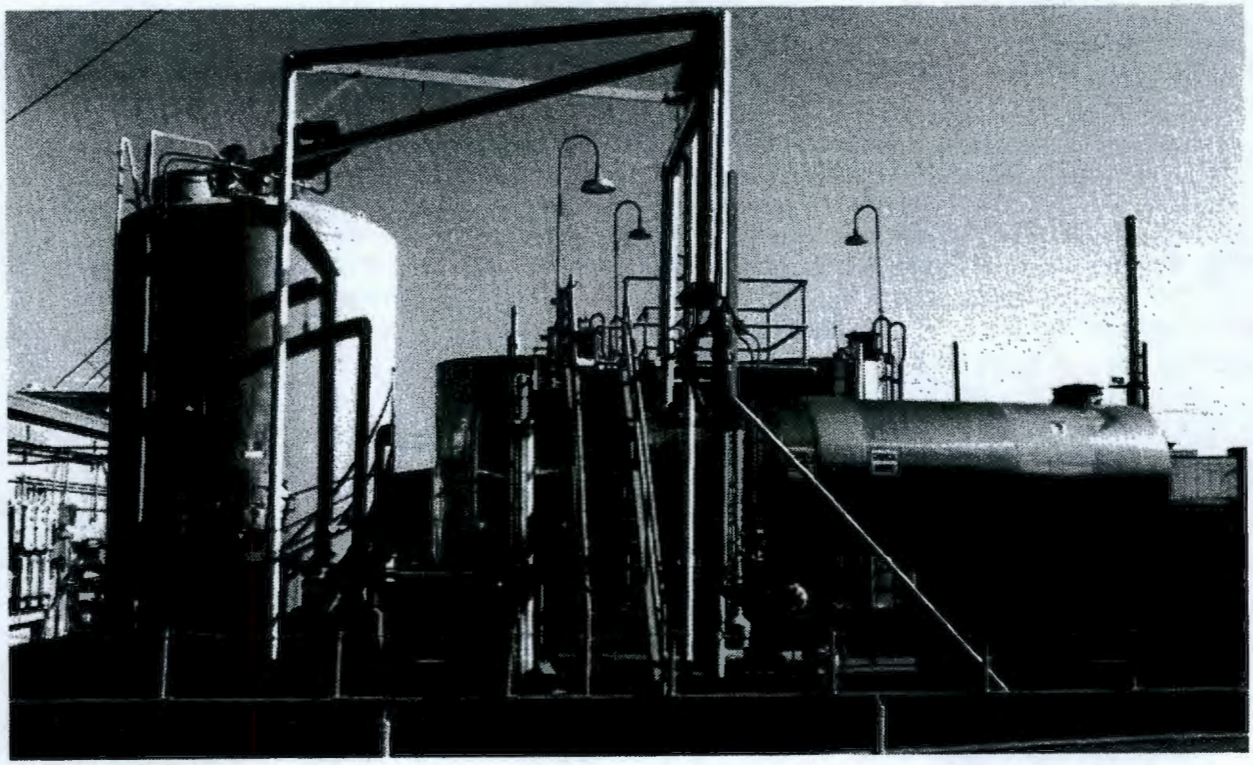
Currently, the former site of 311 MT2 is covered with gravel. There is no visible indication of the former location of the tank.

3.6.22 311-TK-40 (311 Neutralized Waste Tank 1)

311-TK-40 is an inactive liquid mixed waste storage tank in the 311 Tank Farm, located at Hanford coordinates N55029.92 E14516.17 (Hanford Drawing H-3-17798). The site is also known as the 311 Neutralized Waste Tank 1 (WHC 1991). The unit has been used since 1953 and added to the 300 Area Waste Acid Treatment System (WATS) in 1973 (DOE-RL 1990a).

The 4,000-gal, stainless steel, horizontal,cylindrical tank is located inside a concrete containment structure (see Figure 3-24). It has a diameter of 6 ft and a length of 23.83 ft. The tank was first used for storage of nitric acid from 1953 to 1973 (DOE-RL 1990a). From 1973 to the present, the tank has been used in the 300 Area WATS for the storage of neutralized waste prior to disposal (DOE-RL 1990a). During WATS operations, 311-TK-40 and 311-TK-50 received 420,000 gal/yr of waste solution consisting of neutralized liquid from the nonrecoverable uranium stream and filtrate from processing of the uranium-bearing waste stream for the 313 Building recovery operations (WHC 1991). The tank is currently empty (WHC 1991).

Figure 3-24. The 311-TK-40 Neutralized Waste Tank (Horizontal) and the 311-TK-50 Waste Acid Tank (Vertical).



From 1975 to 1985, the solutions from 311-TK-40 were transported via tanker trailer to the 183-H Solar Evaporation Basins for disposal (DOE-RL 1990a, Gerber 1992). In 1985, solutions from 311-TK-40 and 311-TK-50 were transported to the 340-B Building via tank trailer for shipment by rail car to the 200 Area disposal facility or transported offsite for disposal. A sample of each tank trailer load was taken for chemical analysis. A logbook was kept, listing the following for each load: the volume, the pH, the concentration of sulfate and uranium, and whether or not the liquid was free of particulates. Monthly environmental performance reports listed amounts and constituents of neutralized waste acid shipped to the 340-B Building or offsite. A monthly composite sample was analyzed and recorded for constituents such as chromium, copper, nitrate, sulfate, and uranium (DOE-RL 1990a).

Three unplanned releases are associated with the 311 Tank Farm. Unplanned release UPR-300-39 released a 50% sodium hydroxide solution to the ground, and unplanned releases UPR-300-40 and UPR-300-45 released uranium-bearing acid wastes to the ground (WHC 1991). See Sections 5.14, 5.15, and 5.20, respectively, for further details of these releases.

A RCRA Closure Plan for the 300 Area WATS (DOE-RL 1990a), which includes 311-TK-40, was submitted to the Washington State Department of Ecology (Ecology) in June 1990. DOE is waiting for Ecology's approval to proceed with closure activities. Currently, the tank is empty and will not be used for final closure activities associated with the WATS.

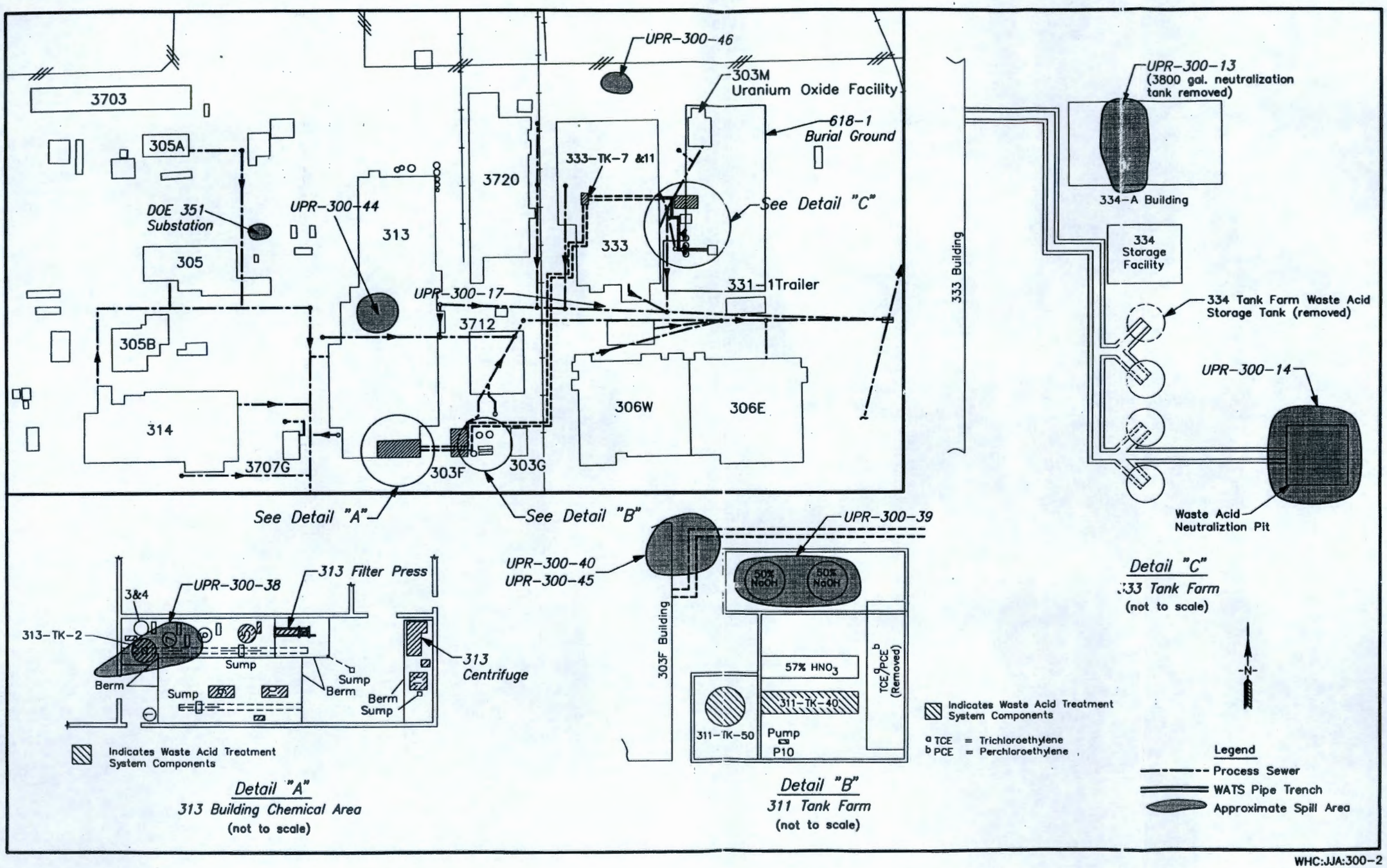
3.6.23 311-TK-50 (311 Neutralization Waste Tank 2)

311-TK-50 is an active, mixed liquid waste storage tank in the 311 Tank Farm, located at Hanford coordinates N55029.12 E14508.17 (Hanford Drawing H-3-55807) (Figure 3-25). The unit is also known as the 311 Neutralized Waste Tank 2 (WHC 1991). The tank was installed in 1985.

The 5,000-gal, stainless steel, vertical tank is located inside a concrete containment structure. Installed in 1985, the tank is used in the 300 Area WATS for storage of neutralized waste prior to disposal (DOE-RL 1990a). During WATS operations, 311-TK-40 and 311-TK-50 received 420,000 gal/yr of waste solution consisting of neutralized liquid from the nonrecoverable uranium stream and filtrate from processing of the uranium-bearing waste stream for the 313 Building recovery operations (WHC 1991).

On four occasions from 1986 to 1987, neutralized slurry was sent directly to 311-TK-50, bypassing the 313 Centrifuge. The solids were settled out and the liquid was decanted into 311-TK-40 (DOE-RL 1990a).

Solutions from 311-TK-50 were transported to the 340-B Building via tank trailer for shipment by rail car to the 200 Area disposal facility or transported offsite for disposal. A sample of each tank trailer load was taken for chemical analysis. A logbook was kept, listing the following for each load: the volume, the pH, the concentration of sulfate and uranium, and whether or not the liquid was free of particulates. Monthly environmental performance reports listed amounts and constituents of neutralized waste acid shipped to the 340-B Building or offsite. A monthly composite sample was



WHC:JJA:300-2

Figure 3-25. 311 Tank Farm, 333 Tank Farm, and 313 Building Chemical Area.

analyzed and recorded for constituents such as chromium, copper, nitrate, sulfate, and uranium (DOE-RL 1990a).

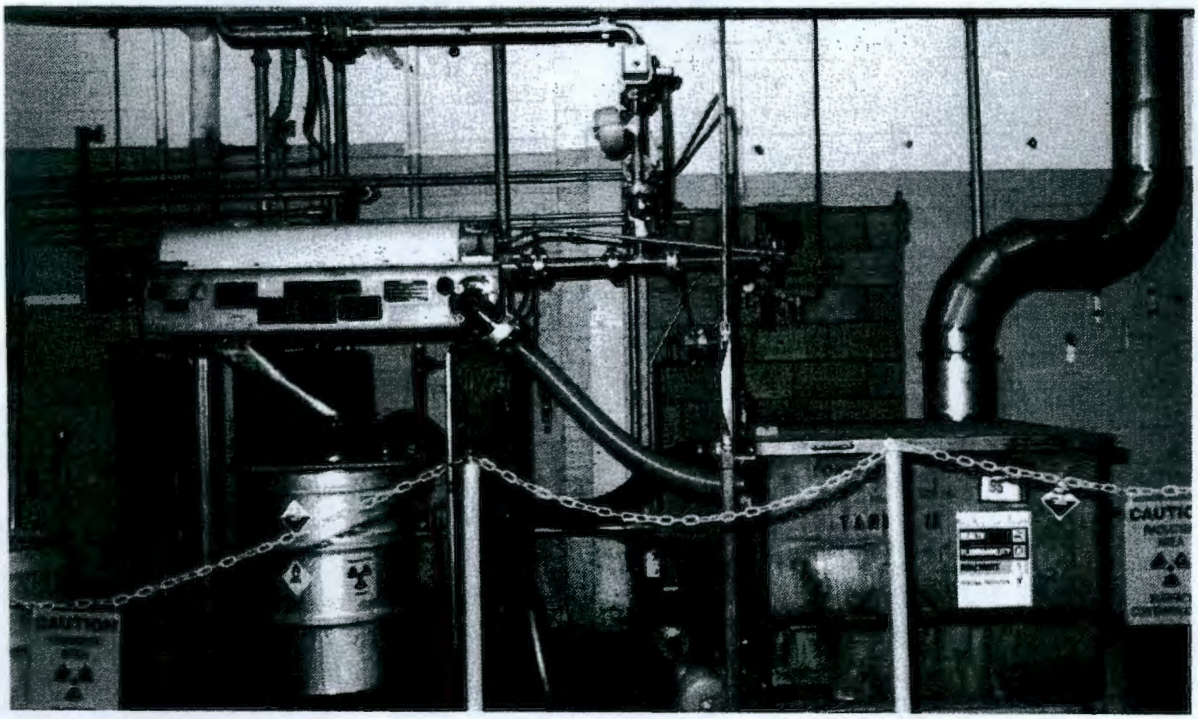
Three unplanned releases are associated with the 311 Tank farm. Unplanned release UPR-300-39 released a 50% sodium hydroxide solution to the ground, and unplanned releases UPR-300-40 and UPR-300-45 released uranium-bearing acid wastes to the ground (WHC 1991). See Sections 5.14, 5.15, and 5.20, respectively, for further details of these releases. See Figure 3-25, Detail B, for details of the 311 Tank Farm and its associated waste site.

A RCRA Closure Plan for the 300 Area WATS (DOE-RL 1990a), which includes 311-TK-50, was submitted to Ecology in June 1990. DOE is waiting for Ecology's approval to proceed with closure activities. Currently, the tank contains 4280 gal of nonhazardous solution containing 40 ppm depleted uranium from cleanup of the WATS. Tank 50 will be utilized for final closure activities of the WATS.

3.6.24 313 Centrifuge

The 313 Centrifuge is an inactive piece of equipment used in the 300 Area WATS. The unit is located in the southeast corner of the 313 Building in the 313 Building Chemical Area (WHC 1991). The 313 Centrifuge was added to WATS in November 1985 and operated through 1988 (DOE-RL 1990a). Figure 3-26 shows a photograph of the 313 Centrifuge.

Figure 3-26. 313 Centrifuge in the 313 Building Chemical Area with Tank 11.



The 313 Centrifuge,along with Tank 11, sits in a concrete curbed area, measuring approximately 14-ft by 5-ft (see Figure 3-25, Detail A). The curbed area has a floor drain connected to the process sewer, which was plugged in 1987. The 313 Centrifuge received neutralized slurry of the Nonrecoverable Uranium-Bearing Waste from Tank 2 in the 313 Building, and separated the liquid and solid phases. The centrifuge could treat a maximum of 3,000 gal of waste per day but was generally operated at a rate much less than maximum capacity (DOE-RL 1990a).

Solids from the centrifuge were drummed and transferred to the 303-K Radioactive Mixed Waste Storage Facility or to the 200 Area for disposal. Drum samples and composite samples of one neutralization tank run were analyzed. Analytical results--along with the gross, tare, and net weight of each drum--were recorded in a logbook. A monthly composite sample of the drummed material was analyzed and recorded for constituents such as chromium, copper, nitrate, and fluoride. Liquid effluent from the centrifuge was collected in Tank 11 from November 1985 to June 1986 for transfer to 311-TK-40 and 311-TK-50. The effluent still contained an unacceptable amount of fine solids after being processed through the centrifuge. After June 1986, the centrifuged effluent was sent from Tank 11 to Tank 5 to be processed through the filter press for further filtering (DOE-RL 1990a). In general, any spills at this location would stay in the concrete containment area. The spills would be pumped back through the WATS system.

A RCRA Closure Plan for the 300 Area WATS (DOE-RL 1990a), which includes 313 Centrifuge, was submitted to Ecology in June 1990. DOE is waiting for Ecology's approval to proceed with closure activities. WHC personnel in charge of the WATS operation do not anticipate using the centrifuge during closure activities.

3.6.25 313 CRO (313 Copper Remelt Operations)

313 CRO, also known as the 313 Building Copper Remelt Operations, is an inactive solid nonhazardous/nonradioactive site located in the 313 Building at Hanford coordinates N55320 and E14350 (WHC 1991). The copper remelt operations (CRO) operated in the 313 Building from 1973 to 1988. The CRO was initiated in the 305 Building and operated in the 305 Building from 1968 to 1973 (Gerber 1992).

These operations involved melting, casting, and machining copper-silicon waste from the fuel fabrication process. The waste included lathe turnings and copper ends from the extruded uranium billets. Approximately 600 lb per day of copper-silicon alloy waste was processed by the CRO during operations (WHC 1991).

3.6.26 313 ESSP (313 East Side Storage Pad)

313 ESSP is an active, mixed solid waste storage site located outside along the eastern wall of the original section of the 313 Building at Hanford coordinates N55050 E14460. The site is also known as the 313 Building East Side Storage Pad. It began operation as a material storage site in the 1940's (WHC 1991).

This site was used during the fuel fabrication operations for storage of byproduct waste materials. The waste was stored in containers and included neutralized solids consisting of sodium fluoride, sodium nitrate, sodium sulfate, and metal precipitates including copper, uranium, and zirconium from the 313 recovery operations (WHC 1991). Site personnel also indicate that the pad was used for the initial storage of raw material for the fuels fabrication operations as it came in on rail cars.

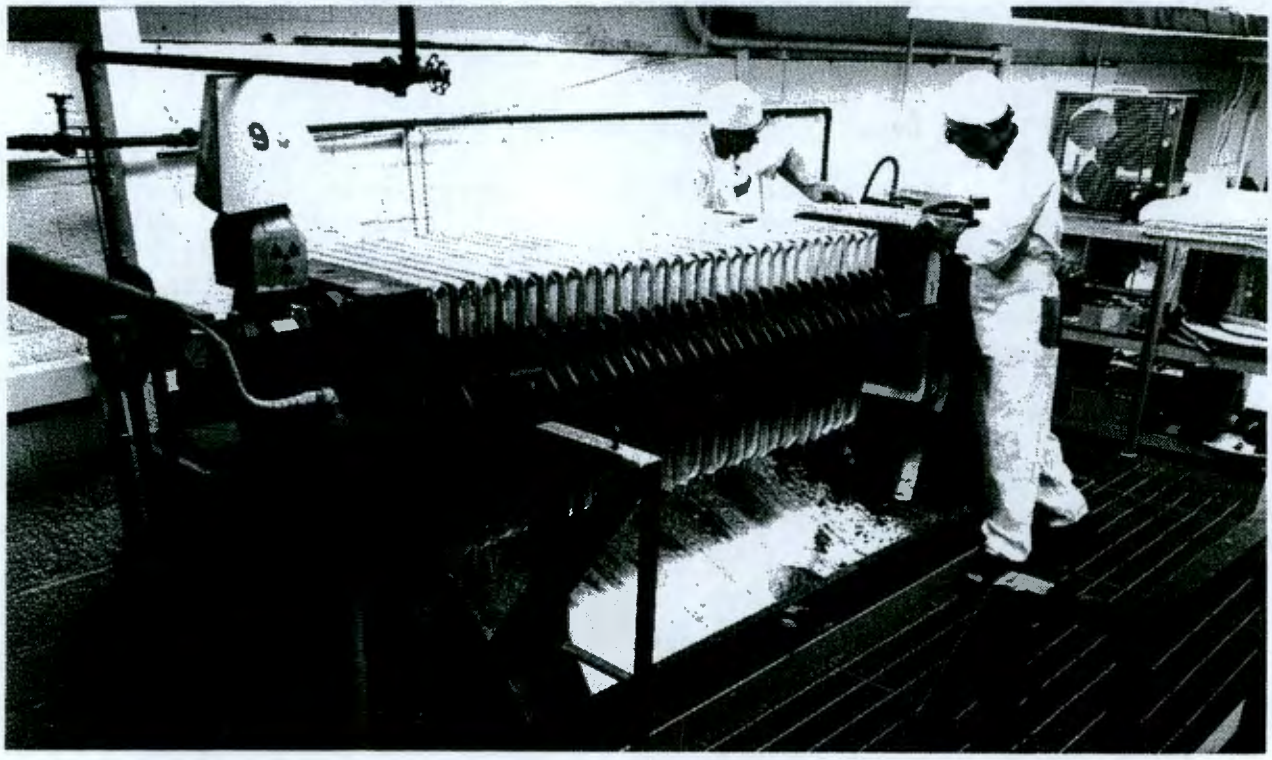
There was no information found regarding possible releases to the environment. Materials were reported to be stored on the pad in a fashion similar to that of the 303 storage facilities, which have documented contamination associated with the storage of materials (Gerber 1992).

Currently the 313 ESSP has seven large storage containers, three of which contain radioactive materials. The pad also has an area for the storage of filled and empty gas cylinders.

3.6.27 313 FP (313 Filter Press)

The 313 Filter Press is an active piece of equipment used in the 300 Area WATS and the Uranium Recovery Operations (URO). The unit is located at the southern end of the 313 Building in the 313 Building Chemical Area (WHC 1991) (see Figure 3-27). The filter press has been in operation since 1944 (DOE-RL 1990a, Gerber 1992).

Figure 3-27. 313 Filter Press in the 313 Building Chemical Area.



The filter press is located in a concrete bermed area with other associated WATS and URO equipment (see Figure 3-25, Detail A). The press is constructed

of cast iron. The filter plates were originally cast iron, but were switched to polypropylene plates in the early 1980's (DOE-RL 1990a). The filter press is used to separate solid and liquid phases from the neutralized slurry of the Uranium-Bearing Acid Waste. The neutralized slurry is received from Tank 5. Starting in June of 1986, the neutralized slurry from the Nonrecoverable Uranium-Bearing Waste was also processed through the filter press after the waste had been processed through the 313 Centrifuge (DOE-RL 1990a). The Nonrecoverable Uranium-Bearing Waste could also be fed directly to the filter press. The filter press can treat a maximum of 1,220 gal/day.

The solids collected on the filter plates from the Uranium-Bearing Acid Waste, known as "C-6" sludge, were periodically removed and placed in 30-gal drums. The drums were shipped to the Feed Materials Production Center (FMPC) in Fernald, Ohio, for uranium recovery (DOE-RL 1990a). The sludge generated from the Nonrecoverable Uranium-Bearing Waste was placed in drums and sent to the 200 Areas for disposal. Filter press effluent was originally discharged to the process sewer until October 1972. After October 1972, the effluent was collected in Tanks 9 and 10, where the volume was measured and samples were taken for uranium analysis. If the effluent contained visible uranium precipitates, it was recycled through the filter press for a second separation process. If the effluent did not contain visible uranium precipitates, it was discharged directly to the process sewer from October 1972 to June 1973 and from October 1973 to January 1975, or it was transferred to Tanks 40 and 50 in the 311 Tank Farm to await final disposal (DOE-RL 1990a).

Unplanned release UPR-300-38 is located in the vicinity of the filter press (WHC 1991, Figure 3-25, Detail A). See Section 5.13 for details of this unplanned release. In general, any spills at this location would result originally in a release to the 300 Area process trenches via the 313 Process Sewer System. The trench drain in the containment area was plugged in 1987, and any spills would be contained in the bermed area. The spilled solution would be pumped back through the WATS system.

A RCRA Closure Plan for the 300 Area WATS (DOE-RL 1990a), which includes the 313 Filter Press, was submitted to Ecology in June 1990. DOE is waiting for Ecology's approval to proceed with closure activities. The 313 Filter Press will be used during WATS closure activities.

3.6.28 313 MT (313 Methanol Tank)

The 313 Methanol Tank (MT) was a hazardous liquid waste storage tank located in the southeastern part of the 313 Building. The site was also known as the 313 Building Underground Methanol Storage Tank (WHC 1991). The tank was used from 1955 to 1971.

The tank was used as an emergency dump tank. In case of a fire in the 313 Building, the methanol from the methanol dehydration tanks could be quickly released to the underground tank. Site personnel indicate that the tank was never used for emergency dumping. The tank was filled with water in 1971.

The tank was emptied in 1987. At that time, it contained 600 gal of water with 0.7% methanol. The tank had been filled with water to stabilize it until the tank could be removed. It was removed on August 30, 1989, along

with the 311 methanol storage tanks. Sampling and visual inspection indicated that the area around the tank was not contaminated, and the excavation was backfilled and cement was replaced in the floor of the 313 Building (WHC 1991). Figure 3-28 shows the removal of this tank.

Figure 3-28. 313 Methanol Tank Removal, August 1989.

3.6.29 313-TK-2 (313 Waste Acid Neutralization Tank)

313-TK-2 is an active mixed waste treatment tank used in the 300 Area WATS. This unit is also known as the 313 Waste Acid Neutralization Tank and Tank 2 (DOE-RL 1990a, WHC 1991). It has been fully operational since January 1975 (DOE-RL 1990a, Gerber 1992). Located in the southern part of the 313 Building (see Figure 3-25, Detail A), it is a vertical, cylindrical tank that is 8.92 ft tall and 5.66 ft in diameter and has a nominal capacity of 1,500 gal. The tank is constructed of type 347 stainless steel with 0.5-in.-thick bottom and sidewalls (DOE-RL 1990a). Tank 313-TK-2 is located in a concrete-bermed containment area with other associated WATS and URO equipment.

313-TK-2 is used to neutralize the Nonrecoverable Uranium-Bearing Waste Acid generated by the fuels fabrication process in the 333 Building. The acid waste is pumped from the 334-A Building storage tanks into 313-TK-2 at a rate of approximately 5 to 10 gal/min. This pump rate is maintained to control the heat of neutralization during pH adjustments. The acid wastes are pH adjusted with a 50% sodium hydroxide solution from the 311 Tank Farm. The target pH of the treated solution is from 9 to 12. The tank could treat up to 3,500 gal of waste acid per day (DOE-RL 1990a).

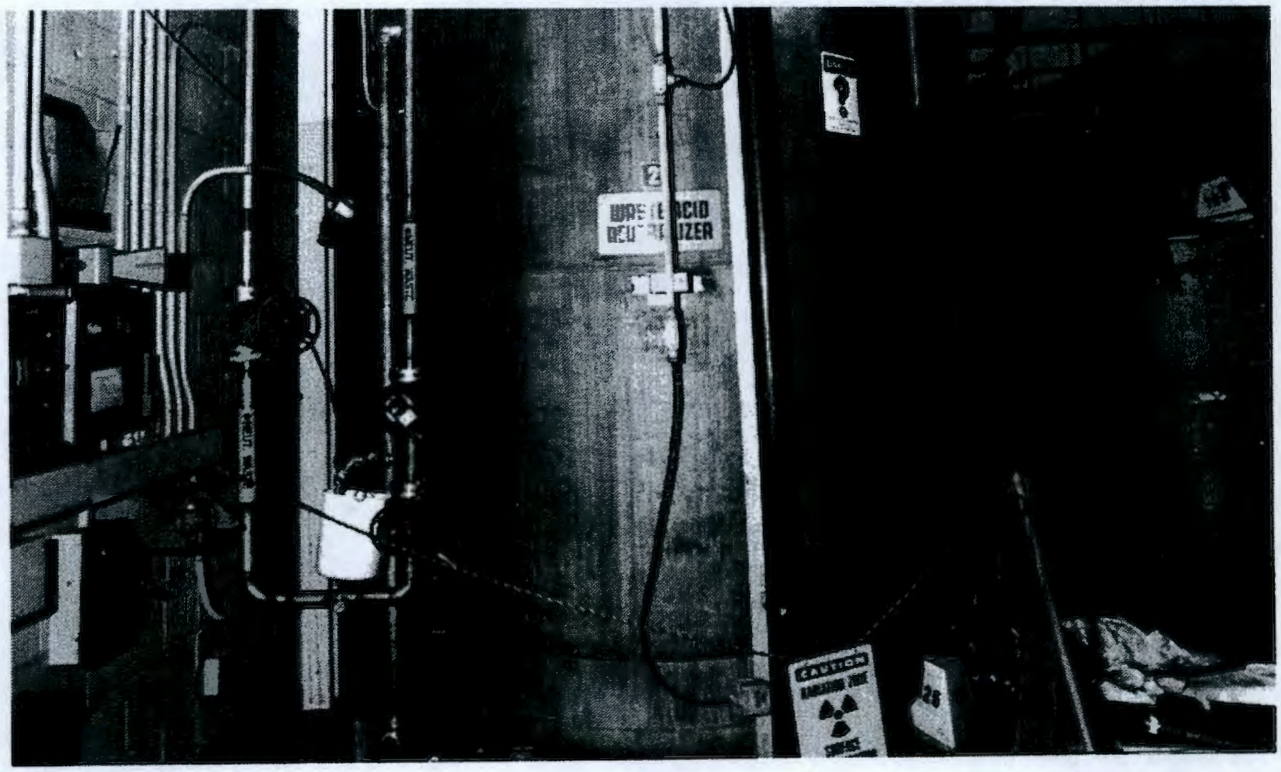
From January 1975 to November 1985, the neutralized waste solution was pumped from 313-TK-2 directly to Tank 40 in the 311 Tank Farm for disposal.

After November 1985, the neutralized waste solution was sent from 313-TK-2 to the 313 Centrifuge for solid and liquid separation (DOE-RL 1990a).

Unplanned release UPR-300-38 is located in the vicinity of 313-TK-2 and may have originated from this tank (see Figure 3-25, Detail A) (WHC 1991). See Section 5.13 for details of this unplanned release. In general, any spills at this location would have originally resulted in a release to the 300 Area process trenches via the 313 Process Sewer system. The trench drain in the containment area was plugged in 1987, and any spills after 1987 would have been pumped back through the WATS system.

A RCRA Closure Plan for the 300 Area WATS (DOE-RL 1990a), which includes 313-TK-2, was submitted to Ecology in June 1990. DOE is waiting for Ecology's approval to proceed with closure activities. Currently, the tank is empty, with the exception of a precipitate cake at the bottom of the tank. The 313 Waste Acid Neutralization Tank is shown in Figure 3-29.

Figure 3-29. 313 Waste Acid Neutralization Tank (313-TK-2).



3.6.30 313 URO (313 Uranium Recovery Operations)

The 313 URO is an active liquid mixed waste treatment site located at the southeastern end of the 313 Building (see Figure 3-25, Detail A). The URO has operated since 1944 (WHC 1991, Gerber 1992).

The URO recovers uranium from uranium-bearing acid wastes used in the fuel fabrication processes in the 313 and 333 Buildings. The uranium-bearing

acid wastes are routed to Tanks 3 and 4 in the 313 Building. From Tanks 3 and 4, the uranium-bearing acid waste is transferred to Tank 7 for neutralization. The waste is neutralized with a sodium hydroxide solution. The target pH is between 9 and 12. The neutralized waste is then transferred to Tank 5. Tank 5 is the feed tank for the press-and-frame filter press (see Section 3.6.27 for details of the filter press). The neutralized acid waste is transferred from Tank 5 through the filter press to separate the solid and liquid phases. The sludge, known as "C-6" sludge, is collected in 30-gal drums, and the drums are shipped to the FMPC in Fernald, Ohio, for uranium recovery (DOE-RL 1990a, Gerber 1992). During full operations, the URO processed approximately 270,000 gal/year.

Unplanned release UPR-300-38 is associated with the URO (see Figure 3-25, Detail A). For details of UPR-300-38, see Section 5.13. In general, any spills at this location would have originally resulted in a release to the 300 Area process trenches via the 313 Process Sewer system. Access points to the process sewer were plugged in 1987. Any subsequent spills would be collected and reprocessed through the recovery system.

3.6.31 315 RSDF (315 Retired Sanitary Drain Field)

The 315 Retired Sanitary Drain Field (RSDF) is an inactive, nonhazardous and nonradioactive liquid waste site that is located northeast of the 315 Water Filter Plant at Hanford coordinates N54012 and E16482 (Hanford Drawing H-3-14190). It consists of a septic tank and a drain field. The site operated from 1950 to 1978 (WHC 1991).

This site received sanitary waste that originated in the 315 Water Filter Plant. The sanitary waste may have contained small amounts of water treatment chemicals used in the 315 Filter House. The site consists of a 500-gal steel sanitary septic tank and a 50-ft drain field constructed of 4-in. tile (Gerber 1992). According to Sanitary System Maintenance records, the septic tank and drain field were abandoned in place in 1978 when the facility was connected to the sanitary sewer. The Sanitary System Maintenance records do not give any details on how the septic tank and drain field were abandoned.

3.6.32 316-3 (307 Disposal Trenches)

The 316-3 site is an inactive, hazardous, liquid and solid mixed waste site that consisted of two parallel trenches. The Hanford coordinates for the centerline of each trench are N54250 N54200, and the inlet to each trench is located at approximate Hanford coordinate E15500 (Hanford drawing H-4-50310). The site is also known as the 307 Disposal Trenches and Process Water Trenches (WHC 1991). The site operated from 1953 to 1965.

The site consisted of two parallel, east-west trending, unlined trenches that were approximately 500 ft long and 20 ft apart. The trenches were approximately 10 ft wide on the western end and 30 ft wide on the eastern end. The depth varied from 12 to 27 ft (WHC 1991, Hanford Drawing H-4-50310). Each trench had a 5-in. vitreous clay pipeline that ran the entire length of the trench (WHC 1991).

From 1953 to 1963, the site received 1 billion liters of uncontaminated and low-level radioactive waste waters from the Works Laboratories, which consisted of the 329 Biophysics Laboratory, 329 Mechanical Development Building, 327 Radiometallurgy Building, 326 Pile Technology Building, and the 324 Radiochemistry Building (Young and Fruchter 1991, WHC 1991). The Fuels Development Building (Building 308) was added to the system in 1960. The liquid wastes from Works Laboratories were sent to the 307 Retention Basins and held for radiological analysis. If the wastes were found to be below discharge limits, they were released to the trenches. If the wastes were above discharge limits, they were transferred to the 340 Building tanks for disposal in the 200 West Area. It has been reported that 40% of the time the waste was not sampled at the retention basins before being released to the trenches (Haney 1960). Haney (1960) also states the discharge limits were never exceeded. The trenches were taken out of service in 1963. They were excavated and most of the contaminated sediments were taken to the 300 North Burial Ground (618-10) (Young and Fruchter 1991).

The trenches were backfilled in 1965. The trench backfill consists of contaminated sediments scraped from the 300 Area South Process Pond (316-1) and flyash from the 300 Area ash pits (Young and Fruchter 1991). Approximately 10,000 yd^3 of contaminated sediments from the South Process Pond were disposed of in the trenches (Young and Fruchter 1991).

The site has an HRS migration score of 79.28 (WHC 1991). The hazardous chemical inventory for the trenches is provided in Table 3-9 (WHC 1991).

Table 3-9. Hazardous Chemical Inventory for 316-3 (307 Process Trenches).

Silver (I)	3.00E+002 Kg	Beryllium	1.00E+00 1Kg
Cadmium (II)	2.00E+001 Kg	Chromium (VI)	1.00E+003 Kg
Copper (II)	2.00E+004 Kg	Fluoride	2.00E+003 Kg
Mercury	1.00E+001 Kg	Nickel (II)	3.00E+003 Kg
Lead (II)	6.00E+002 Kg	Uranium	1.00E+004 Kg
Zinc (II)	1.00+E003 Kg		

In 1987, the east end of the 307 Trenches, near the 3727 Building, was used for testing a grout liquid waste solidification process. A 20-ft-wide, 50-ft-long, and 9-ft-deep section of the trench was excavated (Young and Fruchter 1991). Contaminated material was found in the lower 2 to 3 ft of the excavation; it appeared as discolored sediments, most likely from the South Process Pond. Surveys indicated that the material was contaminated with up to 378 pCi/g beta and 234 pCi/g alpha radiation (Young and Fruchter 1991).

Currently, the site is covered with gravel. There is no visible evidence of the trenches. Buildings 3718E and 3718G are located on top of the trenches (see Figure 3-21).

3.6.33 316-4 (300 North Cribs)

316-4 is an inactive, liquid, radioactive, mixed waste site located approximately 5 mi north-northwest of the 300 Area adjacent to the 618-10 Burial Ground. The site is located within approximately 50 ft of Hanford coordinates S6300 E3750 (Appendix A, Cramer 1985). It is also known as the 321 Cribs, 300 North Cribs, 316-N-1, and 3-Crib. The site began operating in 1948 (WHC 1991). The site reportedly closed in 1955-1956 (Cramer 1987, WHC 1991), but there appears to be evidence that it received waste deliveries in 1962 (Appendix A, Radiation Surveys #100108 and #100127).

The 316-4 site consists to two inverted, bottomless, 1/4-in. stainless steel tanks. The tanks have concrete footings and sit on a bed of gravel. They are 7 ft high and 8 ft in diameter and are approximately 10 ft below grade. One tank has an inlet line and a vent riser. The two tanks sit 2 ft apart and are connected by a 2-in. stainless steel overflow pipe (Hanford Drawing H-3-5288). Associated with the tanks were a well (699-S6-E4A, currently marked HWDS 18) and pumphouse that were used as a groundwater monitoring well for the crib, along with a water supply for rinsing out the tanker trucks (Brown and Ruppert 1950).

From 1948 to 1955/1956, the site received hexone-bearing uranium wastes and limited amounts of other uranium-bearing wastes from the 321 Building research and development activities via tanker truck. The site received approximately 200,000 L of effluent from 1948 to 1955/56 (WHC 1991). Brown and Ruppert (1950) report the site received 63 lb of uranium from 1948 to January 1, 1950. Brown and Ruppert (1950) also report that no contamination was detected in water samples from the associated well. A second report, Paas (1955), indicates that the site received 1230 lb of uranium from 1948 to July 1955. And a third, and later, document, PNL (1991), lists the uranium received at the site as 2070 kg (939 lb). The volume of contaminated soil at the site is reportedly 440 m^3 (WHC 1991). The hazardous chemical inventory for the site lists 1,000 kg of nitrate, 2,000 kg of uranium, and 3,000 kg of methyl isobutyl ketone (Hexone). The site has an HRS migration score of 16.60 (WHC 1991).

Currently, access to the site is unrestricted. There are four cement radiation posts with buried "Caution: Underground Radioactive Material" warning signs (Figure 3-30). In the center of the posts is a 2-ft by 4-ft cement block with 12-in. and 8-in. steel pipes cut off at grade with the cement block. A 6-in. steel pipe is welded to the inside of the 8-in. pipe. Both these pipes are filled with dirt to approximately 2 ft below grade and are open at the top. The cement block and its associated steel pipes were the inlet station for the tanks (Hanford Drawing H-3-5305). On the west side of the cement block, as well as on the east, there is a 4-in. stainless steel pipe and a 2-in. stainless steel pipe that stick up approximately 6 in. and are open at the top. Approximately 10 ft north of the cement block is a 4-in. flanged pipe sticking approximately 6-in. above grade. Sitting inside the 4-in. pipe is a 2-in. flanged pipe. The flanges of these pipes are not bolted together. A 4-in., open-ended pipe, approximately 15 ft long, protrudes out of the slope north of the cement block (see Figure 3-30). A 3-in., open-ended stainless steel pipe is visible northwest of the cement block and sticks up approximately 6-in. This pipe appears to be the vent pipe for one of the tanks (Hanford drawing H-3-5288). All that is remaining of the pumphouse is

Figure 3-30. Site of the 300 North Cribs (316-4).

the 4-ft by 8-ft cement foundation. A 12-in. steel pipe with a locking cap sits on top of the well and is numbered HWDS 18.

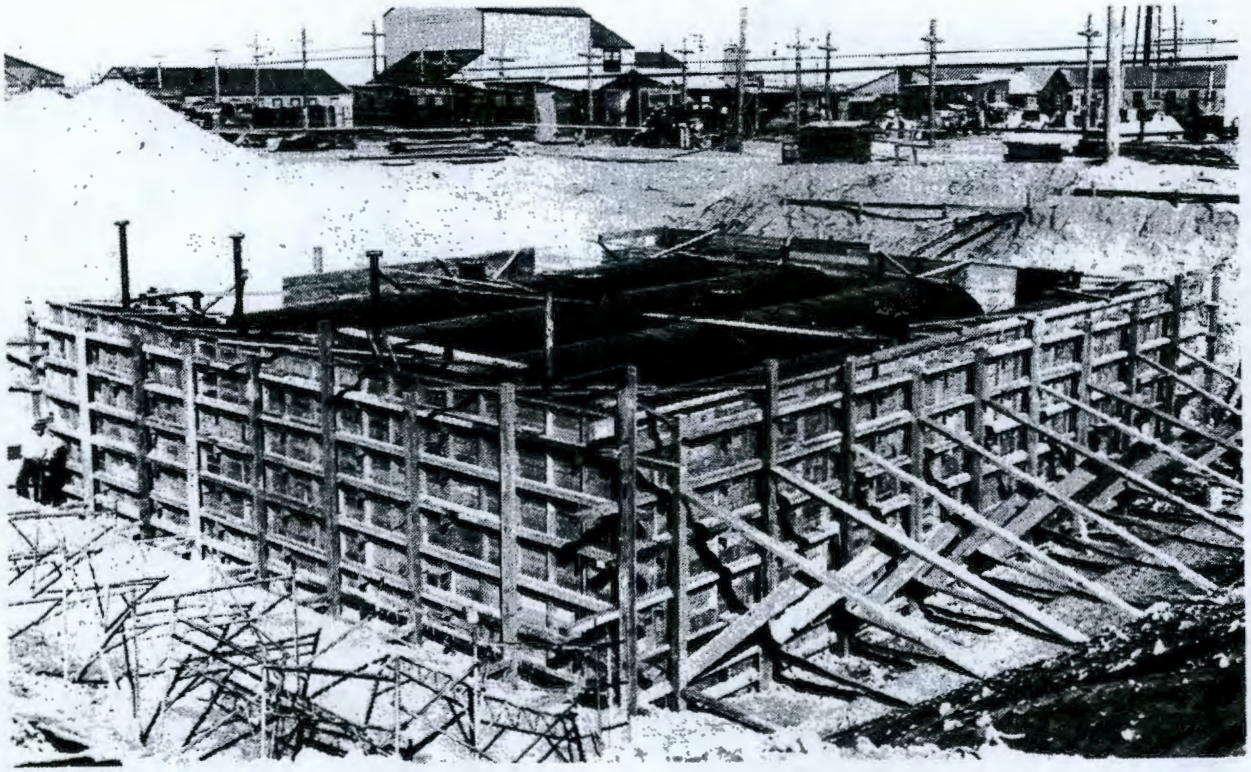
3.6.34 323 Tank 1

323 Tank 1 is an inactive, mixed liquid waste, underground storage tank located at approximate Hanford coordinates N54114.5 E14107.22. It is also known as one of the 321 Building waste tanks (Figure 3-31) (Gerber 1992). The tank was in use from 1945 to 1952 or 1953.

323 Tank 1 is a horizontal, cylindrical tank that is 10 ft in diameter and 48.5 ft long, with rounded ends (Hanford drawing W 75032). The tank is encased in concrete with three identical tanks (see Figure 3-31). The concrete enclosure is 55 ft long, 45.83 ft wide, and 13 ft deep (Hanford Drawing W 75032). The 323 Building, originally the 321-A Building, was built on the top of the concrete structure in 1958. The as built drawing for the 321-A Building (Hanford Drawing SK-3-7980) shows that the top of the concrete encasement was used as the floor of the 321-A Building; the tank risers with flanges are shown above grade in the basement of the building. The inlet pipe for Tank 1 is not shown on this drawing.

During building modifications in 1967 (Hanford Drawing H-3-5662), the 20-in. manhole was cut to the existing floor level and a 1/4-in. cover was welded to the manhole. Hanford Drawing H-3-5662 does not indicate what was done with the three other tank risers.

Figure 3-31. Historical Photograph Showing the Installation of the 321 Building Waste Tanks, 1944.



The tank received uranium-contaminated water and acid solutions from reprocessing research and development activities in the 321 Building, including those related to bismuth phosphate ($BiPO_4$) chemical separations, REDOX, PUREX, RECUPLEX, the Thorex program, and medical isotope extraction (WHC 1991, Gerber 1992).

Currently there is no access to the tank and its condition is unknown. According to facility personnel, the tank was emptied in 1952 or 1953. It has also been reported that the tank was filled with sand or gravel (WHC 1991), though facility personnel indicate that the tank had not been filled prior to 1970. No information could be found to indicate whether or not the tank was filled after 1970.

3.6.35 323 Tank 2

323 Tank 2 is an inactive, mixed liquid waste, underground storage tank located at approximate Hanford coordinates N54114.5 E14118.72. It is also known as one of the 321 Building waste tanks (see Figure 3-31) (Gerber 1992). The tank was in use from 1945 to 1952 or 1953.

323 Tank 2 is a horizontal, cylindrical tank, 10 ft in diameter and 48.5 ft long, with rounded ends (Hanford drawing W 75032). The tank is encased in concrete with 3 identical tanks (see Figure 3-31). The concrete enclosure is 55 ft long, 45.83 wide, and 13 ft deep (Hanford Drawing W 75032). The 323 Building, originally the 321-A Building, was built on the top of the concrete structure in 1958. The as built drawing for the 321-A Building

(Hanford Drawing SK-3-7980) shows that the top of the concrete encasement was used as the floor of the 321-A Building; the tank risers with flanges are shown above grade in the basement of the building. The inlet pipe for Tank 2 is shown with a flange on the end of the pipe. Hanford Drawing H-3-5662, which shows building modifications that were made in 1967, does not indicate what was done to the risers of Tank 2.

The tank received uranium-contaminated water and acid solutions from reprocessing research and development activities in the 321 Building, including those related to bismuth phosphate ($BiPO_4$) chemical separations, REDOX, PUREX, RECUPLEX, the Thorex program, and medical isotope extraction (WHC 1991, Gerber 1992).

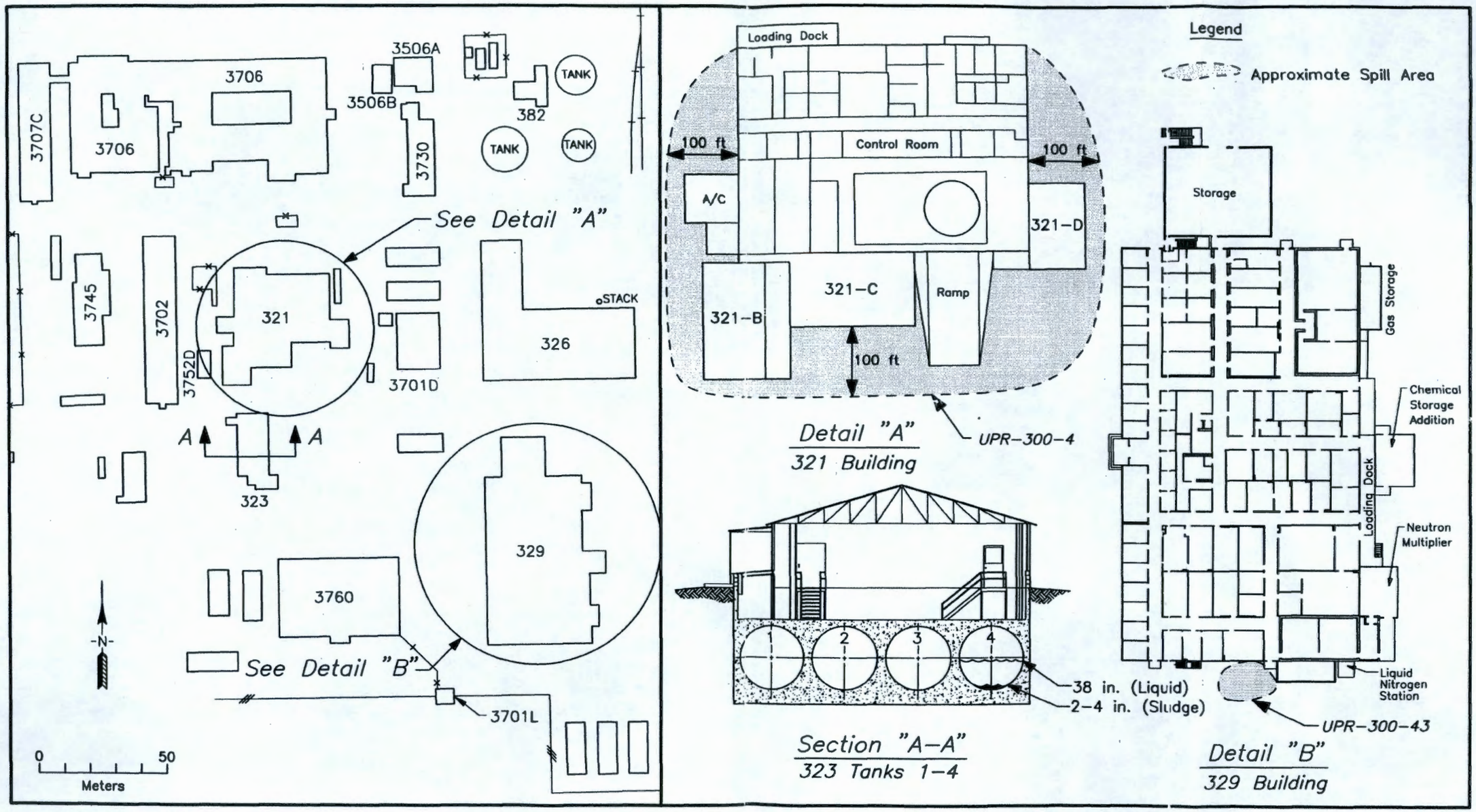
Currently, there is no access to the tank and the current condition of the tank is unknown. According to facility personnel, the tank was emptied in 1952 or 1953. It has also been reported that the tank was filled with sand or gravel (WHC 1991), though facility personnel indicate that the tank had not been filled prior to 1970.

3.6.36 323 Tank 3

323 Tank 3 is an inactive, mixed liquid waste, underground storage tank located at approximate Hanford coordinates N54114.5 E14130.22. It is also known as one of the 321 Building waste tanks (see Figure 3-31) (Gerber 1992). The tank was in use from 1945 to 1952 or 1953. It is a horizontal, cylindrical tank, 10 ft in diameter and 48.5 ft long, with rounded ends (Hanford Drawing W 75032). The tank is encased in concrete with three identical tanks (see Figure 3-31). The concrete enclosure is 55 ft long, 45.83 ft wide, and 13 ft deep (Hanford Drawing W 75032). The 323 Building, originally the 321-A Building, was built on the top of the concrete structure in 1958. See Section A-A of Figure 3-32. The as built drawing for the 321-A Building (Hanford Drawing SK-3-7980) shows that the top of the concrete encasement was used as the floor of the 321-A Building; the tank risers with flanges are shown above grade in the basement of the building, and the inlet pipe for Tank 3 is shown with a flange on the end of the pipe. Hanford Drawing H-3-5662, which shows building modifications that were made in 1967, does not indicate what was done to the risers of Tank 3.

The tank received uranium-contaminated water and acid solutions from reprocessing research and development activities in the 321 Building, including bismuth phosphate ($BiPO_4$) chemical separations, REDOX, PUREX, RECUPLEX, the Thorex program, and medical isotope extraction (WHC 1991, Gerber 1992).

Currently, there is no access to the tank. The current condition of the tank is unknown. According to facility personnel, the tank was emptied in 1952 or 1953. It has also been reported that the tank was filled with sand or gravel (WHC 1991), though facility personnel indicate that the tank had not been filled prior to 1970.



WHC:JJA:300AREA:GA-1

Figure 3-32. The 321 Building, the 329 Building, and 323 Tanks 1 Through 4.

3.6.37 323 Tank 4

323 Tank 4 is an inactive, mixed liquid waste, underground storage tank located at approximate Hanford coordinates N54114.5 E14141.72. It is also known as one of the 321 Building waste tanks (see Figure 3-31) (Gerber 1992). The tank was used to store 321 Building wastes from 1945 to 1952 or 1953. Facility personnel emptied the tank in 1952 or 1953. Hanford Drawings H-3-27735, Sheets 1 and 2, and H-3-5678 indicate that the tank was modified for use during the 323 Building modifications for the Metals Creep Laboratory in 1967 and 1968. The tank appears to have been used again from 1968 to 1987. The 323 Building was transferred to PNL in 1987 and, according to PNL personnel, the tank has not been used by PNL.

323 Tank 4 is a horizontal, cylindrical tank, 10 ft in diameter and 48.5 ft long, with rounded ends (Hanford Drawing W 75032). The tank is encased in concrete with three identical tanks (see Figure 3-31). The concrete enclosure is 55 ft long, 45.83 ft wide, and 13 ft deep (Hanford Drawing W 75032). The 323 Building, originally the 321-A Building, was built on the top of the concrete vault in 1959 and 1960 (Gerber 1992). See Section A-A of Figure 3-32.

The as built drawing for the 321-A Building (Hanford Drawing SK-3-7980) shows that the top of the concrete encasement was used as the floor of the 321-A Building; the tank risers with flanges are shown above grade in the basement of the building, and the inlet pipe for Tank 4 is shown with a flange on the end of the pipe. Hanford Drawing H-3-27735, Sheets 1 and 2, indicates that a drain was installed from the new hot cell to the waste tank during building modifications for the Metals Creep facilities. A drain from a cleanup box to the waste tank was also added during these modifications (Hanford Drawing H-3-5678). The tank is attached to the process water sump as a backup in case of a power failure. The tank possibly received uranium-contaminated water and acid solutions from reprocessing research and development activities in the 321 Building, including bismuth phosphate ($BiPO_4$) chemical separations, REDOX, PUREX, RECUPLEX, the Thorex program, and medical isotope extraction (WHC 1991, Gerber 1992). The tank also received effluents from the hot cell drain, the cleanup box drain, and the process sump during the Metals Creep Laboratory operations.

Tank 4 was entered in May 1987 so that workers could inspect the conditions of the tank and determine if any hazardous conditions existed (see Appendix A [Pearson 1987]). The tank inspection included a radiation survey, photographing the interior of the tank, and measuring and sampling its contents. The inspection indicated that there were no hazardous conditions associated with the tanks and that the tank was in excellent condition (see Appendix A [Pearson 1987]).

Exposure levels of the tank were low at 200 c/m with no smearable contamination. The tank contained 38 in. of liquid, approximately 8,000 gal, and approximately 2 to 4 in. of sludge. The liquid was clear and contained between 8.4×10^{-6} and 9.4×10^{-6} alpha, and between 7.7×10^{-6} and 8.4×10^{-6} beta (see Appendix A [Pearson 1987]). The liquid also contained 24.6 ppm uranium. Both the radiation levels and the amount of uranium exceed set limits for discharge liquids to the process sewer. The sludge contains 1.48 wt% uranium, with approximately 27 wt% aluminum (see Appendix A [Pearson 1987]).

Currently, the tank does not appear to be in use. It has been reported that the drain in the hot cell has had a steel plate welded over the drain. Site personnel indicated that liquids are no longer used in the hot cell. It is not known whether the drain from the cleanup box is still open. The inlet to the tank in the sump room, a manually-operated valve, is shut off; however, it does not have a lock or tag on it. Access to the sump room is through a steel plate bolted over the opening. A health physics technician (HPT) is required for entry. Access into the tank is through a cement cover block over the tank's 20-in. manhole.

3.6.38 324 SRPP (324 Sodium Removal Pilot Plant)

The 324 Sodium Removal Pilot Plant (SRPP) is an inactive, solid mixed waste site that was located in the southeast corner of the 300 Area at Hanford coordinates N54000 and E15700. The 324 SRPP was a radioactive mixed waste alkali metal treatment facility (providing no longer than 90 days of storage) that was used both for developing methods of decontaminating equipment contaminated with radioactive sodium and for treating small quantities of alkali metals (DOE-RL 1985). This treatment occurred in a 12-ft-tall, 30-in.-diameter, 455-gal., cylindrical steel tank, where nitrogen or argon was circulated with water vapor to react with the alkali metal on the component being processed (DOE-RL 1985, WHC 1993c). These alkali metals consisted of sodium, lithium, and sodium-potassium alloy (DOE-RL 1993a). Site personnel indicated that the 324 SRPP has been inactive since at least 1987 and that the steel tank was decommissioned and removed around 1991.

The facility was capable of treating up to 20 L of waste per day, or approximately 7000 kg of reactive, radioactive mixed wastes annually (DOE-RL 1993a). The 324 SRPP was connected to both the 300 Area Process Sewer and the Retention Process Sewer (RPS), which is a subsystem of the 300 Area Process Sewer that is used for diversion of potentially radioactive liquid effluents. Sample data for effluent entering the process sewer from the 324 Building is provided in the *300 Area Stream-Specific Report* (WHC 1990).

An HRS migration score is not reported for this site (WHC 1993c). The 324 SRPP is included in the *Hanford Facility Dangerous Waste Part A Permit Application* (DOE-RL 1993a).

3.6.39 325 WTF (325 Waste Treatment Facility)

The 325 Waste Treatment Facility (325 WTF) is an active, mixed liquid waste site located in the central portion of the 300 Area at Hanford coordinates N54025 and E15000. The 325 WTF serves two purposes: (1) to treat small quantities of diverse chemical and radioactive mixed wastes generated from ongoing R & D activities, and (2) to serve as an R & D facility to test and evaluate the effectiveness of thermal, physical/chemical, and/or biological treatment technologies. The wastes handled in the facility include listed wastes, wastes from nonspecific sources, characteristic wastes, and state-only wastes that are also regulated under the Atomic Energy Act of 1954, as amended (DOE-RL 1993c).

WIDS (WHC 1993c) reports that the 325 WTF is situated in Rooms 520, 522, 524, 528, and 530 of the 325 Building. Of these, Rooms 520 and 528 comprise

the 325 Hazardous Waste Treatment Unit (325 HWTU), as described in the *Part A Permit Application for the 325/3100 Hazardous Waste Treatment Units* (DOE-RL 1993a). Approximately 55 gal of radioactive mixed waste can be treated per day in the 325 HWTU using grout and alkali metal treatments. Storage capacity for the 325 HWTU is 1000 gal (DOE-RL 1993a).

The 325 Building is connected to the 300 Area Process Sewer (WHC 1990). Spills and other contamination associated with sinks, drains, and sumps in the 325 Building have been reported (PNL 1981, PNL 1993a, PNL 1993b, PNL 1993c, PNL 1993d, PNL 1993e). However, none of these incidents has occurred in the rooms that comprise the 325 WTF, as described in WIDS (WHC 1993c). Sample data for liquid effluent entering the Process Sewer from the 325 Building is provided in the *300 Area Stream-Specific Report* (WHC 1990).

An HRS migration score is not reported for this stream (WHC 1993c). The 325 WTF is included in the *Hanford Facility Dangerous Waste Part A Permit Application* (DOE-RL 1993a).

3.6.40 331 LSLDF (331 LSL Drain Field)

331 LSLDF is an inactive, nonhazardous and nonradioactive liquid waste disposal drain field that was used from 1970 to 1974 (WHC 1991). The 331 Life Sciences Laboratory Drain Field is an alias for the 331 LSL Drain Field. The drain field is located at Hanford coordinates N52250 E16600, within the 300 Area and east of the 331 Building (WHC 1991).

The drain field received an average of approximately 0.66 gal of sanitary waste water per hour during the five years of operation (WHC 1991).

3.6.41 331 LSLT1 (331 LSL Trench 1)

331 LSLT1 is an inactive, nonhazardous and nonradioactive liquid waste disposal trench that was used from 1966 to 1969. It is commonly known as the 331 LSL Trench 1 and is also known by the alias 331 Life Sciences Laboratory Trench #1. The trench is located at Hanford coordinates N52200 E16600 in the 300 Area. It was partly removed to allow for the construction of the 331 Building (WHC 1991).

The trench received an average of approximately 9.0 gal of sanitary waste water per hour (WHC 1991).

3.6.42 331 LSLT2 (331 LSL Trench 2)

331 LSLT2 is an inactive, nonhazardous and nonradioactive liquid waste disposal trench that was used from 1969 to 1974. It is commonly known as the 331 LSL Trench 2 and is also known by the alias 331 Life Sciences Laboratory Trench #2. The trench is located at Hanford coordinates N52200 E16600 in the 300 Area (WHC 1991). It replaced 331 LSL Trench 1 in 1969, when part of Trench 1 was removed to allow for the construction of the 331 Building.

331 LSL Trench 2 received an average of approximately 8.33 gal of sanitary waste water per hour during the period the trench was used (WHC 1991).

3.6.43 331-C HWSA (331-C Hazardous Waste Staging Area)

331-C HWSA is an active hazardous waste staging area used since 1970. It is also known by the alias 331-C Hazardous Waste Staging Area. The staging area is located at Hanford coordinates N52220 E16530 in the 300 Area (WHC 1991).

The staging area is used to store containers of liquid hazardous waste. The area typically contains corrosives, ignitables, and regulated empty containers, receiving an estimated total of approximately 600 gal/year (WHC 1991).

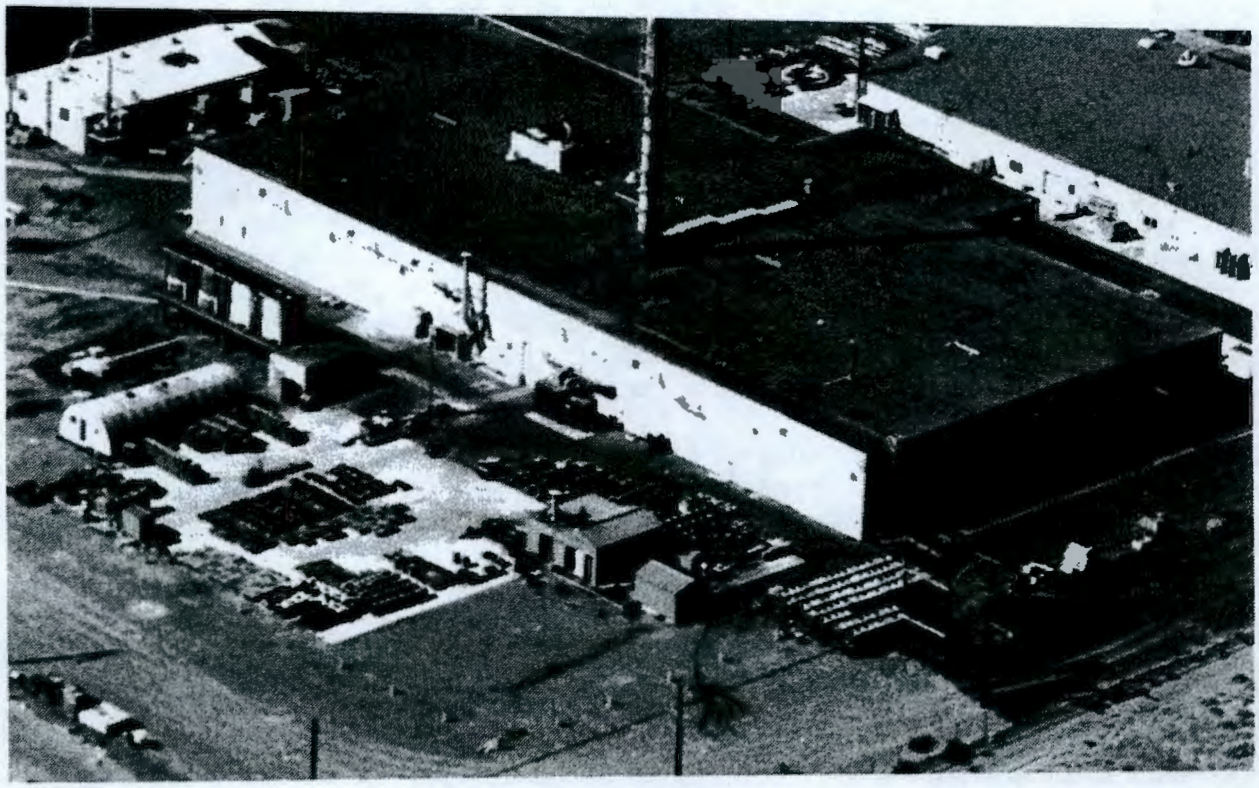
3.6.44 333 ESHWSA (333 East Side HWSA)

The 333 East Side HWSA (ESHWSA), or 333 Building East Side Hazardous Waste Staging Area, is an active, hazardous liquid waste staging area located adjacent to the 333 Building on the north perimeter of the 300 Area. Its Hanford coordinates are N55530 E14850. This area contains miscellaneous small quantities of waste oils, cutting lubricants, chemicals, solvents, etc., stored in containers, accumulating twenty-five to fifty 55-gal drums each year (WHC 1993c). In previous years, the area was used for storage of miscellaneous radioactive and hazardous waste.

The fenced area behind the 333 Building has been used for many years as a storage area for miscellaneous waste drums, and there are undocumented reports of past leakage from drums. Storage techniques included storage on the ground, which increased the potential for spills to the ground. Documented daily visual inspections are conducted at this site. An HRS migration score has not been reported for this site (WHC 1993c).

Figure 3-33 shows the east side of the 333 Building and the 333 East Side Hazardous Waste Storage Area in the lower right portion of the photograph, just east of the 333 Building. It also shows the 333 Laydown Hazardous Storage Area. The 334-A Building and the 334 Tank Farm are visible in the photograph south of the storage areas.

Figure 3-33. The East Side of the 333 Building and the 333 East Side Hazardous Waste Storage Area, August 1969.



3.6.45 333 ESHTSSA (333 East Side Heat Treat Salt Storage Area)

The 333 East Side Heat Treat Salt Storage Area (ESHTSSA) is an inactive, mixed solid waste storage facility located just east of the 333 Building, near the north perimeter of the 300 Area. Its Hanford coordinates are N55320 E14850. While no longer used for the storage of hazardous wastes, this area has served as storage for containers of solidified waste heat-treat salts from the Fuels Fabrication Facility. Storage took place at a variety of locations east of the building, including some storage on the ground. Exact locations are unknown (WHC 1993c).

The waste stored in this area consisted of sodium chloride, potassium chloride, sodium nitrite, sodium nitrate, and potassium nitrate. Approximately thirty to fifty 55-gal drums accumulated each year. An HRS migration score has not been reported for this site (WHC 1993c).

3.6.46 333 LHWSA (333 Laydown HWSA)

The 333 Laydown HWSA (333 LHWSA), also known as the 333 Laydown Hazardous Waste Staging Area, is an active, hazardous liquid waste staging area located just east of the 333 Building on the north perimeter of the 300 Area. Its Hanford coordinates are N55700 E14850. The staging area has operated from 1971 until the present and typically contains corrosive and EP toxic (for chromium) wastes (WHC 1993c).

There have been several small incidents of spillage, probably involving oils from equipment stored in the laydown area (WHC 1993c). No environmental monitoring is conducted, and no cleanup actions have been taken (Cramer 1987). An HRS migration score has not been reported for this site (WHC 1993c).

3.6.47 333-TK-7 (333 Chromium Treatment Tank 1)

The 333-TK-7 tank is an inactive, mixed liquid waste storage tank located near the north perimeter of the 300 Area at Hanford coordinates N55450 E14770. Aliases include the 333 Chromium Treatment Tank 1. The tank was used for storage of spent etching acids (nitric and sulfuric acid with uranium in solution), then later for reduction of chromium IV, but is now empty. The estimated accumulation rate for the tank was 60,000 gal/yr, most of which was routed to other storage tanks (WHC 1993c).

Monthly visual inspections of the tank are performed, and ultrasonic testing for tank wall thickness is to be performed every other year (WHC 1993c).

The 333 Building is connected to the 300 Area Process Sewer, and sample data for liquid effluent discharging to the Process Sewer from the 333 Building is provided in the *300 Area Stream-Specific Report* (WHC 1990). However, the 333-TK-7 tank is located within a concrete curbing to allow containment and recovery of any leakage, had it occurred (WHC 1993c). A RCRA Part A Permit Application and an Interim Closure Plan have been filed for 333-TK-7. An HRS migration score is not reported for this site (WHC 1993c). Figure 3-34 is a photograph showing the 333-TK-7 and 333-TK-11 tanks in the 333 Building.

3.6.48 333-TK-11 (333 Chromium Treatment Tank 2)

The 333-TK-11 tank is an inactive, mixed liquid waste storage tank located near the north perimeter of the 300 Area at Hanford coordinates N55450 E14770. Aliases include the 333 Chromium Treatment Tank 2. The tank was used for storage of spent etching acids (nitric and sulfuric acid with uranium in solution) but is now empty. The estimated accumulation rate for the tank was 60,000 gal/yr, most of which was routed to other storage tanks (WHC 1993c).

Monthly visual inspections of the tank are performed, and ultrasonic testing for tank wall thickness is to be performed every other year (WHC 1993c).

The 333 Building is connected to the 300 Area Process Sewer, and sample data for liquid effluent discharging to the Process Sewer from the 333 Building is provided in the *300 Area Stream-Specific Report* (WHC 1990). However, the 333-TK-11 tank is located within a concrete curbing to allow containment and recovery of any leakage, had it occurred (WHC 1993c).

A RCRA Part A Permit Application and an Interim Closure Plan have been filed for 333-TK-11. An HRS migration score is not reported for this site (WHC 1993c).

Figure 3-34. The 333-TK-7 and 333-TK-11 Tanks in the 333 Building.

3.6.49 333 WSWOT (333 West Side Waste Oil Tank)

The 333 West Side Waste Oil Tank (WSWOT) is an active, nonhazardous and nonradioactive liquid waste storage tank located outside on the west side of the 333 Building at Hanford coordinates N55500 E14760. It is also known as the 333 Building West Side Storage Tank for Waste Oil. The tank is used for the storage of waste oil from the extrusion press sump, which is verified to be non-PCB and nonignitable, prior to removal for offsite shipment. Approximately 500 to 1,000 gal are accumulated each year (WHC 1993c).

The tank began receiving wastes in August of 1972. It is located within a concrete barrier that would permit both the containment and the recovery of any leakage, should it occur. No known releases have been reported (Cramer 1987).

The groundwater beneath 333 WSWOT is monitored with RCRA monitoring wells that are upgradient, beneath, and downgradient of the 300 Area. Weekly inspections are performed, and groundwater monitoring data is published in the Hanford Site annual groundwater surveillance report listing (Cramer 1987).

An HRS migration score has not been reported for this site (WHC 1993c).

3.6.50 334 TFWAST (334 Tank Farm Waste Acid Storage Tank)

The 334 Tank Farm Waste Acid Storage Tank (TFWAST) is an inactive liquid mixed waste storage tank located in the 300 Area at Hanford coordinates N55500 E14900. Beginning in 1971, the tank was used infrequently for the storage of

waste acids containing nonrecoverable uranium from the fuel fabrication process (WHC 1993c).

An Unusual Occurrence Report (UNC 1986) filed in 1986 reported a tank leak that occurred on January 2, 1986. Approximately 350 gal of waste acid (WHC 1993c) leaked from the tank as a result of corrosion near the top of the tank. The acid drained into the 333 Building waste water sewer (the 300 Area Process Sewer) and, ultimately, into the 300 Area process trenches. The pH in the sewer did not drop enough to trip the pH meter alarm, which was set considerably lower than the normal operating level to avoid responses to routine system pH spikes. The corrective measures taken to alleviate the situation included draining and pumping the remaining acid in the tank to other suitable tanks and adding 60 gal of 50% NaOH to the process sewer to neutralize the acid that had reached the process trenches. The pH reading for the 333 waste water stream was back to normal by 0200 hr on January 3, 1986 (UNC 1986). The tank was permanently removed from service following the spill (WHC 1993c). Figure 3-35 is a photograph that shows the 334 Tank Farm prior to the removal of the Waste Acid Tank. The Waste Acid Tank is on the left side of the photograph, and cover blocks over pipe trenches that drain to the process sewer can be seen under the tank farm.

Figure 3-35. The 334 Tank Farm Prior to Removal of the Waste Acid Tank.

No HRS migration score is reported for this site (WHC 1993c).

3.6.51 334-A-TK-B (334-A Waste Acid Storage Tank 1)

The 334-A-TK-B tank, also known as 334-A Waste Acid Storage Tank 1, is an inactive, mixed liquid waste storage tank located at the 334-A Building, which in turn is just east of the 333 Building on the north perimeter of the 300 Area. The tank's Hanford coordinates are N55470 E14900. The tank is now empty, but in the past it received 210,000 gal/yr of waste acids from the fuel fabrication process. The waste acids were primarily hydrofluoric, nitric, sulfuric, and chromic acids, with copper, zirconium, and uranium in solution. The waste contained nonrecoverable uranium (WHC 1993c).

When the tank was operating, documented daily inspections were performed on the tank spill and alarm systems. Documented weekly inspections of the tank itself were also conducted (WHC 1993c).

Spills have occurred from this location, as when liquids were discharged to the 300 Area process ponds or trenches through an open drain in the 334-A Pit. The valve is now plugged. Spills typically discharge from the tank into a concrete pit, which contains the effluent and permits recovery. A spill alarm in the pit alerts operating personnel of the presence of liquid (WHC 1993c).

A RCRA Part A Permit Application and an Interim Closure Plan have been filed for 334-A-TK-B. An HRS migration score has not been reported for this site (WHC 1993c).

Figure 3-36 provides a view of the outside of the 334-A Building, which houses the 334-A Waste Acid Storage Tank 1 and 2. Figure 3-37 shows the inside of the main floor in the 334-A Building. The tanks are located below the grated floor in the basement of the 334-A Building. Figure 3-38 provides a photograph that shows the horizonal 334-A Waste Acid Storage Tanks 1 and 2 on the right side of the photograph.

Figure 3-36. The 334-A Building, 1987.

Figure 3-37. The inside of the Main Floor in the 334-A Building.

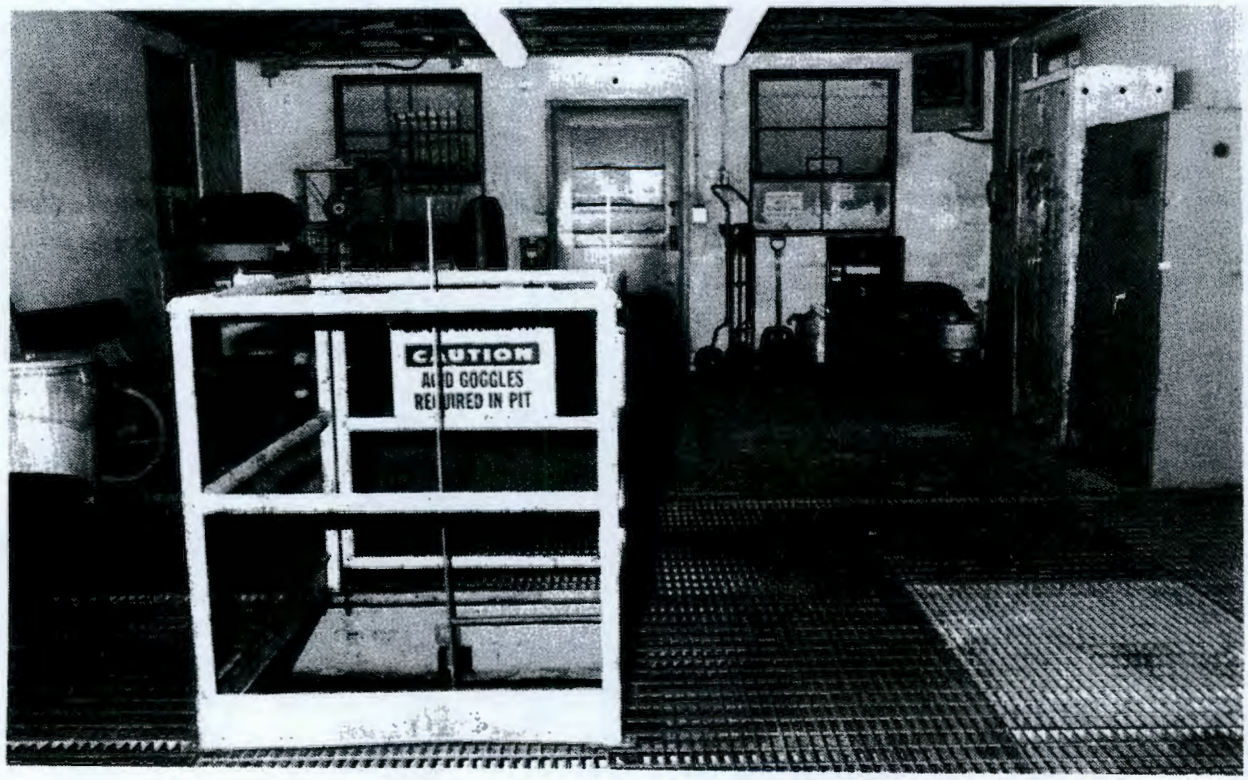
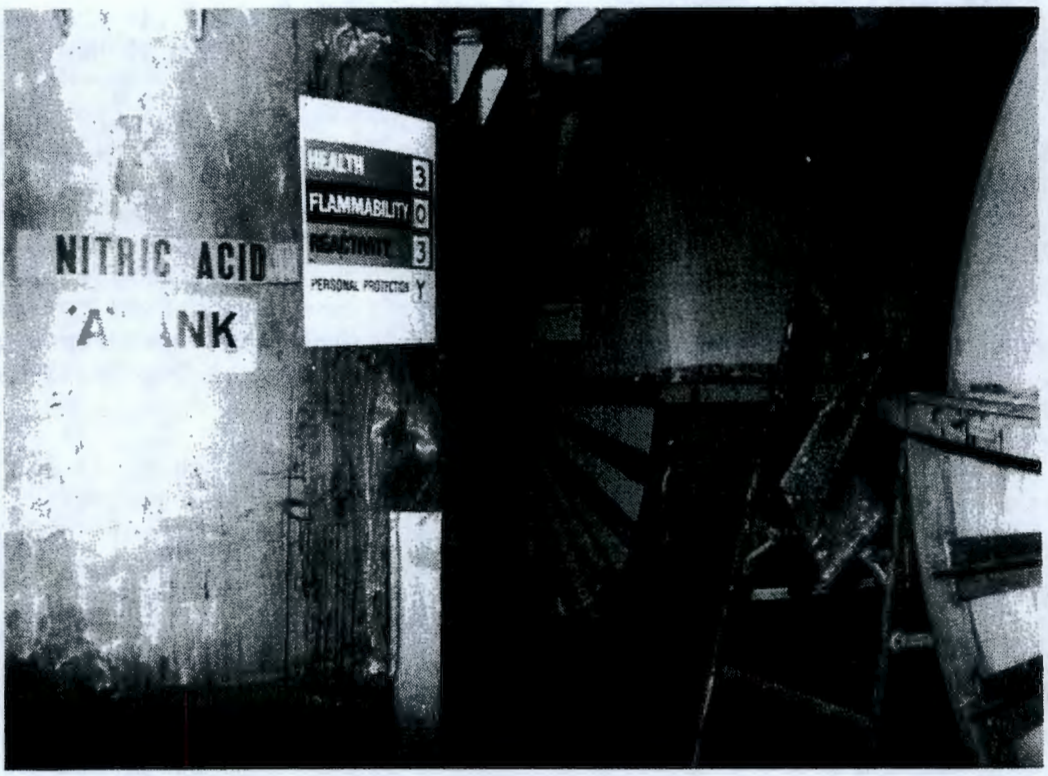


Figure 3-38. 334-A Waste Acid Storage Tanks 1 and 2 (Horizontal on the Right Side of Photograph) 1989.



3.6.52 334-A-TK-C (334-A Waste Acid Storage Tank 2)

The 334-A-TK-C tank, also known as the 334-A Waste Acid Storage Tank 2, is an inactive, mixed liquid waste storage tank located at the 334-A Building, which in turn is just east of the 333 Building on the north perimeter of the 300 Area. Its Hanford coordinates are N55470 E14900. The tank is now empty, but in the past it received 210,000 gal/yr of waste acids from the fuel fabrication process. The waste acids were primarily hydrofluoric, nitric, sulfuric, and chromic acids, with copper, zirconium, and uranium in solution. The wastes contained nonrecoverable uranium (WHC 1993c).

When the tank was operating, documented daily inspections were performed on the tank spill and alarm systems. Documented weekly inspections of the tank itself were also conducted (WHC 1993c).

Spills have occurred from this location, as when liquids were discharged to the 300 Area process ponds or trenches through an open drain in the 334-A Pit. The valve is now plugged. Spills typically discharge from the tank into a concrete pit, which contains the effluent and permits recovery. A spill alarm in the pit alerts operating personnel of the presence of liquid (WHC 1993c).

A RCRA Part A Permit Application and an Interim Closure Plan have been filed for 334-A-TK-C. An HRS migration score has not been reported for this site (WHC 1993c).

3.6.53 335 and 336 RSDF (335 and 336 Retired Sanitary Drain Field)

The 335 and 336 Retired Sanitary Drain Field is an inactive sanitary waste water disposal unit, including a septic tank and drain field, that received waste from 1973 to 1978. The drain field is located at Hanford coordinates N53870 E16140 (WHC 1991).

According to Site personnel, a septic tank and the drain field received unknown amounts of sanitary waste from the 335 and 336 Buildings. An office trailer was located south of the 335 Building and could also have contributed sanitary waste to the drain field. The 335 and 336 Buildings functioned in their original roles of containing sodium-related tests for FFTF development through the late 1970's (Gerber 1992). The buildings have housed several programs since then. Today, the 335 Building is known as the Radionuclide Logging System Laboratory, and the 336 Building is known as the Fuels Dynamics Laboratory (Gerber 1992).

An examination of building drawings indicates that kitchen and bathroom plumbing were connected to the septic tank. The hookups included sinks, lavatories, showers, and heating and air conditioning units (Hanford Drawing H-3-28591). More recent drawings indicate that the tank and the drain field were abandoned (Hanford Drawing M-3904, Sheets 14 and 15). Review of a septic tank list indicates that the 335 and 336 Drainfields were abandoned in 1978 (Appendix A, Septic Tank List). The 335 and 336 Buildings are currently connected to the 300 Area Sanitary Sewer System. According to Site personnel, the building was hooked up to the 300 Area Process Sewer, but these drains have been taken out of service.

The groundwater monitoring system for the drainfields is covered in the RCRA groundwater monitoring wells for the 300 Area Process Trenches. No known releases are associated with this site (Cramer 1987). The site currently appears as a parking lot. The septic tank riser can be seen in the 335 Building parking lot surrounded by four yellow metal posts.

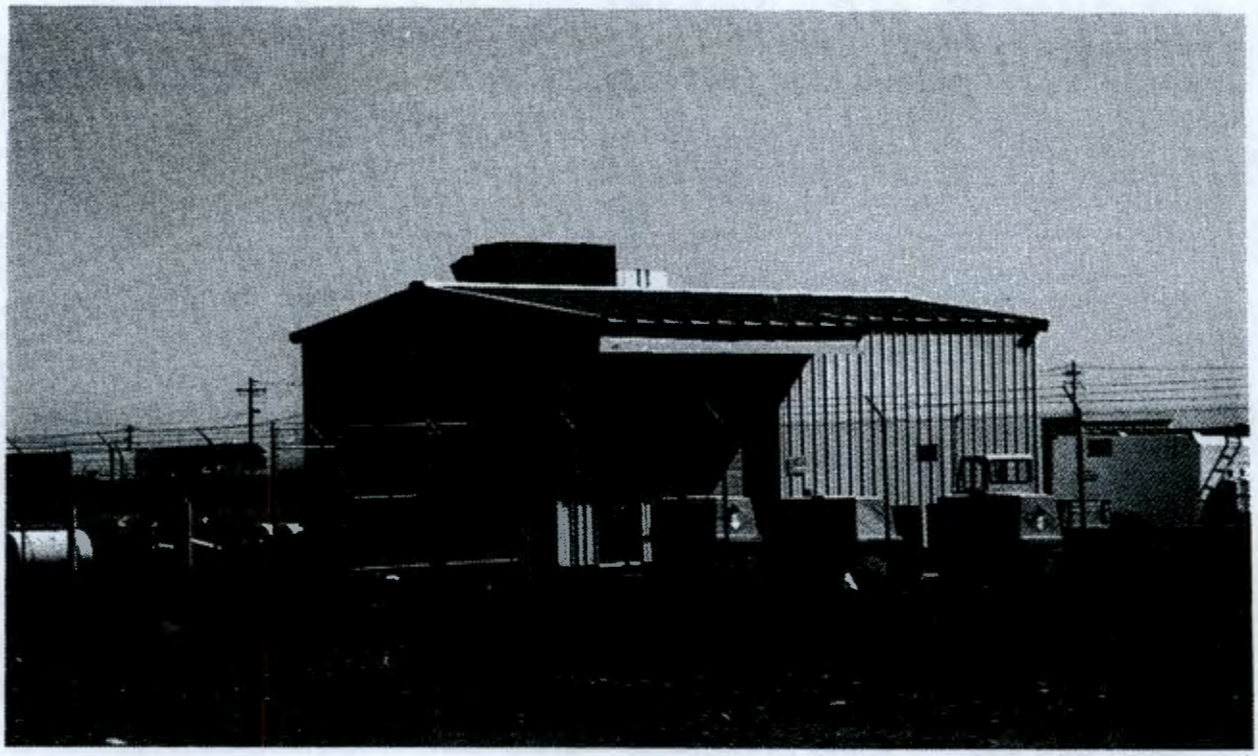
3.6.54 350 HWSA (350 Building Hazardous Waste Staging Area)

The 350 Building Hazardous Waste Staging Area is an active, hazardous liquid waste staging area that is located in and around the 350-D Building in the 350 Plant Operations and Maintenance Facility. It is at Hanford coordinates N52500 E14600 in the 300 Area. The 350 HWSA is also known as the 350 Building Hazardous Waste Staging Area (WHC 1991). The area has been used since 1982 and typically contains approximately 600 gal of corrosives, 600 gal of used oil and PCB-contaminated oils, and 40 nonregulated empty containers per year (Cramer 1987).

According to Site employees, oil containing PCB's from ballasts is stored inside the 350-D Building, along with combustible liquids. The PCB's are then transferred to the 350-B Building. Used motor oil is stored in a 300-gal tank located behind the 350-D Building. The 300-gal tank is in a containment pit with a sump. Other liquids are stored in front of the building, on asphalt, in clearly labeled areas. Environmental monitoring consists of performing intermittent visual inspections when the staging area contains hazardous waste (DOE-RL 1987).

The site currently appears as an active facility within the fenced boundary of the 350 Plant and Operations Facility (Figure 3-39). Liquid wastes are stored inside the 350-D Building and outside in front of the 350-D Building on asphalt in clearly labeled groups. Behind the building, clean drums are stored adjacent to the 300-gal used oil tank. According to Site employees and Cramer (1987), no unplanned releases are associated with this facility.

Figure 3-39. The 350 Building Hazardous Waste Staging Area.



3.6.55 3712 USSA (3712 Uranium Storage Area)

The 3712 Uranium Storage Area is an active, solid uranium metal storage facility that is located in the 3712 Building in the 300 Area at Hanford coordinates N55100 E14570. This site has been receiving uranium metal in the form of fuel rods and billets since the 1960's. It is also known as the 3712 Building Uranium Scrap Storage Area (WHC 1991) and as the 3712 Fuels Warehouse (Gerber 1992).

The 3712 USSA was built in 1961 and is a one-story steel frame structure with metal siding and a metal roof. It has a concrete floor and foundation, is 108 ft long and 90 ft wide, and has a total area of 9,720 ft^2. There is no drain to the process sewer. The 3712 Building was used to store uranium fuel elements, component parts for fuel fabrication, and uranium scraps from fuel manufacturing processes conducted in both the 313 and 333 Buildings (Gerber 1992). According to Site personnel, the 3712 Building currently holds approximately 1.5 years' supply of fuel elements that were to be used in the

now-closed N Reactor, as well as uranium billets awaiting fabrication into fuel elements.

Unusual occurrences related to this facility include fires in 1979 and 1985 and a steam valve failure in 1993. According to Site employees, the building was designed to drain excess water. Figure 3-40 shows the building draining into a below-grade railroad track after the 1979 fire. This railroad track has been backfilled, and the drains are no longer exposed.

Figure 3-40. The 3712 Building, Draining into a Below Grade Railroad Track after the 1979 Fire.

The 1979 fire occurred in one of four rows of various forms of uranium scrap crated and banded for shipment (Figure 3-41). The cause of the fire was determined to be inadequate curing of these billets prior to crating (Appendix A, Occurrence Report #UO-79-27). This fire resulted in the spread of U_3O_8 contamination and fire suppressant chemicals (Gerber 1992). The fire in 1985 started when uranium fines in a scrap box ignited. The facility was decontaminated after each fire (Cramer 1987).

Contamination was discovered near the 3712 Building when the 311 Stillhouse and the underground methanol tanks were removed. During excavation, it was noted that the vitrified clay 300 Area Process Sewer pipe was almost completely eroded away; it was suspected that all of the process sewer piping beneath the 3712 Building was in the same condition. See Section 3.6.3.

Figure 3-41. 3712 Uranium Storage Area after 1979 Fire.

3.6.56 3713 PWHWSA (3713 Paint Shop Hazardous Waste Satellite Area)

The 3713 Paint Shop Hazardous Waste Satellite Area is an inactive, hazardous liquid waste staging area. The site is located outside the southeast door of the 3713 Building in the 300 Area at Hanford coordinates N54850 E13950 (WHC 1991). The 3713 Building is currently a carpenter shop.It is a one-story wooden frame building with a 4-in. reinforced concrete slab floor supported by concrete block foundation walls that have concrete spread footings. The building is 120 ft long, 40 ft wide, and 17 ft high, and has a total area of 4,800 ft^2. The 3713 Building was connected only to the sanitary sewer system (Gerber 1992).

Hazardous wastes are no longer accumulated at this facility because the paint shop was moved. The site received waste from 1984 to 1987 (Cramer 1987). During that time, the area contained miscellaneous small quantities (less than 55-gal accumulated at any one time) of waste solutions, including solvents and paint shop solids from sign and paint shop operations. Approximately 55 gal/yr were accumulated. Documented weekly visual inspections were performed. No known releases are associated with this facility (Cramer 1987).

The site currently appears as a concrete pad approximately 30 ft long and 20 ft wide that is surrounded by a 6-ft-high fence. The pad is currently being used to store miscellaneous items. A drain appears in the center of the pad. Soil surrounding the pad is slightly discolored.

3.6.57 3713 SSHWSA (3713 Sign Shop Hazardous Waste Satellite Area)

The 3713 Sign Shop Hazardous Waste Satellite Area is an inactive, hazardous liquid waste satellite area. The site is located outside the north door of the 3713 Building in the 300 Area at Hanford site coordinates N54850 E13950 (WHC 1991). It received wastes from 1984 to 1987 (Cramer 1987). The 3713 Building is currently a carpenter shop.

The 3713 Building is a one-story wooden frame building with a 4-in. reinforced concrete slab floor supported by concrete block foundation walls that have concrete spread footings. It is 120 ft long, 40 ft wide, and 17 ft high, and has a total area of 4,800 ft^2. The 3713 Building was connected only to the sanitary sewer system (Gerber 1992).

The 3713 SSHWSA area contained miscellaneous small quantities (less than 55 gal accumulated at any one time) of nonsolvent waste solutions from sign shop operations. Less than 55 gal/yr were accumulated. Documented weekly visual inspections were performed. No known releases are associated with this facility (Cramer 1987).

The site currently appears as the north entrance to the 3713 Building. No evidence of a storage area or discolored soil is apparent.

3.6.58 3718-F BS (3718-F Burn Shed)

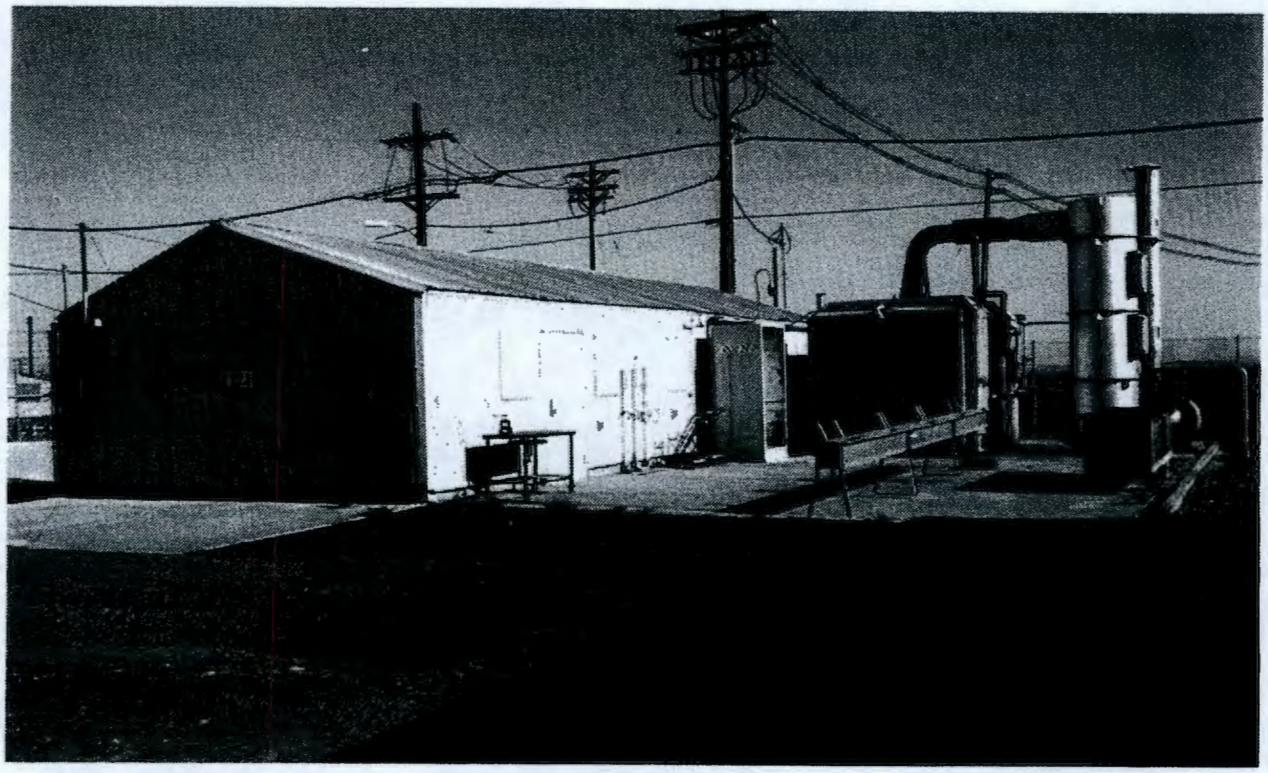
The 3718-F Burn Shed is an inactive, hazardous solid waste treatment facility associated with the 3718-F Alkali Metal Treatment Facility. The 3718-F Burn Shed is located next to the 3718-F Building in the 300 Area at Hanford coordinates N54130 E15950 (WHC 1991). The 3718-F Building is a single-story building that is 20 ft wide and 48 feet long. An adjoining concrete pad, measuring 25 ft wide by 48 ft long, is located on the east side of the building (DOE-RL 1985).

The burn shed is located on this adjoining pad along with an accompanying fume scrubber, two reaction tanks for cleaning equipment, and a safety shower. The concrete pad is 15.2 cm (6 in.) thick, is bermed along two sides (south and north), and is sloped to the east into an approximately 4-in.-deep trench. The pad was designed to prevent runoff into the surrounding soils; instead, it channels drainage to the trench drain, which, in turn, drains to the process sewer system (DOE-RL 1992a).

The burn shed is a small sheet metal enclosure that is 3.0 m (10 ft) wide and 3.7 m (12 ft) long and has a 2.4-m-wide (8-foot-wide), garage-type roll-up door (see Figure 3-42). There are small, 3-in.-diameter stirring ports and windows in the north and west side. In the burn process, the waste alkali metals were placed in 18-in^2-burn pans that were 4 in. deep. In turn, these burn pans were placed in a catch pan that was 40 in. by 30 in. by 8 in. deep (DOE-RL 1992).

The treatment of the bulk alkali metal consisted of burning the metals in the burn shed to eliminate their ignitability and reactive characteristics (DOE-RL 1993a). According to Site personnel, violent explosions occasionally occurred during burning. The bullet-proof windows were replaced on several occasions.

Figure 3-42. The 3718-F Alkali Metal Storage Facility Showing the Burn Shed and Fume Scrubber on the Right and Treatment Tanks 1 and 2 on the Pad in Front of them, 1991.



The burn shed is connected to the fume scrubber. The fume scrubber consists of an American Air Filter Company compactor that acts as a wet dust collector, moisture separator, and a high-pressure, high-velocity exhaust fan. The dust collector (compactor) dissolves the sodium oxide smoke that is passed through the fume scrubber, and the moisture separator removes this solution (aqueous sodium hydroxide) from the exhaust stream (DOE-RL 1985). The aqueous sodium hydroxide from the fume scrubber is discharged directly to the process sewer. According to Site employees, some aqueous sodium hydroxide did impact the soil surrounding the pad. The treatment capacity of the 3718-F Facility was 20 L per day (DOE-RL 1985). Table 3-10 lists the wastes disposed at the 3718-F Facility from 1982 to 1987.

Table 3-10. Wastes Disposed at the 3718-F Facility (DOE-RL 1992a).

Year	Total	Sodium	Lithium	Sodium-Potassium alloy	Other
1982	1,061.4	1,052.3	9.1	0	0
1983	719.2	700.8	13.6	4.5	0.23
1984	36.3	36.3	0	0	0
1985	2.3	2.3	0	0	0
1986	186.1	153.3	30.9	1.8	0.9
1987	112.2	41.7	70.4	0	0
Total	2,117.5	1,986.7	124	6.3	0.32

The site currently appears much as it did when it was in operation, except that the burn pans and catch pans have been removed from the burn shed and the soil surrounding the facility has been disturbed.

More information on the 3718-F Facility is presented in the *Part B Permit Application for the Alkali Metal Treatment and Storage Facilities* (DOE-RL 1985) and the *3718-F Alkali Metal Treatment and Storage Facility Closure Plan* (DOE-RL 1992a).

3.6.59 3718-F SF (3718-F Storage Facility)

The 3718-F Storage Facility is an inactive, hazardous solid waste storage facility located in the 3718-F Building in the 300 Area. The facility is located at Hanford coordinates N54130 E15950 (WHC 1991). The 3718-F Building houses the Alkali Metal Treatment Facility, which is a storage, treatment, and decontamination facility for handling alkali metal wastes or equipment contaminated with alkali metals. None of the material treated is radioactive (DOE-RL 1985).

This facility is a single-story building that is 20 ft wide and 48 ft long. The gabled ends, roof, and siding are corrugated steel. The building sits on a concrete pad. The northern half of the building, which is 20 ft wide and 24 ft long, is a storage area. The southern half of the building is a work area. Dangerous wastes stored at the facility are stored in 55-gal drums or other smaller containers (DOE-RL 1985).

The maximum storage inventory is 2,000 L (DOE-RL 1985). Table 3-11 lists the quantity of wastes that were stored at the 3718-F Facility from 1982 to 1988. Waste stored in containers at the 3718-F Facility included NaK, sodium, lithium, and, occasionally, laboratory quantities of reactive, ignitable wastes (DOE-RL 1985). No known releases are associated with this facility (Cramer 1987).

Table 3-11. Waste Stored at the 3718-F Facility (DOE-RL 1992a).

Year	Total (Kg)	Sodium (Kg)	Lithium (Kg)	Sodium Potassium alloy (Kg)	Other (Kg)	Other Description
1982	0	0	0	0	0	
1983	122.5	113.4	0	9.1	0	
1984	3.6	3.6	0	0	0	
1985	59.7	44.0	1.4	14.3	0	
1986	75.4	0.7	13.8	1.0	0.9	Calcium
					59.0	Radioactive Sodium
1987	379.4	95.7	215.5	68.3	0	
1988	31.8	31.8	0	0	0	
Total	672.4	289.2	230.7	92.7	59.9	

More information on the 3718-F Facility is presented in the *Part B Permit Application for the Alkali Metal Treatment and Storage Facilities* (DOE-RL 1985) and the *3718-F Alkali Metal Treatment and Storage Facility Closure Plan* (DOE-RL 1992a).

This site currently appears as it did when it was active (see Figure 3-42). The storage area seems clean and there is no evidence of spills. Some clean miscellaneous equipment is presently being stored in the building. According to Site personnel, there were no spills associated with this storage area.

3.6.60 3718-F TT1 (3718-F Treatment Tank 1)

3718-F Treatment Tank 1 is an inactive, hazardous liquid waste treatment tank. The tank is part of the 3718-F Alkali Metal Treatment Facility, which is located at Hanford coordinates N54130 E15950. The 3718-F Alkali Metal Treatment Facility is used for the treatment and storage of materials contaminated with alkali metal wastes (WHC 1991).

Treatment Tank 1, the smaller of the two reaction tanks, contained alcohol solutions. According to Site personnel, there was a second alcohol treatment tank that has since been removed. Tank 1 has a 511-L (135-gal) capacity and is 26.7 cm (10.5 in.) wide, 739.1 cm (291 in.) long, 25.4 cm (10 in.) deep. The alcohol reaction tank is constructed of 0.3-cm (1/8-in.) 304-L stainless steel and has a solid, hinged cover (DOE-RL 1992a).

According to Site personnel, some minor spills could have been associated with this tank and the alcohol reaction tank that was removed. The tank currently appears as it did when in use (see Figure 3-42).

More information on the 3718-F Facility is presented in the *Part B Permit Application for the Alkali Metal Treatment and Storage Facilities* (DOE-RL 1985) and the *3718-F Alkali Metal Treatment and Storage Facility Closure Plan* (DOE-RL 1992a).

3.6.61 3718-F TT2 (3718-F Treatment Tank 2)

3718-F Treatment Tank 2 is an inactive, hazardous liquid waste treatment tank. The tank is part of the 3718-F Alkali Metal Waste Treatment Facility, which is located at Hanford coordinates N54130 E15950. The 3718-F Alkali Metal Treatment Facility is used for the treatment and storage of materials contaminated with alkali wastes (WIDS 1993c).

Treatment Tank 2, the larger of the two reaction tanks, contained water. This water reaction tank has a 1,628-L (430-gal) capacity and is 74.9 cm (29.5 in.) wide, 304.8 cm (120 in.) long, and 71.1 cm (28 in.) deep. The tank is constructed of 0.3-cm (1/8-in.) 304-L stainless steel and has a hinged screen cover (DOE-RL 1992a).

This tank currently appears as it did when it was in use. The tank base is less than 1 ft from the adjacent soil (see Figure 3-42). According to Site personnel, violent explosions were associated with this tank. At times, the

tank lifted 1 ft off the ground. Spills and splashes from this tank did impact the soil.

More information on the 3718-F Facility is presented in the *Part B Permit Application for the Alkali Metal Treatment and Storage Facilities* (DOE-RL 1985) and the *3718-F Alkali Metal Treatment and Storage Facility Closure Plan* (DOE-RL 1992a).

3.6.62 3746-D SR (3746-D Silver Recovery)

The 3746-D Silver Recovery facility is an active, hazardous solid waste site that is located at Hanford coordinates N54975 E13725. This site is also known as the 3746-D Silver Recovery Process Facility (WHC 1991). According to Site personnel, the silver recovery process in the 3746-D Building began in approximately 1984 to process corrosive, silver-containing photochemical wastes for the reclamation of silver. Prior to this time, the silver was reclaimed in the 3705 Building.

According to a precious metals generating report for Fiscal Year 1993, 2,040 gal of photochemical waste was processed to recover 1139.686 troy ounces of silver.

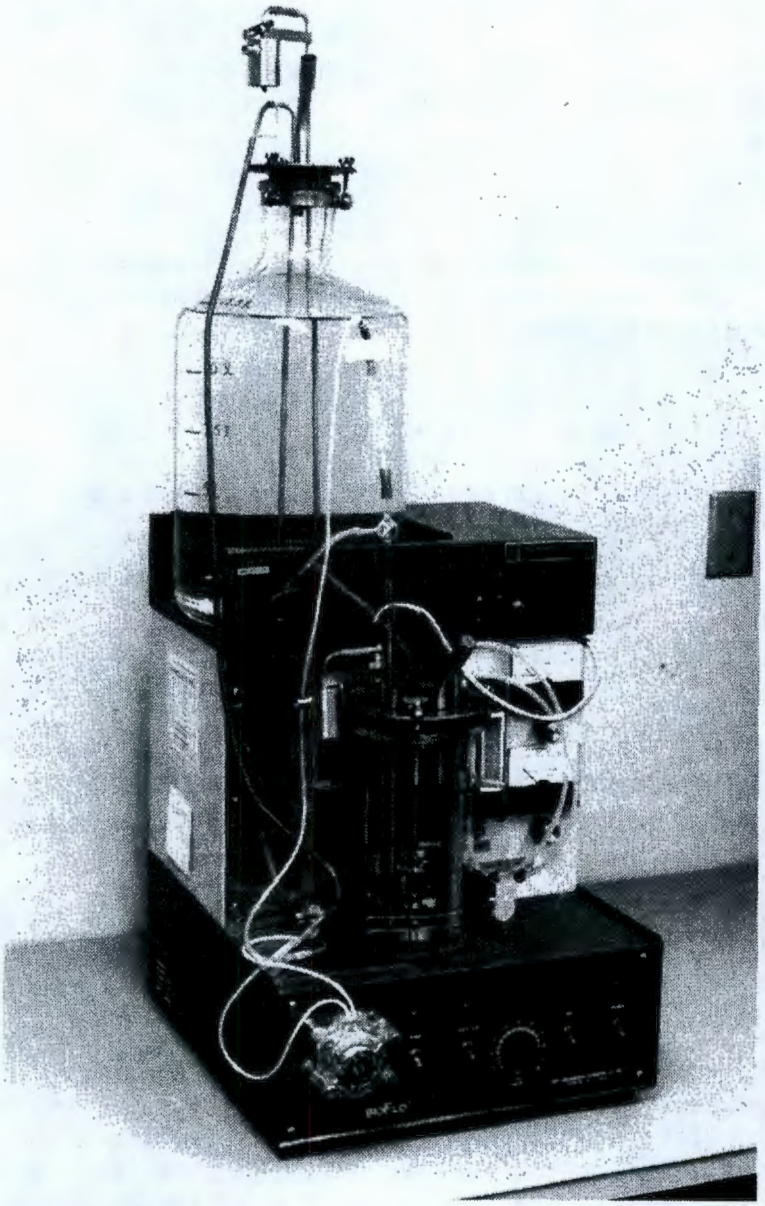
According to Site personnel, grab samples of the treated effluent were analyzed for eight EP toxic metals and pH from 1988 to 1992. Results from 22 samples received on August 11, 1988, along with the discharge limits, are included in Zabel (1989), part of Appendix A. If the effluent met these discharge limits, it was poured down a sanitary sewer drain adjacent to the reclamation process in the 3746-D Building. Since 1992, the effluent has been shipped offsite.

The 3746-D Silver Recovery site currently appears as a small portion of a Quonset hut adjacent to the 3705 Building. The building is also used to store photochemicals and photographic supplies. According to Site personnel, no unplanned releases are associated with this facility.

3.6.63 BTTF (Biological Treatment Test Facilities)

The Biological Treatment and Test Facilities (BTTF) are active liquid mixed waste sites that serve as microbiological research and development laboratories. While WIDS identifies the Hanford coordinates for the BTTF as N52700 E16600, the various laboratories are actually spread between the 324, 325, and 331 Buildings in the 300 Area (WHC 1993c). The technologies are being developed to treat RMW and hazardous waste via biological treatment processes (Figure 3-43). These technologies treat waste constituents in soil, effluents, and groundwater through the use of microorganisms that are either naturally present or are environmentally enhanced. These waste constituents include organics, nitrates, chromium, and cyanide. Overall, the waste that will be handled in the BTTF includes listed waste, waste from nonspecific sources, characteristic wastes, and state-only wastes (DOE-RL 1993a).

Figure 3-43. Biological Treatment Technology Being Developed, 1988.



The 324, 325, and 331 Buildings are connected to the 300 Area Process Sewer, and sample data is provided in the *300 Area Process Waste Water Stream-Specific Report* (WHC 1990). Drawings of the 324 Building in the *Part A Permit Application for the Physical and Chemical Treatment Test Facilities* (see Section 3.6.38) indicate that effluent holding tanks associated with the BTTF are in close proximity to, and may have access to, the Process Sewer System in the building's basement. However, WIDS (WHC 1993c) does not report any record of spills or leaks associated with BTTF R & D activities.

A RCRA Part A Permit Application has been filed for the BTTF. An HRS migration score has not been reported (WHC 1993c).

3.6.64 PCTTF (Physical and Chemical Treatment Test Facilities)

The Physical and Chemical Treatment Test Facilities (PCTTF) are active, mixed liquid waste sites that serve as chemical and physical treatment research and development laboratories. The various laboratories that comprise the PCTTF are located in the 324, 325, 329, and 3720 Buildings in the 300 Area (WHC 1993c). The technologies under research and development in these laboratories address treatment of RMW and hazardous waste via various physical and chemical processes. These technologies include the following:

- pH adjustment
- Ion exchange for selective removal of contaminants from waste solutions
- Waste concentration by evaporation
- Waste dissolution, such as waste retrieval from storage tanks by pH adjustment or fusion

- Precipitation/filtration and solvent extraction from solutions, slurries, and sludges
- Solids washing for the separation of contaminants from sludges
- Catalytic destruction methods, i.e., electrolytic generation of oxidants such as silver, cerium, and other electrochemically enhanced processes for decontaminating metals and oxidizing nonmetals
- Grouting.

The RMW and hazardous waste to be handled with these physical and chemical technologies include listed wastes, wastes from nonspecific sources, characteristic wastes, and state-only wastes. Petroleum refining wastes are also included (DOE-RL 1993a).

Each of the four buildings identified above is connected to the 300 Area Process Sewer, and sampling data representative of the effluent streams discharging from these buildings is provided in the *300 Area Process Waste Water Stream-Specific Report* (WHC 1990), with perhaps the exception of the 3720 Building, whose stream appears to be commingled with that from the 333 Building. Drawings of the 324 Building that are provided in the Part A Permit Application (DOE-RL 1993a) indicate that effluent holding tanks in the basement are in close proximity to, and may have access to, the Process Sewer System; however, it is not clear whether or not these holding tanks are components of the PCTTF. No spills or leaks have been reported in WIDS (WHC 1993c) for any of these facilities.

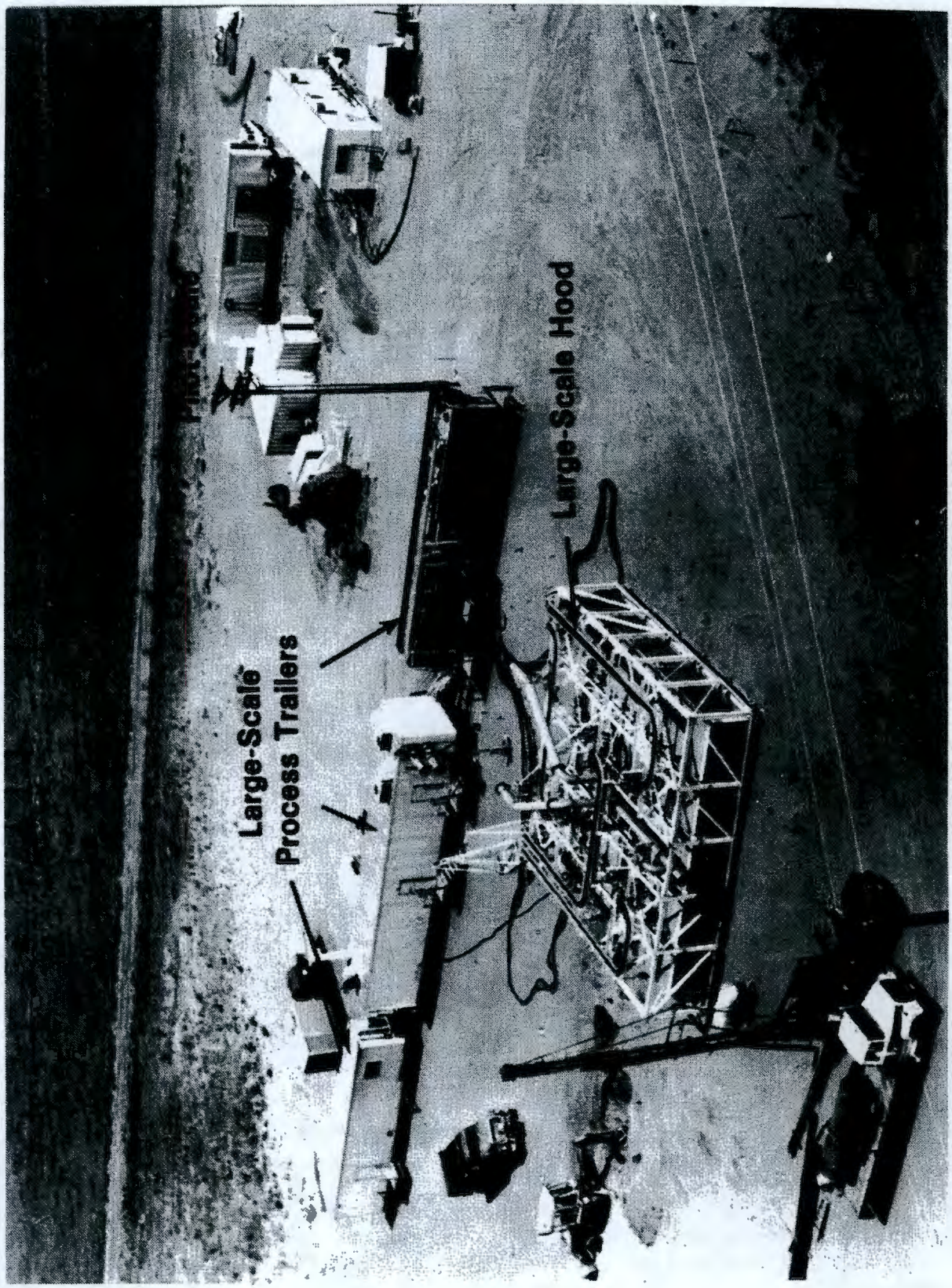
A RCRA Part A Permit Application has been filed for the PCTTF. An HRS migration score is not reported for any of these sites that comprise the PCTTF (WHC 1993c).

3.6.65 TTTF (Thermal Treatment Test Facilities)

The Thermal Treatment Test Facilities (TTTF) are active, mixed solid waste sites that are associated with the research and development of thermal treatment technologies for both RMW and hazardous waste, including listed waste, waste from nonspecific sources, characteristic wastes, and state-only wastes. The two primary technologies involved include in situ vitrification (ISV) and waste vitrification. Other thermal treatment processes identified in the Part A Permit Application (DOE-RL 1993a) include plasma arc pyrolysis, in situ heating of soils and sludges for the removal of organics, metal melting for volume reduction and the immobilization of contaminated metals, gamma induced oxidation of organic chemicals, thermal treatment for the drying and decomposition of liquid slurries, in-can melting of soil wastes and liquid slurries, and microwave heating to dry and immobilize liquid and solid wastes. While WIDS provides Hanford coordinates N53925 E14900 for the TTTF, associated laboratories and facilities are located in the 324, 325, and 331 Buildings of the 300 Area (DOE-RL 1993a). A photograph of the TTTF is provided in Figure 3-44.

The TTTF is actually composed of four treatability testing units, including bench-, engineering-, pilot-, and large-scale units. The engineering- and bench-scale testing units are located in the 324 Building, while the pilot- and large-scale units are transportable within the Hanford Site, including the current test site just west of the 300 Area. The design capacities of

Figure 3-44. Aerial Photograph of the Thermal Treatment Test Facility, 1986.

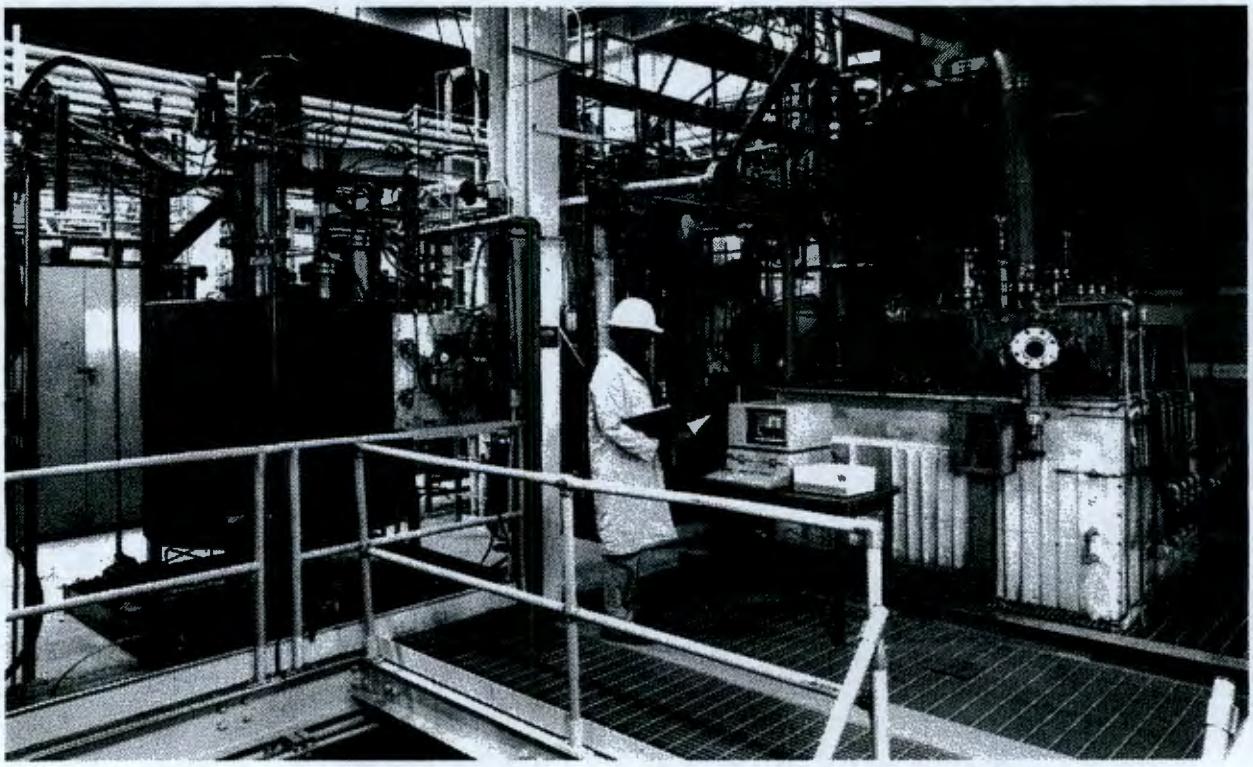


the units vary from 5 gal per day for bench-scale studies to 17,000 gal per day for the large-scale tests (DOE-RL 1993a).

ISV is a thermal treatment process that converts contaminated soils and sludges into a glass and crystalline product. Electrical current is passed among an array of four electrodes imbedded in the contaminated soil or sludge, thereby melting and glassifying the material. This process continues outward and downward until the appropriate vitrification depth is obtained. Both RMW and dangerous waste constituents are stabilized by this method, while organic contaminants are destroyed by pyrolysis, whose byproducts oxidize as they migrate to the surface. In some treatability studies, vitrified soil is left in place for additional study before either being removed or designated as nonhazardous (DOE-RL 1993a).

Waste vitrification prototype equipment (Figure 3-45) is located in the 324 Building, where treatability studies are conducted using simulated and actual RMW samples. RMW is mixed with glass-forming materials and then vitrified into a highly durable glass for disposal. The design capacity for this equipment ranges from 1.5 gal/day (bench-scale) to 30 gal/day (pilot-scale).

Figure 3-45. Waste Vitrification Prototype Equipment in the 324 Building, 1986.



The 324 Building is connected to the 300 Area Process Sewer and the Retention Process Sewer (RPS), which is a subsystem of the 300 Area Process Sewer that is used for the diversion of potentially radioactive liquid effluents. Sample data representative of the effluent discharging from the building is provided in the *300 Area Process Waste Water Stream-Specific Report* (WHC 1990). Drawings provided in the Part A Permit Application (DOE-RL 1993a) for the 324 Building indicate that effluent holding tanks in the basement are in close proximity to, and may have

access to, the 300 Area Process Sewer System; however, it is not clear whether these holding tanks are components of the TTTF. No spills or leaks have been reported in WIDS (WHC 1993c) for any of these facilities. No HRS migration score has been reported for any of the facilities or sites associated with the TTTF (WHC 1993c).

3.7 UNDOCUMENTED 300 AREA WASTE SITES

3.7.1 Solid Waste Burial Ground

This undocumented solid waste burial ground is an inactive solid waste site located at Hanford coordinates N56600 E14400 (Paas 1955). The burial ground is reported to have operated from 1943 to 1944. It was uncovered accidentally in 1952 during the excavation of holes for power distribution poles. Both the size of the site and the type of material buried at the site are unknown. Upon the 1952 discovery of the site, the approximate area was designated as a radiation zone and posted with underground radioactive material warning signs (Paas 1955). It is unclear if earlier authors considered this site a portion of the 618-8 Burial Ground, discussed in Section 6.10, or confused it with the "Early Burial Ground," described in Section 3.7.6.

In a letter by A. R. Keene dated March 3, 1961 (Appendix A), this burial ground is described and shown on an included sketch as site number 32. Keene further states that this burial ground was used for about 6 months in 1944 for the disposal of solid uranium wastes. However, photographs from the time period indicate that the burial ground referred to was probably the "Early Burial Ground" that was located farther to the north.

It appears that this burial ground came into being at about the same time that the 313 Building was expanded to its present size and that it could have been created to receive construction debris. This is further confirmed by ground penetrating radar (GPR) surveys conducted in the area that indicate that construction-type debris are buried here (Mary Sinclair Letter 1987).

This site also appears in a 1954 photograph (see Section 3.7.6) as a disturbed area with large debris piles. It seems from other documentation that this waste site has been assumed to be part of the 618-8 Burial Ground (Appendix A, DSI, Webb to Carpenter, February 8, 1994). However, it appears to be an independent solid waste site.

3.7.2 366 and 366A Fuel Oil Bunkers

The 366 Building is an underground, rectangular building with the roof at ground level. The entire building is constructed of reinforced concrete. The building is 69 ft, 8 in. long; 26 ft, 6 in. wide; and 13 ft high; and it has a total of 1846 ft^2 (WADCO 1975). The 366 Building is a 144,000-gal fuel oil tank, and the 366A Building is a 235,000-gal fuel oil tank (Map M-3600, Sheets 1 and 2). Apparently, in about 1990, one of these tanks--it is unclear which--was cleaned out. These cement tanks were originally lined with carbon steel; however, due to corrosion, the steel liners were removed.

3.7.3 Process Sewer System

The 300 Area Process Sewer System and Retention Process Sewer are described in Section 3.3. It is a documented active liquid waste site, but is not included as a waste site in WIDS (WHC 1991). for that reason, it is included as an undocumented waste site in this section.

All underground process sewer lines remain in place and should be assumed to be contaminated. Numerous instances of line deterioration have contributed to soil contamination around the buried line. All soils in the proximity of the process sewer system should be considered "suspect" contaminated.

An example of process line deterioration is described in WHC (1989). As part of a 1989 demolition of the 311 Stillhouse, a length of vitrified clay process sewer pipe was unearthed and found to be badly corroded. The section between the neutralization pit and the 3712 building manhole was corroded to a point that its entire lower half was missing. Approximately 200 ft of line beneath the 3712 building was estimated to be in the same condition (see WHC 1989, Appendix A). This section of pipe still receives rain water drainage from the 311 Tank Farm catch basin and three floor drains in the 303-F Building.

3.7.4 3705 Photography Building

The 3705 Building is a one-story concrete building 68 ft wide, 94 ft long, and 23 ft high. It was constructed in 1963 to provide laboratory space for processing film badges and meters worn by HW personnel and for storing personnel exposure records. The 3705 Building functioned in its original capacity through the early 1970's, when it was converted to a photography processing shop. It is currently referred to as the Photography Building (Gerber 1992). The 3705 Building is connected to the 300 Area sanitary and process sewers. The silver reclamation process was housed in this building until 1984, when it was moved to the adjacent 3746-D Building. According to Site employees, effluent was discharged to the process sewer during silver reclamation in the 3705 Building.

3.7.5 3730 Gamma Neutron Irradiation Facility

The 3730 Building is currently used for gamma irradiation testing with a 350,000-Ci ^{60}Co source emplaced in a small liquid-filled pit in the building. A leak of the ^{60}Co source was detected in 1974. The leak was discovered during an aerial survey using infrared photography. The leaking source contaminated cooling water that was discharged to the process sewer and finally the process ponds. Gerber (1992) states that the sanitary sewer and the groundwater near the 3730 Building are contaminated from the ^{60}Co source that leaked. No information has been collected to date supporting the conclusions on contamination presented in Gerber (1992).

3.7.6 Solid Waste Burial Ground (Early Burial Ground)

The Early Burial Ground is an inactive solid waste site located adjacent to the north side of the rail spur to the 300 Area. Early aerial photographs of the 300 Area reveal the location of the burial ground (Figures 3-46 and 3-47). The aluminum recycling Area is shown in Figure 3-48.

Figure 3-46. Aerial Photograph of the 300 Area, Showing the Early Burial ground, October 1950.

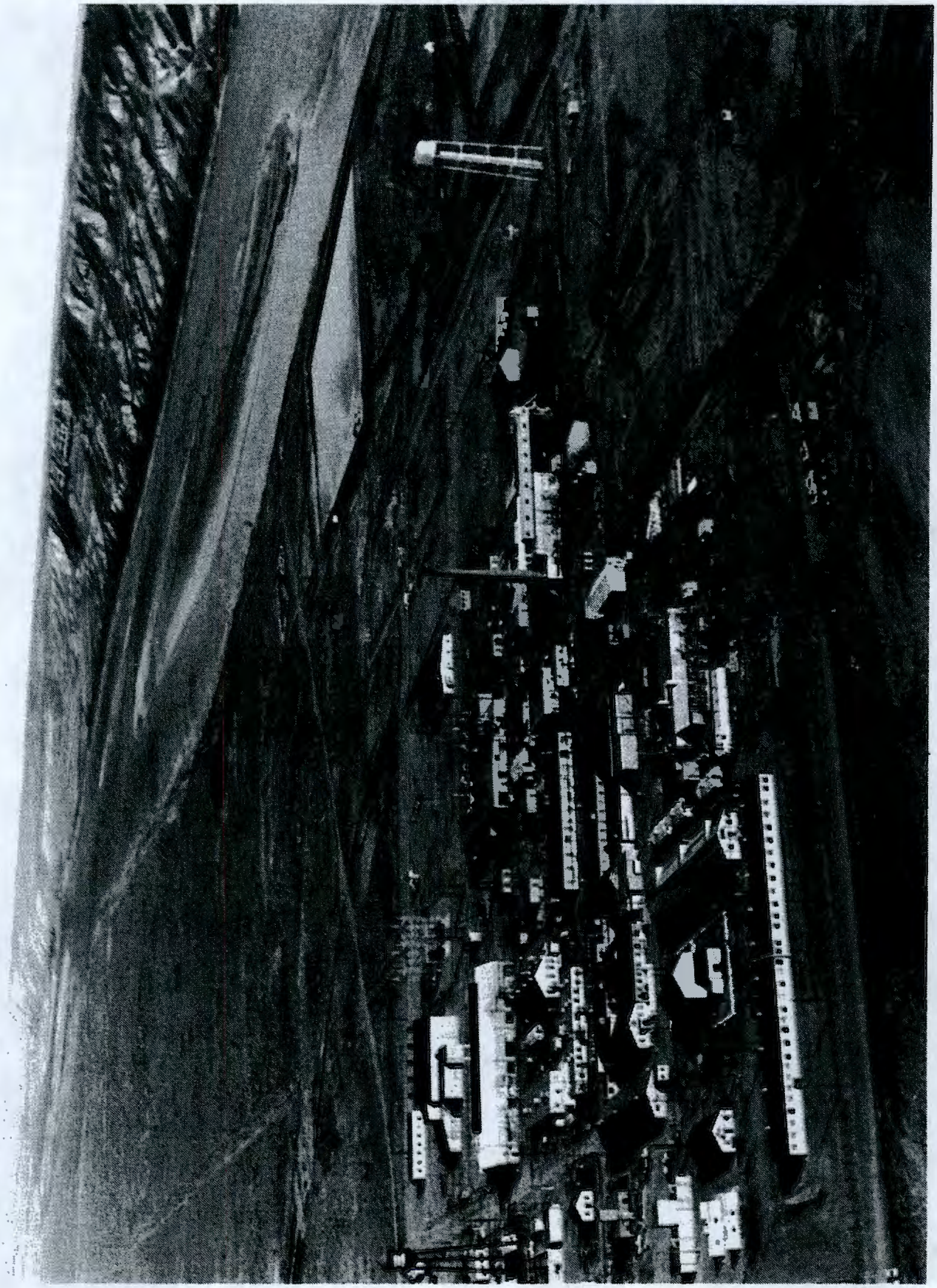


Figure 3-47. Aerial Photograph of the 300 Area, Showing a Faint Outline of the Early Burial Ground, March 1954.

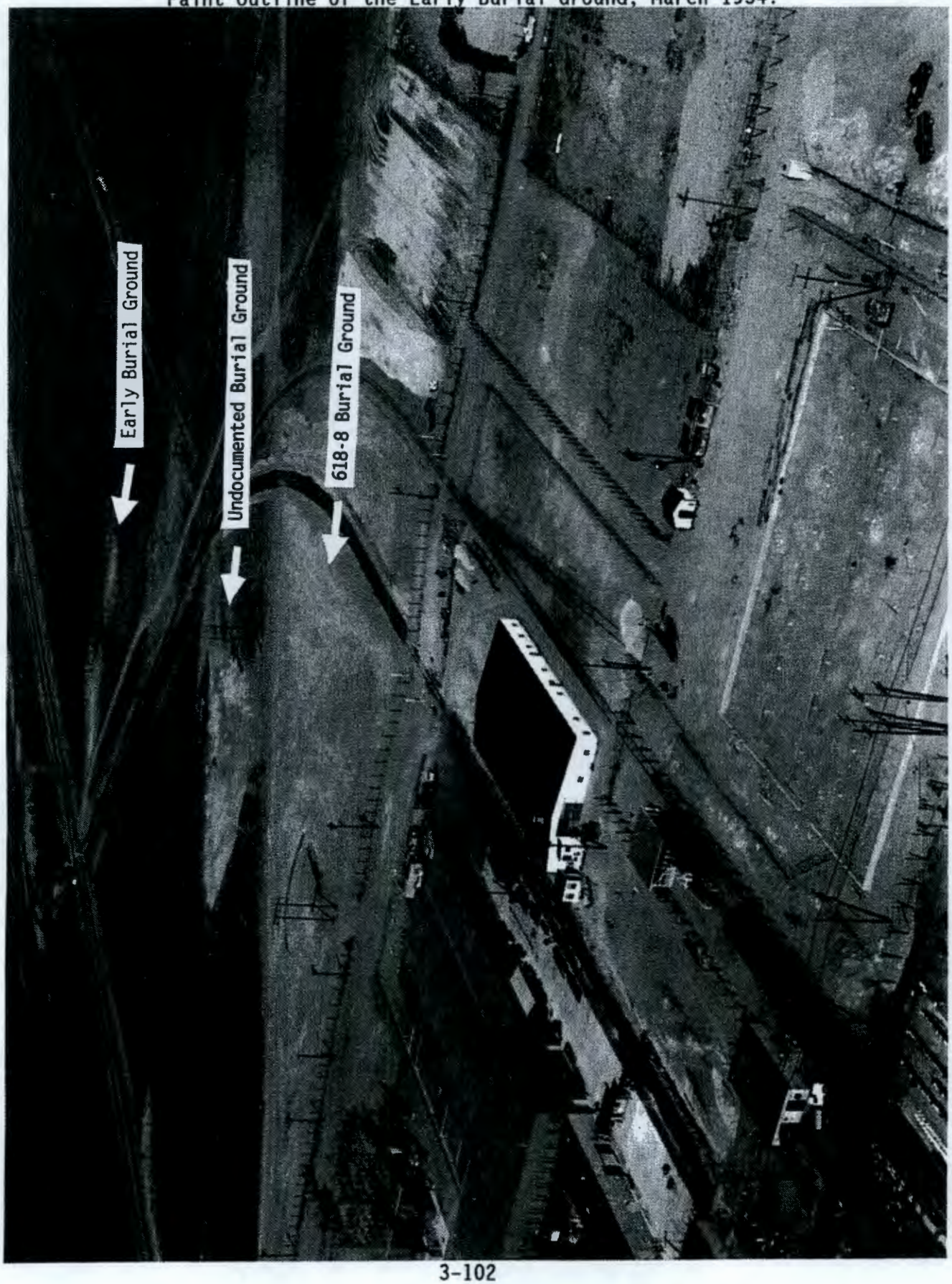


Figure 3-48. Aerial Photograph of the 300 Area, Showing the Uranium-Contaminated Aluminum Recycling Area, Date Unknown.

The burial ground was active in 1943 and 1944 and was not posted after closure in 1944 (Paas 1955).

This burial ground has often been confused with the 618-8 Burial Ground, which is described in Section 6.10 of this report. Reportedly, this burial ground was used for 6 months in 1944 and 1945 to dispose of uranium-contaminated equipment, fines, and chips. A faint outline of the site can be seen in an aerial photograph taken in 1954 (see Figure 3-47).

The site is further complicated because, after its closure, a rail spur lying adjacent to the south end of the site was added, and a gravel roadway crossed the site at about its midpoint. Further, the site was used as a staging area, described in Section 3.7.27, for the recycling of aluminum scrap that was contaminated with uranium (see Figure 3-48).

Recently, the rail spur siding was "cleaned up" of its surface contamination (uranium-contaminated aluminum pieces) so that rail crews could move rail cars in and out of the 300 Area without the need of HPT support and other radiological controls that were in place for surface contaminated areas. This "clean" area covers about 5 ft on either side of the track section. However, the cleaned area is maintained as a controlled Underground Radioactive Material area.

During maintenance activities on April 26, 1994, a ball of "green earth was uncovered" (Appendix A, RL--WHC-FLEETOPS-994-0004). This contaminated soil read up to 72,000 disintegrations per minute (dpm) beta-gamma. It was removed to the adjoining Surface Contamination area (Appendix A, RL--WHC-FLEETOPS-994-0004).

The site currently appears as a cobble- and soil-covered area with natural vegetation growing on its surface. It is bounded, for the most part, with a light-duty post-and-chain barricade and is posted with "Surface Contamination" warning signs. A wide "roadway," created recently by the excavation and placement of a process sewer line to the new treatment facility north of the 300 Area, traverses the site. Both sides of the roadway are barricaded with light-duty post-and-chain fences and are posted as surface contamination areas. The roadway is not barricaded or posted in any way.

3.7.7 382 Pump House Underground Gasoline Tank

The 382 Pump House contains an Allis-Chalmers gasoline engine and a 75 kW diesel-driven generator. Three 145-gal underground petroleum storage tanks were located near the facility: 382-1, 382-2, and 382-3. Tank 382-1 was a single-wall carbon steel tank used to store unleaded fuel.

The gasoline engine was removed from service on August 6, 1992, because scheduled tightness testing of Tank 382-1 indicated that the tank failed to pass the test (Horner Ezy Check). The tank was identified as having a leak rate of 0.171 gal/h.

The remaining fuel was removed and a tag/lockout (3G-92-00506) was placed on the tank to preclude refueling (Occurrence Report RL--WHC-WHC300EM-1992-0039). The tank was subsequently removed, and the site was backfilled to grade.

During the tank excavation, a soil gas survey was conducted. That survey detected gasoline contamination of soil to a depth of about 20 to 25 ft. Refer to Jacques (1993) for more information.

According to Site employees and a letter to M. Mihalic (see Appendix A), Tanks 382-2 and 382-3 will be removed by Project L-44, scheduled for Fiscal Year 1994.

3.7.8 3709A Fire Station

The 3709A Fire Station included refueling facilities for vehicles and equipment. During scheduled tightness testing during August 1991, the fuel storage tanks failed the test and were assumed to be leaking (Occurrence Report RL--WHC-WHC600EM-1991-1008). During the removal of the two underground storage tanks (300-FS-15/16) and associated piping, field instruments indicated petroleum vapors (Occurrence Report RL--WHC-WHC300EM-1992-0012). Detection of vapors indicates that either gasoline or diesel fuel had been released to the soils by either leakage or spillage. The contaminated soils were located beneath the pump station island. It appeared that fittings and/or faulty flex hoses under the pumps had leaked an unknown quantity of fuels. Samples were taken for analysis, and additional excavation was performed (about 15 ft deep) to determine the extent of the release. The site was lined with plastic and the original soils were redeposited.

A Deep Soil-Gas Survey, conducted at the site, indicated that vapor phase contamination may have reached groundwater. It appeared that no liquid petroleum products reached groundwater, however.

3.7.9 325 Laboratory Diesel Fuel Tank

The 325 diesel fuel tank was permanently taken out of service on October 14, 1992, when the tank was removed. The tank site was monitored during removal activities for organic vapor and radiological hazards. There was no indication of free product during the excavation, removal, or site assessment.

Once the tanks were removed, the site was backfilled with native soil and the asphalt pad was replaced.

Eight soil samples were taken and sent for analysis. All samples were well below "action limits." Diesel TPH indications were less than 25 ppm. Summary documents are included in Appendix A.

3.7.10 384 Powerhouse #6 Fuel Oil Spill

During refueling operations at the 384 fuel storage bunker, it was discovered that a siphon tube valve on the tanker truck remained partly open, resulting in the release of fuel oil to the asphalt roadway and to graveled areas nearby (Occurrence Report RL--WHC-WHC300EM-1991-1032).

The trucking vendor was requested to perform spill cleanup activities, and those activities were performed. Absorbent materials were used to treat the contaminated areas and were removed for disposal by the vendor.

3.7.11 350 Building Sanitary Sewer Lift Station

During routine surveillance of the 350 Sanitary Sewer Lift Station, it was noted by power operations personnel that the water had a white, milky discoloration. Samples taken for analysis indicated that no hazardous substances had been released.

Investigation revealed that the source of the contaminant was cleanup activities of painters and that the substance was latex paint. Latex paint is considered a nonhazardous material (Occurrence Report RL--WHC-WHC300EM-1993-0012).

3.7.12 309 Building Glycol Spill

During routine surveillance on April 30, 1993, it was discovered that the #3 water chiller in the 309 Building was leaking. An expansion joint had failed and the system fluid was being pumped into the machinery room. The drain in the machinery room drains to a common sump that discharges to the process sewer.

The discharge consisted of 795 gal of a 38%-by-volume solution of water and glycol. The volume (302.1 gal of glycol) exceeded CERCLA limits for this type of release and was reported. The system was repaired, and no remediation action was taken for the process sewer due to this spill (Occurrence Report RL--WHC-WHC300NE-1993-0002).

3.7.13 Hanford Grout Lysimeter Facility

In 1984, the Hanford Grout Lysimeter Facility (HGLF) was constructed about 3 mi northwest of the 300 Area. It consists of six large-diameter boreholes that are 6 ft in diameter and 25 ft deep (Gerber 1992). In January 1991, it was discovered that drainage from a buried lysimeter had probably leaked into the underlying sediments. The lysimeter contains radio-traced, simulated solidified and neutralized cladding removal wastes. It is estimated that, over a 3-yr period, as much as 300 L of drainage may have occurred. The maximum concentration of contaminants in the sediments is estimated to be 6×10^{-5} μCi/mL to 1.3×10^{-4} μCi/mL of ^{99}Tc.

3.7.14 The 329 Biophysics Laboratory

The 329 Biophysics Laboratory was built in 1952 and 1953 to support the pioneering HW environmental and bioassay programs (Gerber 1992).

In August 1991, radioactive contamination was found outside the 329 Building. During a routine survey outside the building, a radiation protection technologist (RPT) found radioactive contamination levels of approximately 40,000 dpm beta-gamma in a 1 ft^2 area of soil. The source of the contamination is unknown (Occurrence Report RL--PNL-PNLBOPER-1991-1036).

3.7.15 314 Metal Extrusion Building

The 314 Metal Extrusion Building was a World War II MED and du Pont structure. The building is rectangular with a rectangular addition along the north side. The gable roof is corrugated asbestos. The exterior walls are concrete block. The

floor is reinforced concrete, with test pits and a basement room at the west end (AEC/GE 1964).

The building has a high bay; autoclaves; high-pressure, high-temperature loops; and test space for prototype equipment. Charging machines and reactor auxiliary equipment have been developed there (AEC/GE 1964).

In the 314 Building, uranium that arrived at HEW as billets was heated in a muffle-type furnace with an interior inert gas atmosphere. The uranium was then transferred through a closed passageway to the extrusion press, which also operated in an inert atmosphere. After being extruded, the rods were outgassed, straightened, and sent to the 313 Building for machining and jacketing. In 1948, the extrusion press in the 314 Building was excessed, and HEW began receiving rolled uranium rods from an offsite commercial mill (Gerber 1992). The equipment and missions of the 314 Building continued to change as technology improved.

Airborne contamination readings within and near the 313 and 314 Buildings were frequently high, resulting from lathe and machining operations, extrusion press work, straightening, outgassing, and other fuel fabrication procedures. As part of the uranium scrap recovery procedures, acid sludges were collected in a dumpster just north of the 314 Building and allowed to evaporate and/or overflow into the surrounding soils. Additional contamination in and around the 313 and 314 Buildings resulted from the pervasive use of hazardous chemical previously described (Gerber 1992). In 1991, radioactive contamination was found outside 314 Building; see Occurrence Report #RL-PNL-PNLBOPER-1991-0017.

The 314 Building was modified in the 1970's and was used by PNL for a variety of research projects and craft services. The remodeling efforts uncovered asbestos and residual uranium contamination (Gerber 1992).

3.7.16 324 Building

Discussions with Site personnel indicate the possibility that radioactive liquids used in C-Cell leaked through a cracked sump in the cell into the soils below the cell. The quantity and description of the wastes that potentially discharged to the ground are unknown. In the mid 1970's, a stainless steel liner pan was installed below the floor of the cell, and the cell bottom was reconstructed.

Currently, liquids are not used in B-Cell because the integrity of the sump in that cell is not known and a stainless steel pan liner has not yet been installed in that cell. No evidence of B-Cell leaking has be found to date.

3.7.17 331 Building Animal Waste Tanks and Trench

Concrete cradles for large waste tanks are visible southeast of the 331 Building. The tanks have been removed, but PNL employees refer to them as animal waste tanks. The cradles are located in an excavated 90-ft-long, 75-ft-wide, and 12-ft-deep pit with sloping, gravel-covered sides. Concrete stairs enter the pit from the west side, and two pole lights are located at its bottom. An aerial photo, date unknown, shows the site when the tanks were in place (Figure 3-49). Four insulated steel lines enter the pit from the north wall, two of which are connected to each tank. The pit is unfenced and has no warning signs.

Figure 3-49. Aerial Photograph of the 331 Building, the 331 Building Animal Waste Tanks, and the 331 Building Trench.

An open, east-west trending trench passes about 30 ft south of the pit. It is about 100 ft long, 8 ft wide, and 4 ft deep, and appears to be active since its bottom is water-filled with vegetation growth. The trench is visible in Figure 3-49. No fencing or warning signs are in place.

3.7.18 333 Building

From investigation of waste sites identified in and around the 333 Building and discussions with Site personnel, it is likely that areas beneath the 333 Building are contaminated. Therefore, the 333 Building is included as an undocumented waste site.

The 333 Chromium Treatment Tanks 1 and 2 (333-TK-7 and 333-TK-11) are located inside the 333 Building and are discussed as separate waste sites in Sections 3.6.47 and 3.6.48.

Other tanks in the 333 Building were used to handle chemicals similar to those handled in 333-TK-7 and 333-TK-11. However, these tanks have not been documented as separate waste sites.

Site personnel report that the 333 Building tanks and equipment used for preweld etching include the following: One HF Nitric Acid tank, one Tap Water tank, two D-I-W Rinse tanks, and one Dryer. Final etch tanks located in the building include the following: One D-I-W Rinse tank, three Tap Water Rinse tanks, three HF nitric Acid tanks, and one Degreaser. Uranium billet cleaning tanks and equipment located in the building include the following: Two Nitric Acid tanks, one Tap Water Rinse tank, one D-I-W Rinse tank, and one Dryer. Prebraze etch tanks and equipment located in the building include the following: Two HF Nitric tanks, two Tap Water Rinse tanks, Hot Nitric Acid and D-I-W Rinse tanks, and a Dryer. Copper strip and chemical milling tanks in the building include: Nitric Acid, Static Water Rinse, Nitric Sulfuric Acid and Tap Water Rinse tanks.

Refer to Figures 3-50, 3-51, 3-52, 3-53, and 3-54 for 1994 photographs of several of these tanks. Additionally, refer to Figure 3-55 for a historical photograph showing zircaloy-2 and Cu-Si component cleaning tanks being used in the 333 Building.

Figure 3-50. Two of the Preweld Etch Tanks Located in the 333 Building: "HF Nitric Acid" and "Tap Water Rinse."

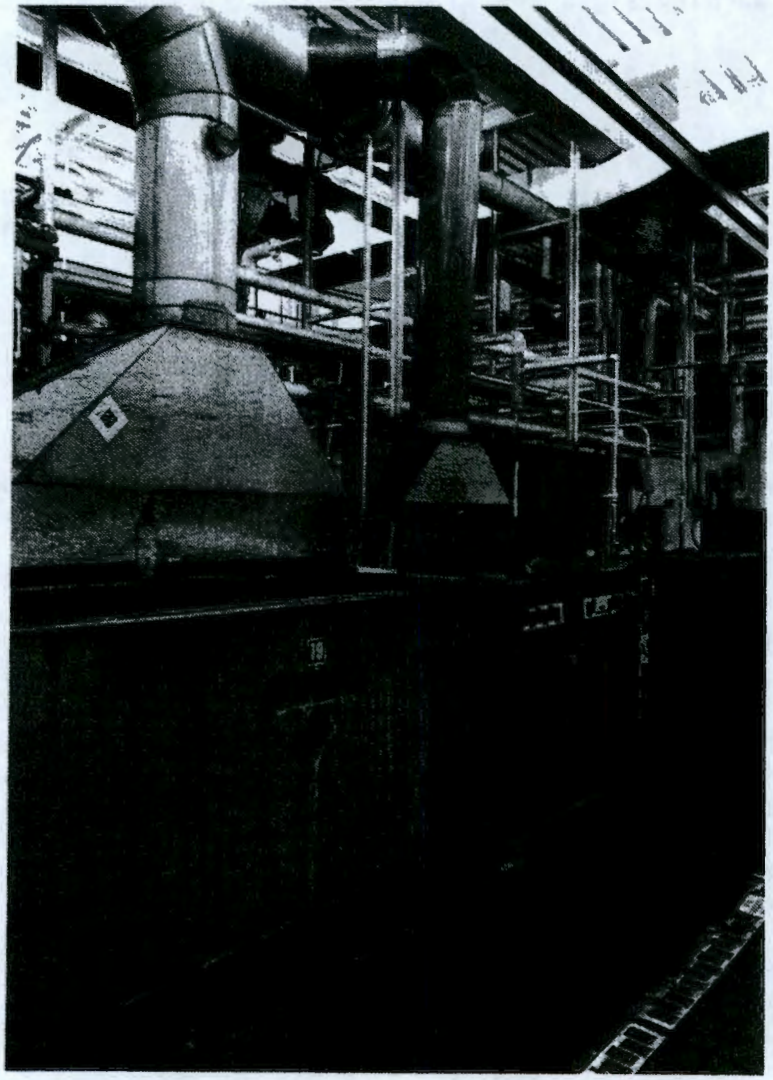


Figure 3-51. Two of the Final Etch Tanks Located in the 333 Building: "D-I-W Rinse" and "Tap Water Rinse."

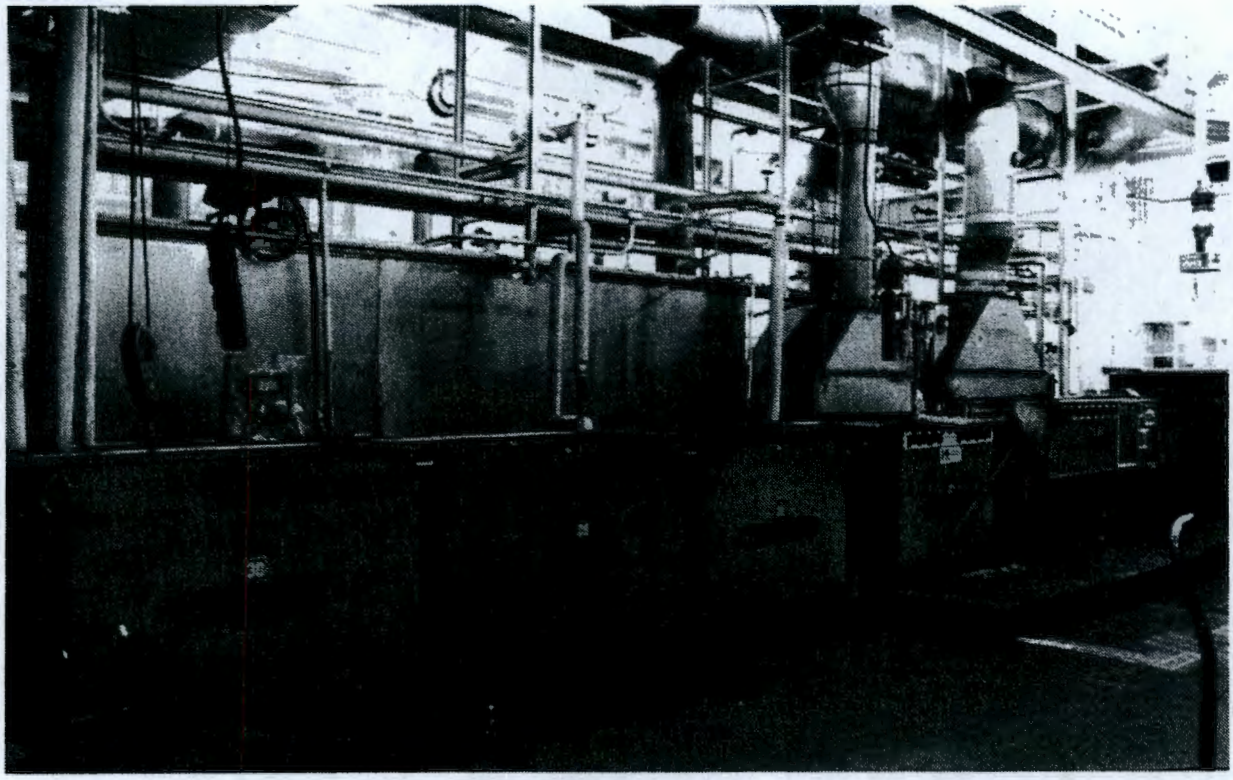


Figure 3-52. Three of the Uranium Billet Cleaning Tanks Located in the 333 Building: "Degreaser," "Nitric Acid," and "Tap Water Rinse."

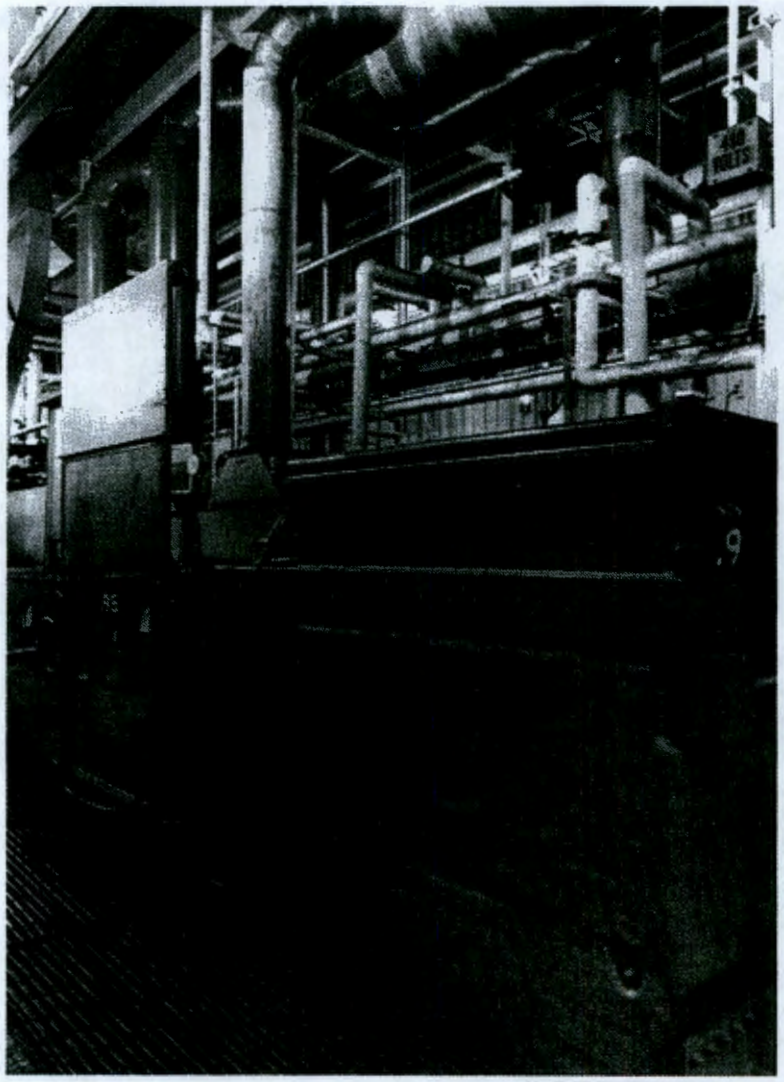


Figure 3-53. Two of the Pre-Braze Etch Tanks Located in the 333 Building: "D-I-W Rinse" and "Tap Water Rinse."

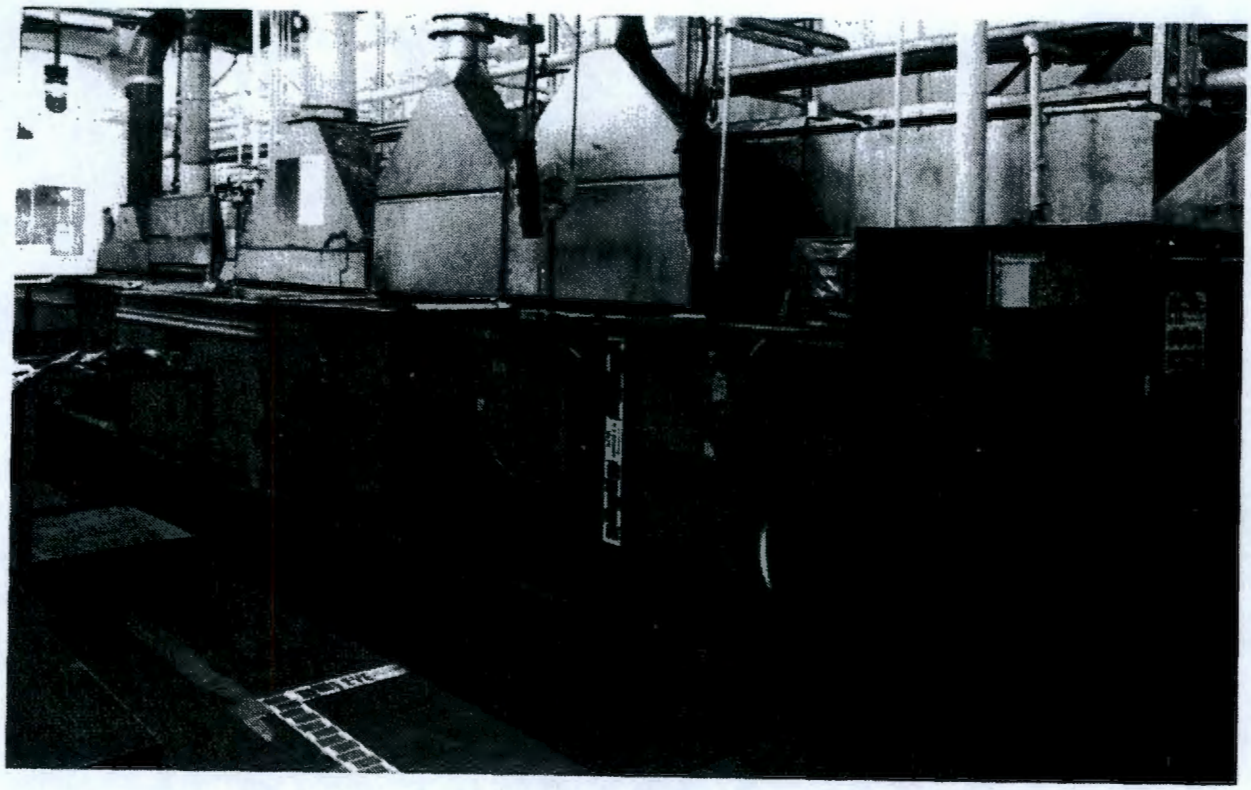


Figure 3-54. 1985 Photograph Showing Zircaloy-2 and Cu-Si Component Cleaning Tanks being Used in the 333 Building.

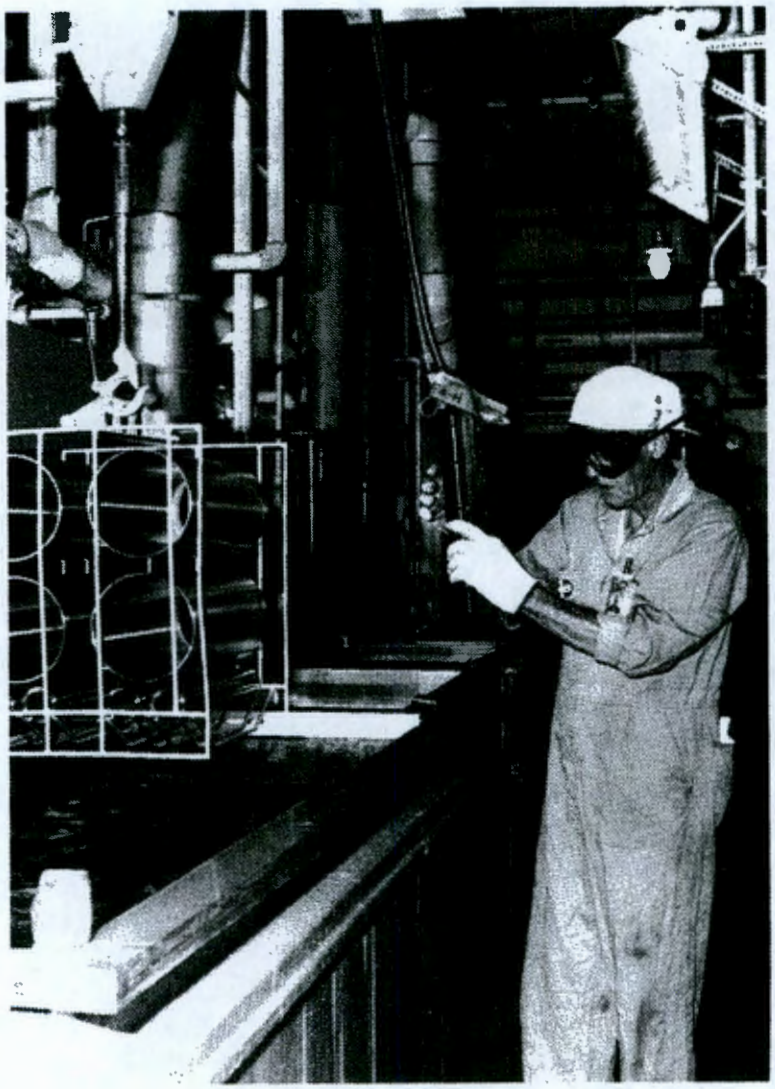
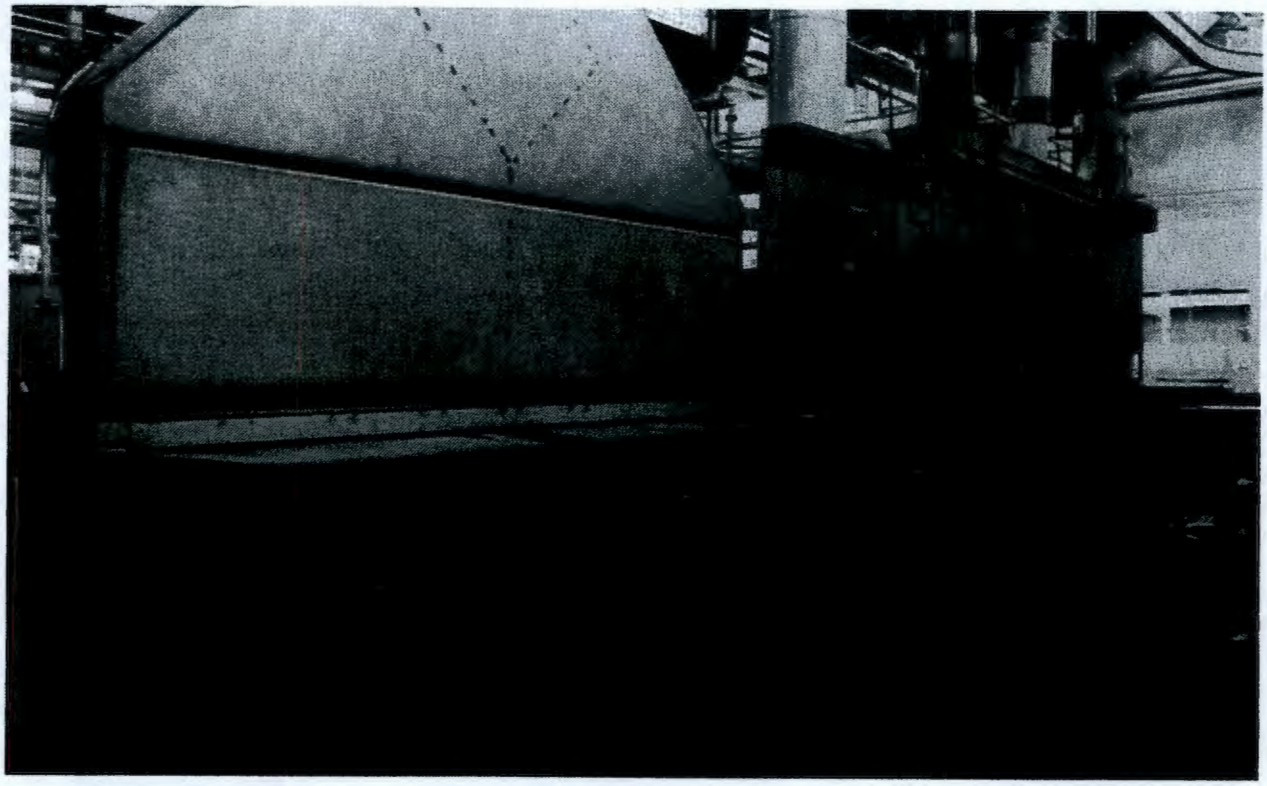


Figure 3-55. Copper Strip and Chemical Milling Tanks Located in the 333 Building: "Nitric Acid," "Static Water Rinse," "Nitric-Sulfuric Acid," and "Tap Water Rinse."



3.7.19 306E Fabrication and Testing Laboratory, 306W Metal Fabrication Development Building

Originally completed in 1956 and named the Fuel Element Pilot Plant, this facility was constructed to support the 313 Building operations. It was expanded in 1960 to contain the co-extrusion fabrication processes for N Reactor fuels fabrication. In 1972, the east half was designated as 306E, and that portion of the building became the Hanford Engineering Development Laboratory (HEDL) operated by Westinghouse Electric Corporation. That half was the newer portion of the building. The west portion of the building, which is older, was named 306W and was allocated to PNL (Gerber 1992).

"The original building encompassed a total area of approximately 40,000 ft^2. The building is two stories high, with no basement, and has a framework of bolted steel. The first floor consists of reinforced concrete, while the second floor is steel deck topped with concrete. This building is connected to the sanitary and process sewer" (Gerber 1992).

"Multiple leaks and fires occurred over the years in and around the 306 Building, in barrels and waste 'load luggers' containing uranium, thorium, heavy metals, and other fuel component scrap. These fires oxidized and volatilized uranium and other wastes: long-lived contamination, which can be recirculated today, settled in building sumps, crevices, and nearby soil" (Gerber 1992).

From 1956 to 1967, and once after 1967, a lime tank and valve pit just north of the east end of the 306 Building intercepted and neutralized nitric acid-bearing

chemical wastes before discharge to the process sewer. In 1976, this pit was inspected, along with the process waste sump, sewer manholes, and the inlet box to the process sewer leaching trenches, after several hundred gal of slightly enriched uranyl nitrate hexahydrate solution was spilled in the sump. The investigation found that much uranium and thorium contamination lies in and beneath the 306 Building floor, slab, pipe trenches, and sewer lines (Gerber 1992).

Another radiological safety survey in 1977 found significant accumulated uranium contamination in a tailings pile just west of the 306 Building, leaching into the 300 Area Process Trench.

In 1990, a PNL survey performed after a windstorm found hot particulates in the soil surrounding the 306-W Building (Gerber 1992).

Additionally, on March 22, 1993, radioactive contamination was found in the drain line in a sink in Room 117 in the 306W Building. An RPT discovered 10,000 dpm beta-gamma in the sink drain (Occurrence Report RL-PNL-PNLBOPER-1993-0010).

3.7.20 Burial Trench West of Process Trenches

Located north of the 300 Area and adjacent to the 316-5 Process Trenches is a rectangular area suspected to be an undocumented burial ground. Young and Fructer (1991) identify this ground in Plate 1 and Photograph A.37 (1987) of their report. Activity in this area can be seen in aerial photographs taken as early as 1951 (Young and Fruchter 1991, Photograph 90061562.2).

This site is currently posted as a surface contamination area. Based upon a surface radiation survey dated January 14, 1994 (Appendix A), the site is approximately 135 ft long and 45 ft wide.

3.7.21 DOE 351 Substation

The DOE 351 Substation, which has been designated an inactive, RCRA, hazardous and radioactive solid and liquid waste site, is located in the 300 Area of the Hanford Site. This facility was initially operated by the Bonneville Power Administration (BPA) from March 30, 1973, to February 11, 1991, when all BPA equipment was removed. The remaining equipment at the substation is currently being operated by RL (EPA 1992).

Mineral oil containing PCBs and solvents used during routine equipment maintenance were the only hazardous constituents used by BPA at this substation. While no spills were documented at this site by BPA, 19 soil samples were collected and analyzed for PCB content during a routine Toxic Substances Control Act (TSCA) inspection in 1987. PCB concentrations in the range of 1 to 3 mg/kg were detected in four of the samples (BPA 1989), suggesting that some spillage of PCB-contaminated oil may have occurred at the site. Additional sampling was conducted in 1989 when capacitors were being removed from the site; PCB concentrations in these samples were less than 2 mg/kg (EPA 1992).

During removal of BPA capacitors suspected to be leaking on October 18, 1990, radioactive yellow cake uranium was discovered clinging to below ground footings. Work was reportedly suspended until the area could be evaluated. Equipment removal was completed on February 11, 1991, with the exception of the uranium-contaminated

footings. According to Site personnel, the footings and contaminated soil were subsequently removed that same year under the full-time supervision of WHC Health Physics. Recent communication with WHC staff has confirmed that 1994 excavations by Power City electrical contractors unearthed no additional contamination in the substation.

Analysis of soil samples collected in October 1990 indicated that of 16 samples, 14 contained no PCBs, while one contained 2 ppm and another contained 62 ppm PCBs. The specific location of these samples was not identified, nor was there any indication that these samples were tested for radionuclides. This location was designated an Area of Concern in 1992 due to the discovery of the yellow cake uranium in 1990 (EPA 1992).

The reported presence of yellow cake uranium at this site and the elevated concentration of PCBs in a 1990 soil sample suggest that further investigation may be warranted.

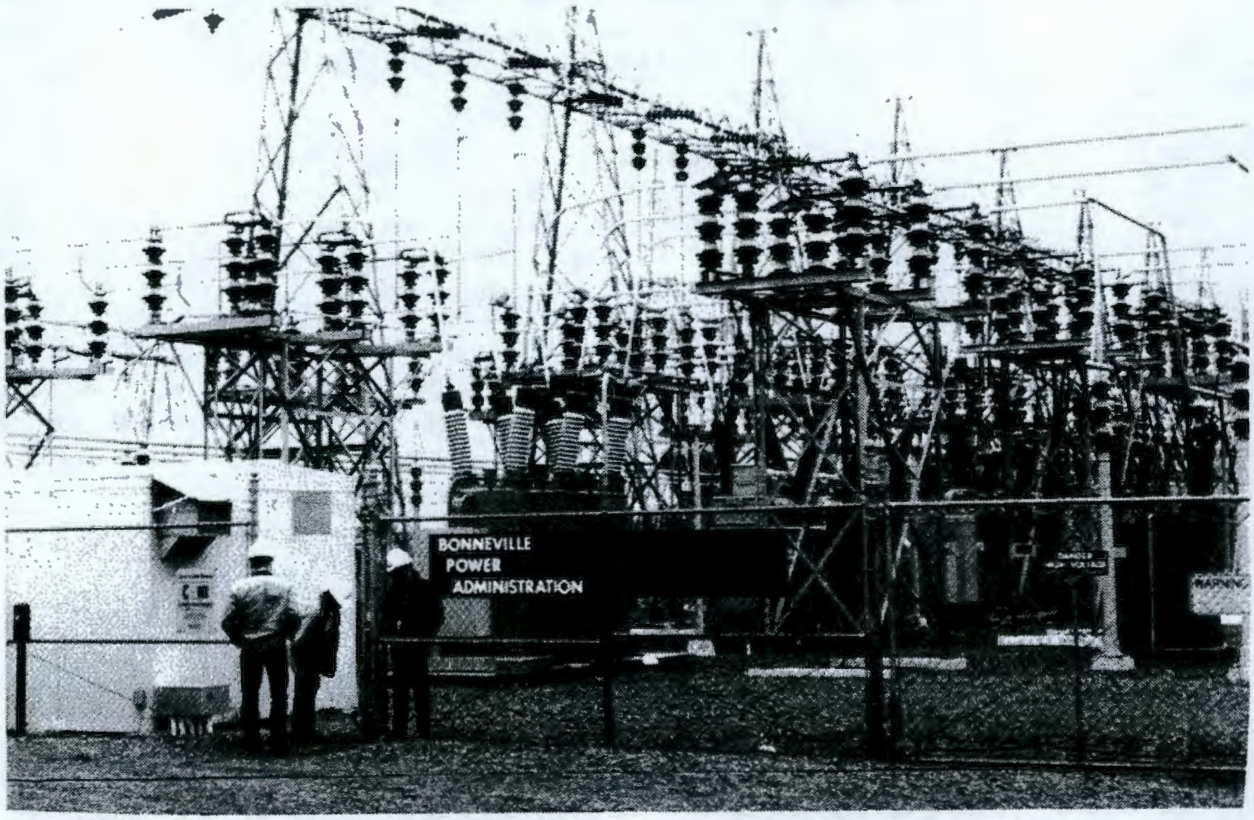
Figure 3-56 is a 1994 photograph of the substation.

Figure 3-56. DOE 351 Substation.

3.7.22 Benton Switch Substation

The Benton Switch Substation is an active RCRA hazardous waste site located southeast of the Washington Public Power Supply System (Supply System) facilities and approximately 2000 ft west of the Columbia River at the north end of a utility access road on the Hanford Site (Figure 3-57).

Figure 3-57. Benton Switch Substation.



The substation began operation on November 18, 1948, and contains various electrical equipment, circuit breakers, transformers, and support facilities (WIDS Information Acquisition Form 1993). Mineral oil containing PCBs and solvents used during routine equipment maintenance are the only potentially hazardous constituents at this location (EPA 1992).

Table 3-12 contains information about releases to the Benton Switch Substation switchyard that have been identified (EPA 1992).

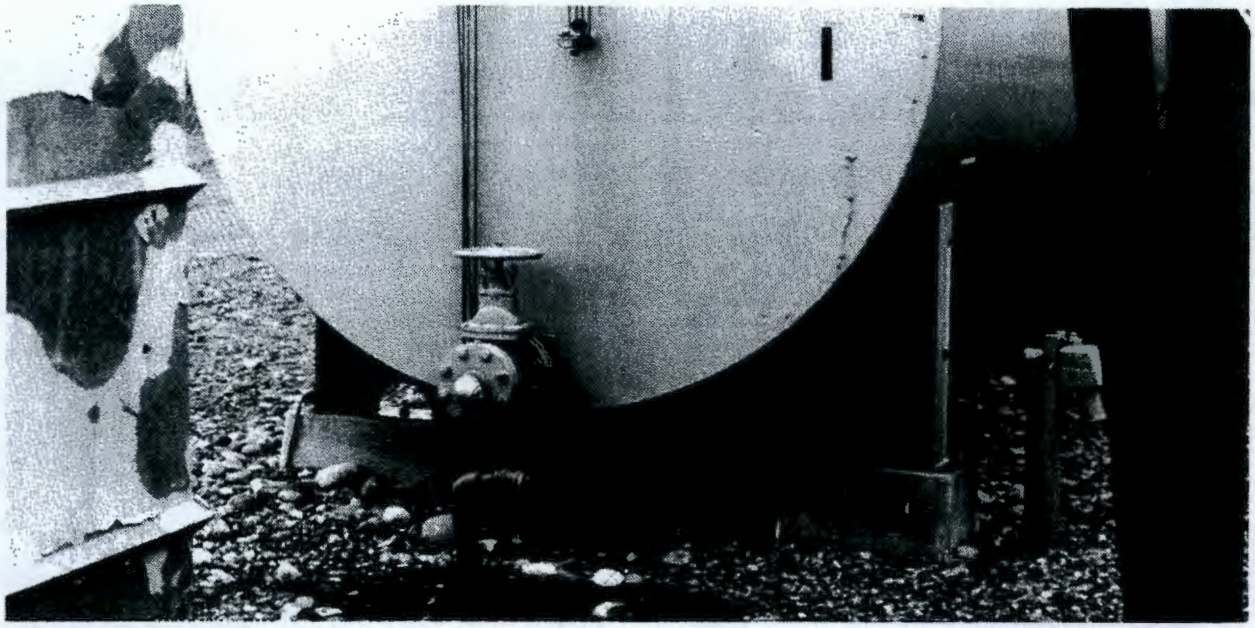
Table 3-12. Releases to the Benton Switch Substation.

Location	Date	Release
Power Circuit Breaker 0-514	11/13/90	Insulating Oil Leak
Transformer T-1587	11/13/90	Insulating Oil Leak
C-Phase Bushing Power Circuit Breaker B 0-587	2/20/91	Insulating Oil Leak
Power Circuit Breaker CB 0-1958	3/21/91	Insulating Oil Leak

No volume estimates were provided for these releases, although leaks of insulating oil are typically low-volume leaks identified by small stains on the ground, according to BPA personnel. Figures 3-58 and 3-59 are 1994 photographs of such leaks.

Figure 3-58. Insulating Oil Leakage Below Tank.

Figure 3-59. Insulating Oil Leakage Below Tank Valve.



Twelve soil samples were collected and analyzed for PCBs in March 1985. Eleven of the sample results showed no PCBs at or above the detection limit of 0.1 ppm, while one sample collected next to an oil leak showed 0.12 ppm of PCB (Arochlors 1254 and 1260). A transformer gauge was discovered to be leaking during the RCRA Visual Site Inspection conducted in November 1991; no volume estimates have been reported (EPA 1992). According to personnel accounts, BPA is currently conducting a regional program to convert all mineral oils used on their facilities to mineral oil of concentrations less than 3 ppm.

While no volumes were reported for the releases identified at this site, the PCB concentrations detected in the 12 samples were low.

3.7.23 H. J. Ashe Substation Switchyard

The H. J. Ashe Substation Switchyard is an active hazardous RCRA waste site located northwest and adjacent to the Supply System property, approximately 0.5 mi north of Nuclear Power Plant number 2, and 2.75 mi west of the Columbia River.

Figures 3-60 and 3-61 are 1994 photographs of the switchyard. The facility, which was energized on December 3, 1976, consists of two large structures--a control house and maintenance building--and yard areas with smaller buildings that are used for dry chemical storage.

Figure 3-60. H. J. Ashe Substation Switchyard.

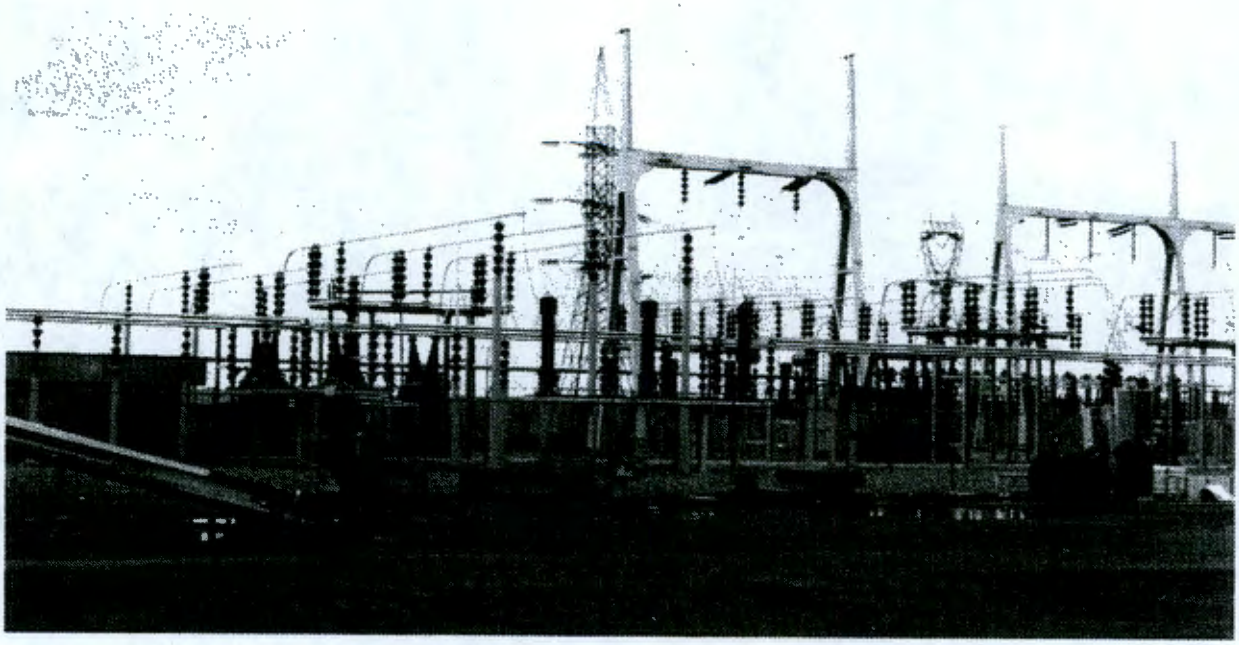
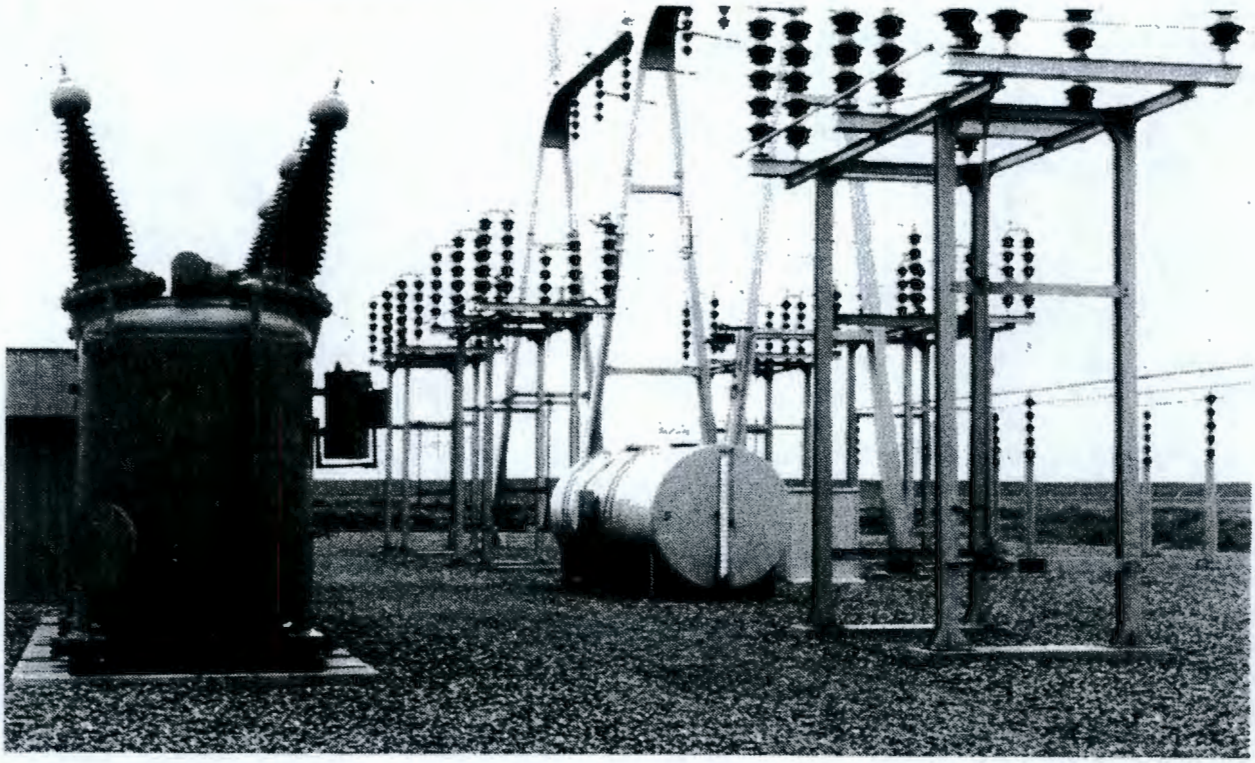


Figure 3-61. H. J. Ashe Substation Switchyard.



The substation and maintenance facilities comprise approximately 30 acres and contain the following structures and equipment (EPA 1992, BPA 1991):

- An oil-filled circuit breaker (7,600 gal)
- Two underground gasoline tanks (4,000 gal each)
- Ten mineral oil storage tanks (5,000 gal), four of which contained oil in 1991
- A storage building for hazardous waste, flammable materials, and herbicides (1,000 lb maximum)
- An oil and water separator connected to the gas pump island and garage drains.

In addition, the site also contains a number of drywells, septic drainfields, and two grounding wells. The precise number of drywells is not documented, but they are typically associated with blacktop areas in the switchyard. No spills have been documented as having reached these drywells, and it has been recommended that spill prevention be addressed in the Spill Prevention Control and Countermeasures (SPCC) Plan for these drywells. The septic drainfields are components of the septic systems in each building, and as with the drywells, there are no reported unplanned releases associated with these drainfields.

The two grounding wells have raised some concern in that they potentially penetrate the groundwater radionuclide plume that exists in this region. The two 360-ft grounding wells are backfilled with sand and are thus not sealed in accordance with Washington Department of Ecology well construction standards (BPA 1991). Though these regulations do not apply specifically to grounding wells, these wells might

provide a potential pathway for contaminant migration. However, no unplanned releases have been reported in proximity to these wells. It is possible that the sand backfill is less permeable than the glacial flood deposits that underlie the facility.

Of the structures identified above, the hazardous waste, flammable materials, and herbicide storage building (H. J. Ashe Substation Storage Area) and the oil and water separator (H. J. Ashe Substation Oil/ Water Separator and Dry Well) have been specifically identified as separate RCRA solid waste management units No. 12 and 13, respectively (EPA 1992). As such, these facilities are discussed separately (see Sections 3.7.24 and 3.7.25).

EPA states that the following wastes are generated at the H. J. Ashe Substation, as reported in annual hazardous waste reports (EPA 1992):

- 1,1,1-Trichloroethane mixture
- 1,1,1-Trichlorethane-contaminated soils
- Acetone waste mixture
- Spent photographic fluids, fixer, and developer
- Battery acid and fluid mixture
- Ferric chloride etching solution waste
- Methanol waste mixture (Karl Fisher reagent)
- Pentachlorophenol and sodium pentachlorophenol
- Solvent compound-thinner waste
- Toluene-isopropanol with potassium hydroxide (titrating solution).

The annual hazardous waste reports in which these wastes are reported were not specifically identified, nor is any information provided regarding the volumes and ultimate disposition of the wastes generated. However, Table 3-13 contains information about releases to the switchyard that were identified by BPA (EPA 1992).

Table 3-13. Releases to the Switchyard.

Location	Date	Release
Reactor #1, C-Phase	9/13/90	Insulating Oil Leak
CT4885, B-Phase	9/13/90	Insulating Oil Leak
Reactor #1, I-428	10/2/90	Insulating Oil Leak
PCB 0-1026	4/26/91	Insulating Oil Leak
Reactor #2, I429	11/20/90, and 2/20/91	Insulating Oil Leak

No information is provided as to the volume or ultimate disposition of these releases, though BPA personnel have indicated that spills of this nature are typically small and are signified by stained soil.

Two underground gasoline storage tanks were removed from the site on January 30, 1989. No leaks, hydrocarbon deposits, or odors were observed at the time of the tank excavation. These tanks were subsequently replaced in April 1989 with two new tanks (EPA 1992).

Fifteen soil samples were collected for PCB analyses in 1986 to support a construction project at the Ashe Substation. All samples were less than 0.05 ppm PCB except one sample, which was at 0.11 ppm (BPA 1991).

3.7.24 H. J. Ashe Substation Oil/Water Separator and Dry Well, BPA SWMU #13

The H. J. Ashe Substation Oil/Water Separator and Dry Well (BPA SWMU #13) is an active, RCRA, hazardous waste site located in the H. J. Ashe Substation, which is northwest of and adjacent to the Supply System property, approximately 0.5 mi north of Nuclear Power Plant #2, and approximately 2.75 mi west of the Columbia River. The Oil/Water Separator, which was installed in 1988 adjacent to the fuel island, is constructed of precast concrete and has a capacity of 120 gal. It is designed to remove oil, lubricants, and other petroleum products from incoming water, which originates from the eight floor drains in the maintenance headquarters building shop and equipment storage area to which it is connected. Drainage from the Oil/Water Separator, as well as runoff intercepted by two catch basins located south of the Maintenance Headquarters building, flows into the Dry Well, which is located approximately 250 ft south of the Maintenance Headquarters building (EPA 1992). The Dry Well also catches drainage from the blacktopped area between the Maintenance Headquarters building and the Flammable, Herbicide, and Toxic Waste Storage building (BPA, 1991).

The bottom of the Dry Well is approximately 15 ft below ground surface. The Oil/Water Separator, which is located upstream of the dry well, has not been cleaned out since its installation in 1988, which suggests that both oil phase and water-phase effluent may have reached the dry well at some time. However, no spills have been documented (EPA 1992). The Oil/Water Separator and Dry Well have been designated as SWMU #13.

The bottom of the Dry Well may require further investigation due to the potential for past discharges from the Oil/Water Separator.

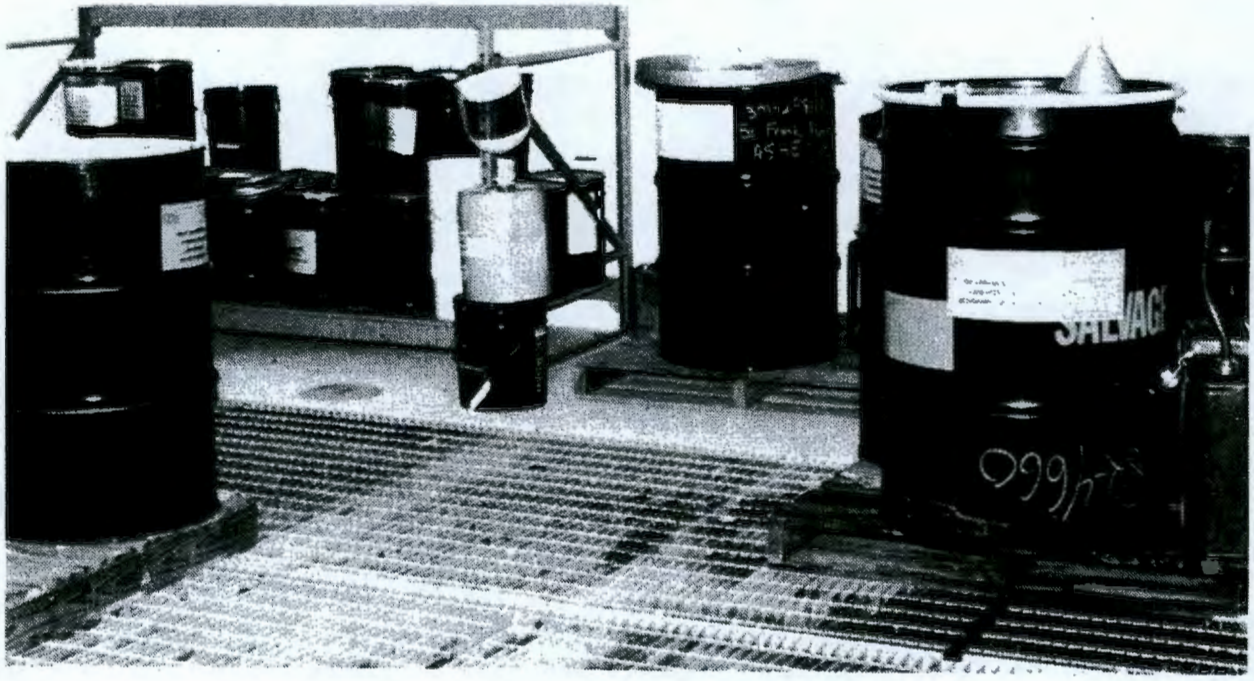
3.7.25 H. J. Ashe Substation Storage Area, BPA SWMU #12

The H. J. Ashe Substation Storage Area, also known as the Generator Storage Area, is an active, RCRA, hazardous waste site located inside the Hazardous Waste, Flammable Materials, and Herbicide Storage building in the H. J. Ashe Substation Switchyard. Figure 3-62 is a 1994 photograph of the substation storage building. The H. J. Ashe Substation Switchyard is located northwest and adjacent to Supply System property, approximately 0.5 mi north of Nuclear Power Plant Number 2, and 2.75 mi west of the Columbia River. The 20- by 15-ft Generator Storage Area contains a sump to catch any spills or other releases. This sump is at the low end of a graded portion of the building floor and has no outlet (EPA 1992). Figure 3-63 is a 1994 photograph of the sump.

The Generator Storage Area was found to be clean and well maintained during a visual site inspection conducted for the BPA in November of 1991. No evidence of a release to the environment of hazardous waste or hazardous constituents was found at that time, nor are any releases reported for this site. WIDS (WHC 1991) notes that 55-gal drums of waste are stored over the sump (see Figure 3-63), but does not provide information as to the nature of this waste. This site has been designated as BPA Solid Waste Management Unit #12 (EPA 1992).

Figure 3-62. H. J. Ashe Substation Storage Area Building.

Figure 3-63. H. J. Ashe Substation Storage Area, Sump Under Grated Floor.



Due to the lack of evidence or records of any releases at this site, as well as the lack of an outlet from the sump, it is unlikely that this site will require further action.

3.7.26 Cutup Oil Dump

The cutup oil dump is an inactive, nonhazardous and nonradioactive solid waste site located along the west bank of the Columbia River, just north of river mile 348, at Washington State plane coordinates E594523 N121375. The duration of the dump site's operation is unknown.

The site consists of approximately 1 yd^2 of oil-stained sand. Used diesel oil filters are scattered around the stained soil. An empty 55-gal drum is located at the bottom of the riverbank, approximately 20 yd north of the stained soil. An empty can of starting fluid was found at the bottom of the bank, below the stained soil. Miscellaneous pieces of wood are also scattered around the area.

3.7.27 Aluminum Recycle Staging Area

The Aluminum Recycle Staging Area is an inactive solid waste site that has been designated as a surface contamination area. It is located on the south end of the Early Burial Ground, described in Section 3.7.6, adjacent to the 300 Area north rail spur (Young and Fruchter 1991).

Prior to its use as a staging area for scrap materials, the site was used as a rail loading area (Young and Fruchter 1991). When recycling of aluminum scrap began in 1962, the area was used to stage aluminum, aluminum/silicon alloy, and beryllium-contaminated aluminum scrap for recycling. Scrap materials were piled near the rail spur until a large enough quantity could be collected to receive bids for the material from offsite vendors. Once sold, the material was loaded into open-topped rail cars with a clam shell bucket.

The scrap was collected from all sources and mixed in the piles. Lathe chips from the fuels processing operations, which had slight uranium contamination, were included in the scrap. At the time of this operation, uranium was not thought of as being a hazardous material. There is a large area covered by these uranium-contaminated aluminum fines due to the recycling activities and a lack of material control.

Site employees report that the only restriction placed on the vendors who purchased the scrap materials was that "they [the scrap materials] could not be used to fabricate cooking utensils or pots and pans."

Figure 3-64 is an aerial photograph showing the Aluminum Recycle Staging Area in the 300 Area.

Today, the entire affected area is bound by a light-duty post-and-chain barricade and is posted as a radiological "Surface Contamination Area." The 340 Complex rail spur that runs through the center of the area has been cleaned up to allow unimpeded access to the 300 Area by rail crews.

Figure 3-64. Aerial Photograph of the 300 Area Showing the Aluminum Recycle Staging Area.

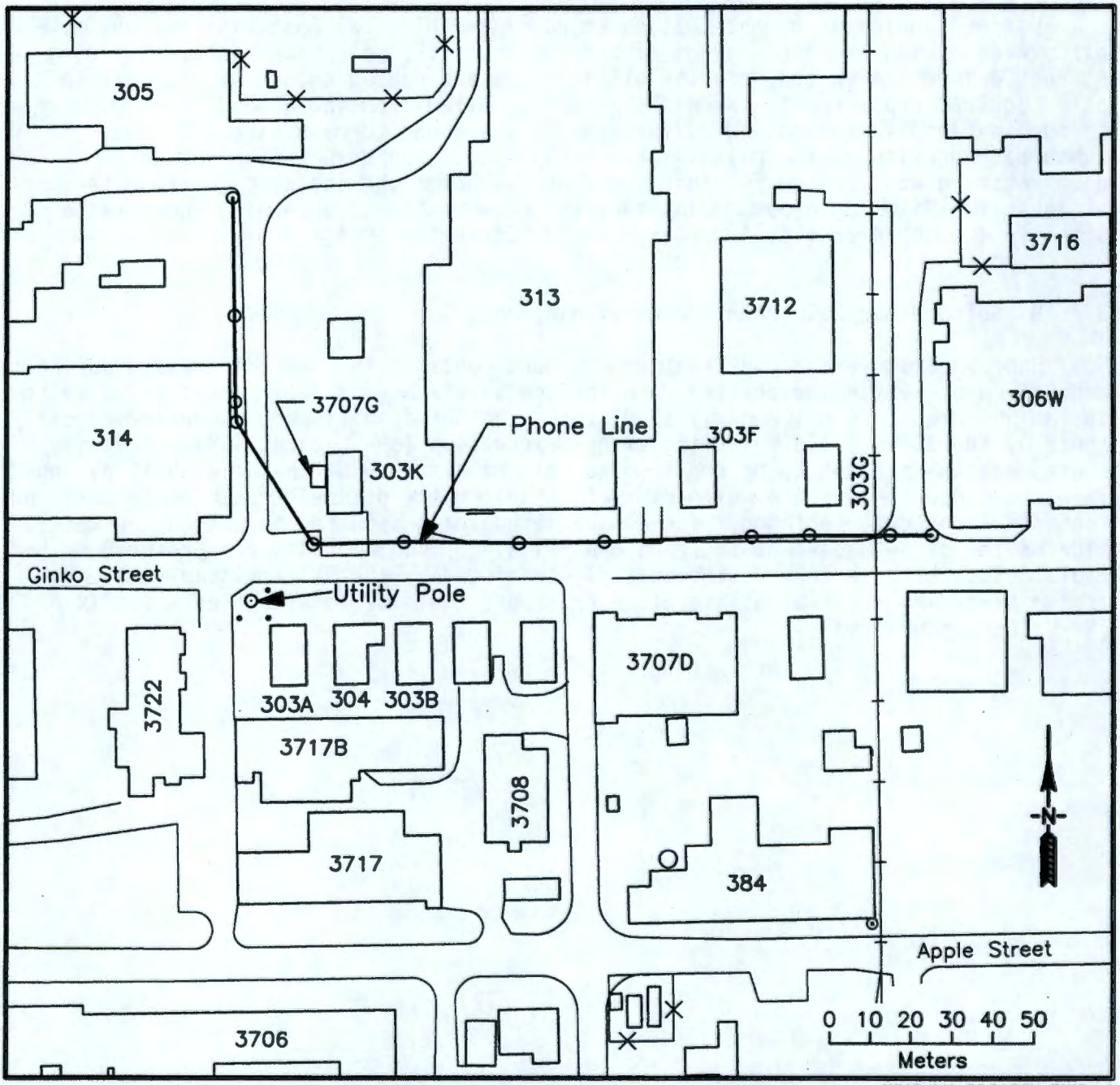
3.7.28 Solid Waste Site Near 314 Building

Hanford employees report that underground radiological contamination was discovered during the replacement of a damaged utility pole near the 314 Building. A truck driver had backed into the utility pole and caused enough damage that the pole required replacement. When the pole was pulled from the ground, "yellow cake" (a combination of uranium and sulfuric acid) was found to be attached to the subsurface portion of the pole (Figure 3-65). It is unknown whether or not documentation was created for this incident, although the incident was reported by at least two Site employees during separate conversations concerning known waste sites in the 300 Area (see Appendix A [R. W. Carpenter 1994]).

3.7.29 Solid Waste Site Near 303-G Building

Hanford employees report that underground contamination was discovered during excavation activities associated with the installation of a fiber optic phone system in the 300 Area during the early 1990's. Contaminated soils were encountered just south of the 303-G Building during trench excavation (see Figure 3-65). The contamination appeared to be confined to the soils just beneath the asphalt paving. It was decided to "punch a hole" every 50 ft along the planned trench route until no contamination could be found. The contaminated soils appeared to end on the west side of the street adjacent to the 306-W Building. Contaminants are presumed to be radiological because they were reportedly confirmed by the HPT assigned to the job at the time. No confirming literature or report could be located (See Appendix A [R. W. Carpenter 1994]).

Figure 3-65. Underground Radioactive Contamination Along Ginko.



WHC:JJA:300AREA:RWC-1

4.0 400 AREA FACILITIES AND WASTE SITES IN OPERABLE UNIT 300-FF-2

4.1 400 AREA HISTORY AND BACKGROUND

The 400 Area is located in the southeast part of the Hanford Site, approximately 8.2 km from the Columbia River and 6.2 km from the nearest Site boundary. It covers approximately 135 acres of land. Hanford Site Drawing H-6-951 shows the location of the 400 Area relative to other areas at the Hanford Site.

This area contains several major buildings and structures, including the Fast Flux Test Facility (FFTF) reactor and its support facilities. Waste sites related to reactor operations are also located in the area.

Figure 4-1 is a drawing that shows the original locations of many buildings and structures in the 400 Area. Figure 4-2 provides a more recent drawing of the buildings, facilities, and structures that remain in the 400 Area. And Figure 4-3 provides an aerial photograph of the 400 Area that was taken in the early 1990's.

4.2 FAST FLUX TEST FACILITY DESCRIPTION AND HISTORY

FFTF is a 400-MW-thermal, sodium-cooled, low-pressure, high-temperature reactor that is currently being managed by WHC for the DOE. Nickels (1991) writes that FFTF consists of "a complex of buildings and equipment arranged around a reactor containment building. This arrangement includes the reactor itself, as well as equipment and structures for heat removal, containment, core component handling and examination, instrumentation and control, and for supplying utilities and other essential services." The FFTF Reactor Containment Building, which is centered at Hanford coordinates S1300 W7619.16 (Hanford Site Drawing H-4-14647), houses the reactor and its immediate support systems.

FFTF was designed and constructed for the irradiation testing of fuels, core components, and target assemblies for liquid metal fast breeder reactors. Dahl (1991) states that the reactor provided "extensive capability for in-core irradiation testing, including eight core positions that may be used with independent instrumentation for the test specimens. Four of these positions may be used for independently cooled test loops." Reactor activities were later expanded to include long-term testing and evaluation of reactor components and systems, fusion power materials testing, passive safety testing, the production of medical isotopes, space power system research, and many other domestic and international research programs (DOE 1992, Swaim et al. 1991a, WHC 1992). Producing electricity was never part of FFTF's mission (Nickels 1991).

Refer to Pitner and Baker (1992) for information about the reactor's metal fuel test program and Bauer et al. (1989) for information about fusion materials experiments. Information about FFTF's accomplishments and capabilities may be found in Swaim (1991), along with information about international tests that were performed at FFTF.

The construction of FFTF began in 1970 and was completed in 1978. The reactor reached initial criticality in February 1980 and began operating at full power in December of that year. Swaim et al. (1991a) states that "after an extensive acceptance test program, which included verification of natural circulation for decay heat removal, the plant began routine cycle operation in April 1982." Figure 4-4 is a historical photograph of FFTF and associated structures under construction. Figure 4-5 provides a 1994 photograph of FFTF.

The reactor operated in full-power cycles that were greater than 100 days in duration. Between those cycles, it would be shut down several weeks at a time for refueling. The Combined Exhaust System was operated on a continuous basis during both full-power cycles and refueling (Nickels 1991).

For brief summary descriptions of the various systems at FFTF, including the Cell Atmosphere Processing System (CAPS) and the Radioactive Argon Processing System (RAPS), refer to the *Fast Flux Test Facility Shutdown Program Plan*, WHC-SD-FF-SSP-004 (WHC 1994).

Although the reactor was designed for a full-power rating of 400 MW thermal, the full-power rating was later lowered to 291 MW thermal to limit temperatures in experimental fuel assemblies that were part of the Core Demonstration Experiment. In November 1991, FFTF was operating at the lower full-power limit of 291 MW thermal. Returning to the design full-power rating of 400 MW thermal remained an option, however (Dahl 1991).

Missions proposed for FFTF have included the production of medically useful isotopes, conversion of radioactive waste to less hazardous materials, nuclear weapons neutralization, materials testing for fusion and space reactors, and the generation of electricity (Nickels 1991). However, none of these missions have been adopted for the reactor.

After an evaluation of several potential long-term missions for FFTF, DOE Headquarters (HQ) concluded that justification to continue operating the reactor does not exist. Consequently, on April 1, 1992, RL directed WHC to place FFTF in standby status pending an investigation into potential missions. The plant achieved a steady-state "hot" standby condition in December 1992. Sodium coolant flow was maintained at 400° F in the primary and secondary heat transport systems (WHC 1994).

After exploring potential missions for FFTF, the Secretary of Energy announced in January 1993 that none were feasible and that a five-year process would be begun to place the reactor into "cold" standby. An independent review team later recommended that the reactor be placed into a radiologically and industrially safe shutdown condition rather than standby, and DOE-HQ adopted this recommendation (WHC 1994).

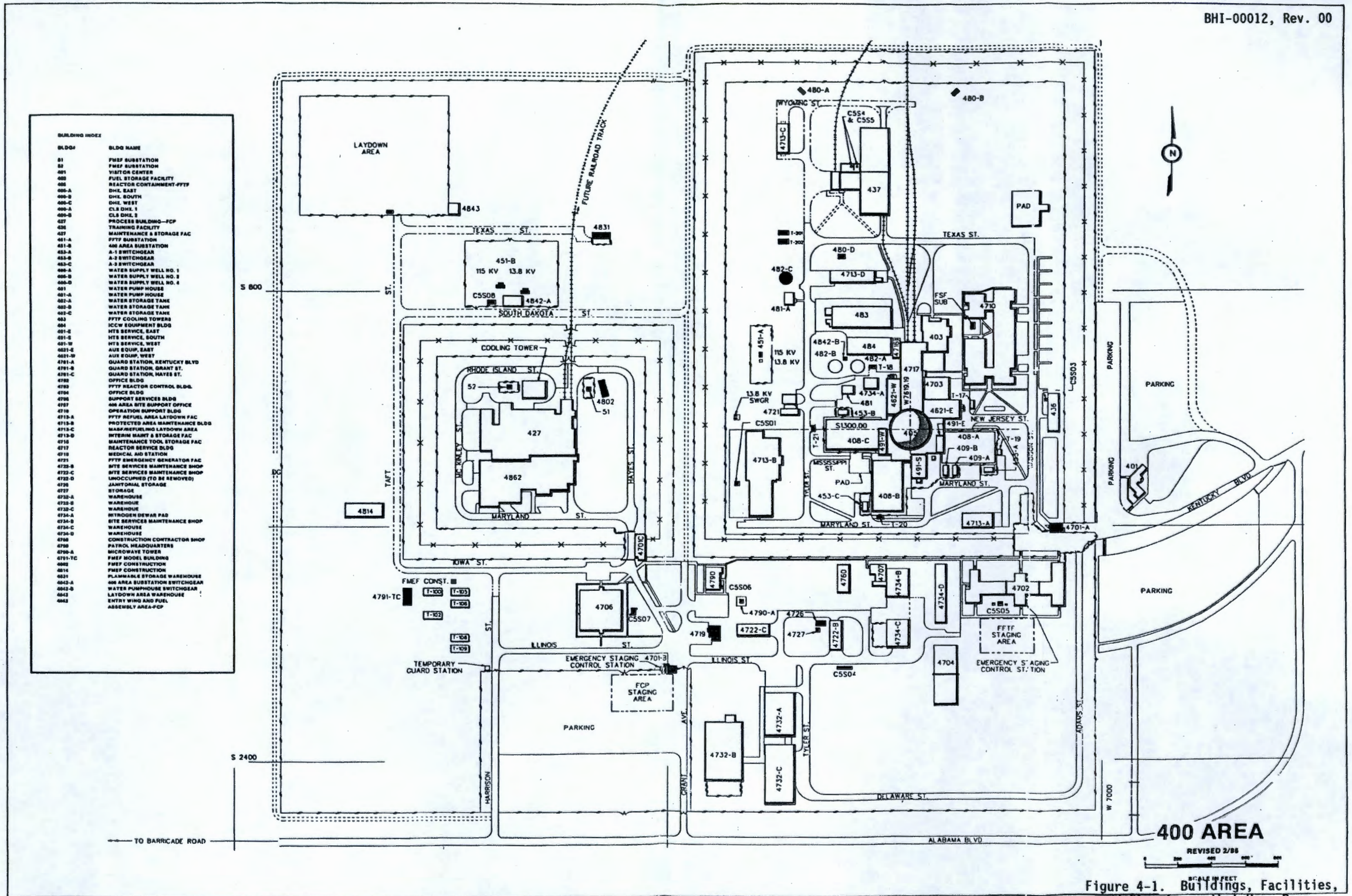
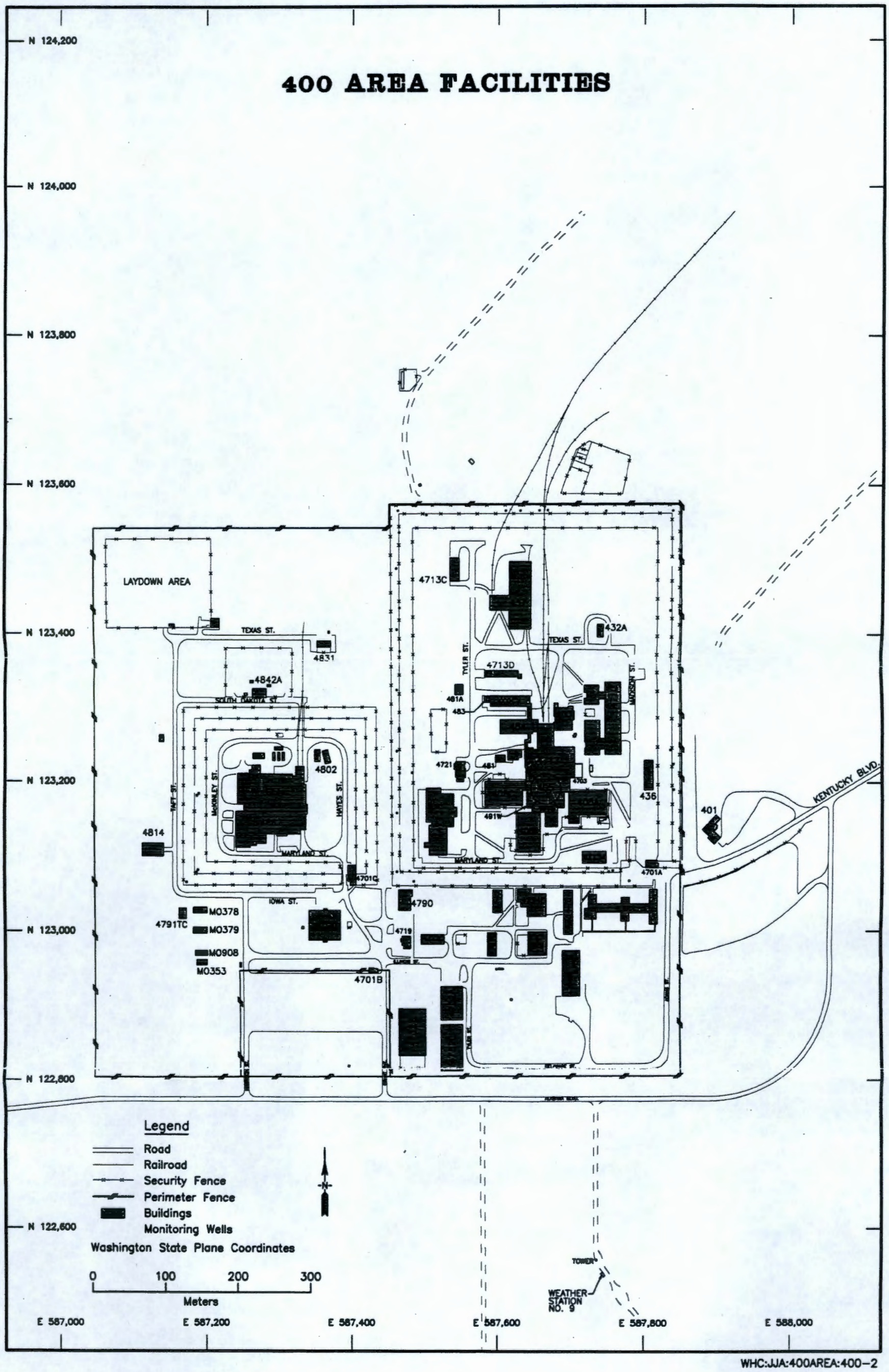


Figure 4-1. Buildings, Facilities, and Structures that Have Been Located in the 400 Area. 4-3/4



WHC:JJA:400AREA:400-2

Figure 4-2. Buildings, Facilities, and Structures Located in the 400 Area.

Figure 4-3. Aerial Photograph of the 400 Area.

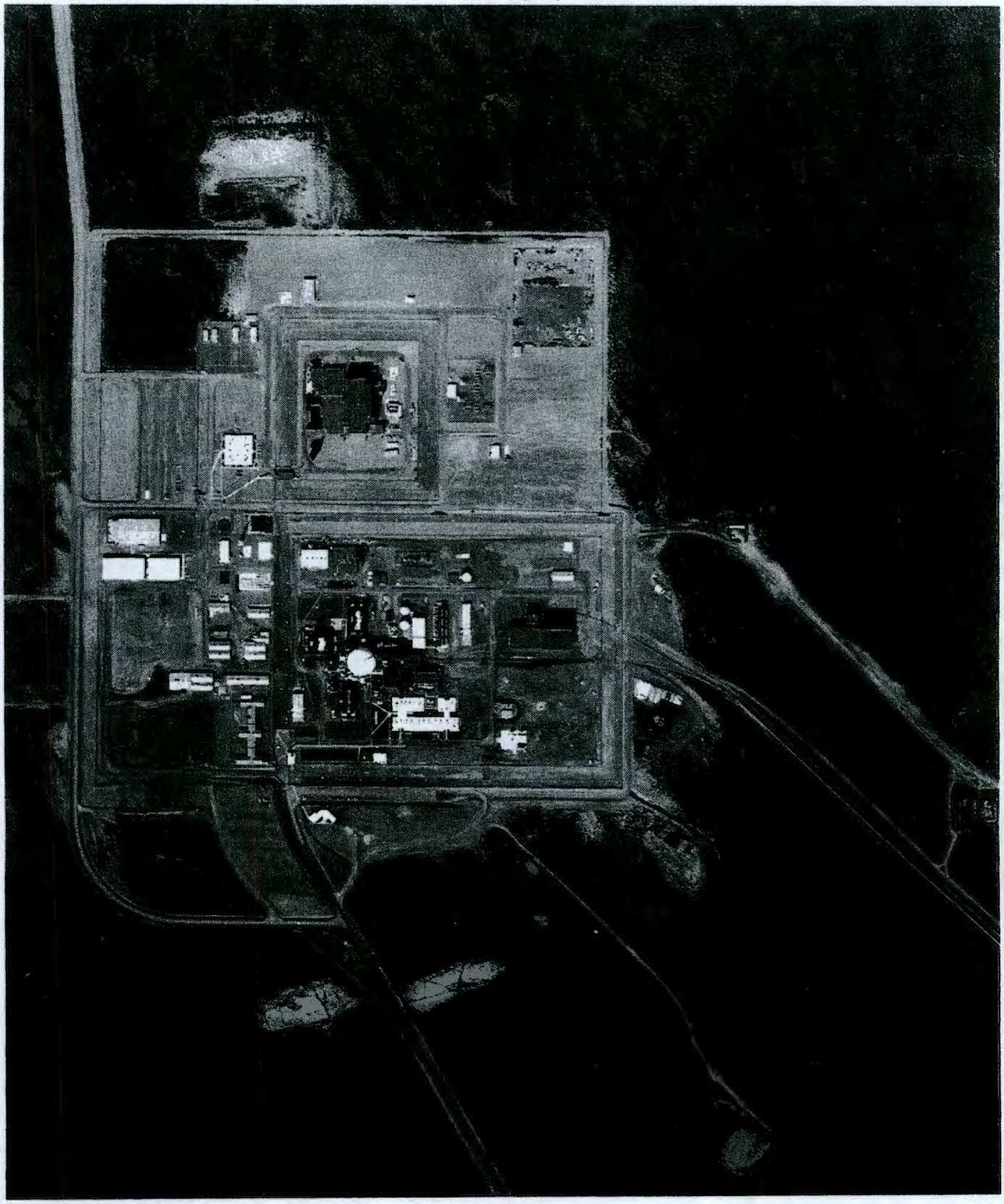


Figure 4-4. Historical Photograph of the Fast Flux Test Facility Under Construction.

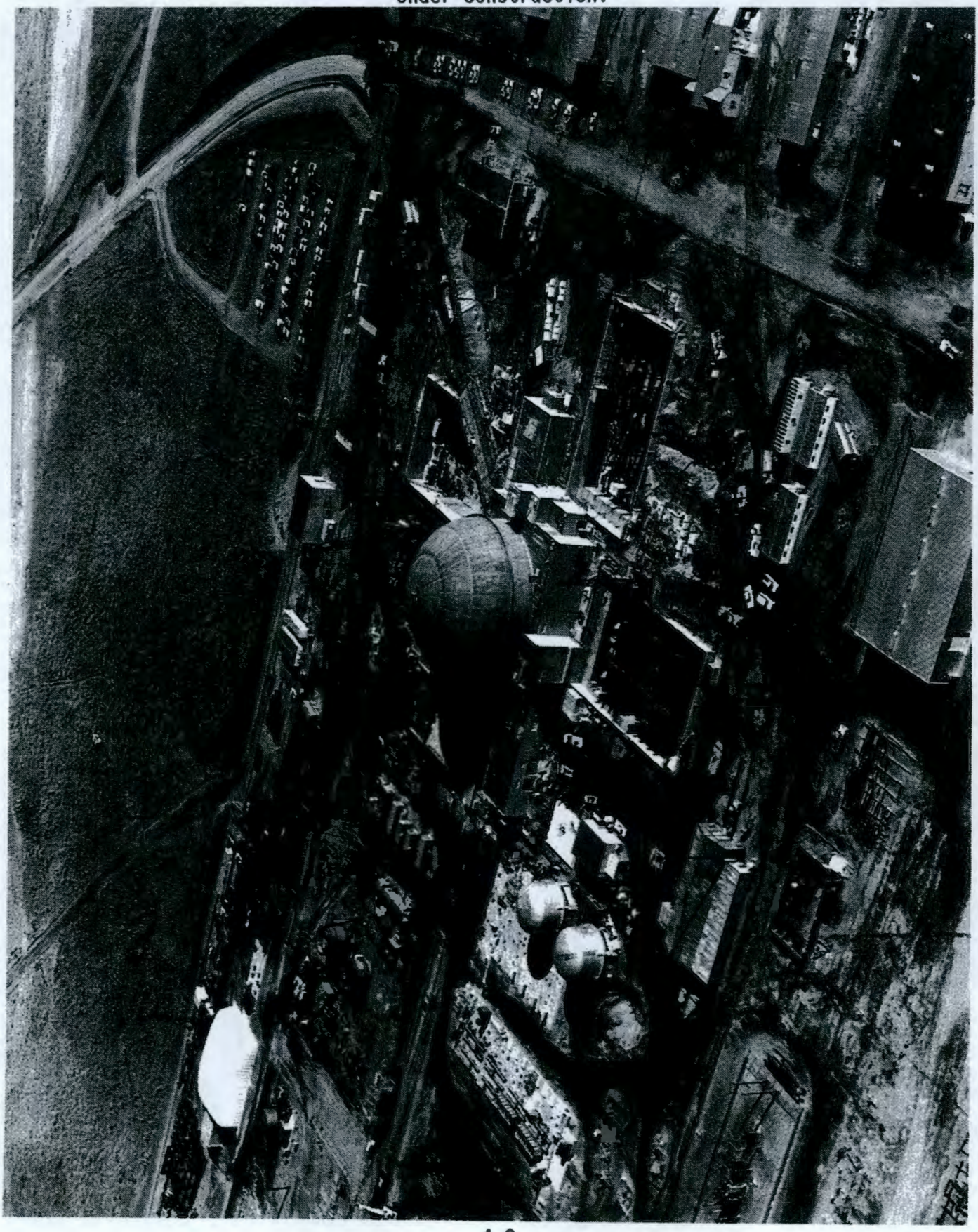


Figure 4-5. Photograph of the Fast Flux Test Facility, 1994.

Transitioning FFTF into a shutdown state requires the following deactivation activities: reactor defueling, dispositioning of unirradiated or "green" fuel, dispositioning special fuel, washing and dry-cask storage of irradiated fuel, draining sodium systems and disposing of sodium residuals, shutting down auxiliary systems, and converting bulk sodium to a form suitable for disposition (WHC 1994).

WHC (1994) states, "Most of the existing plant surveillance and maintenance activities will continue as needed to maintain the FFTF in a safe condition and conform with the requirements that support environmental, worker health and safety, and DOE Order compliance. These plant activities will eventually be phased out as they are no longer required to support the Shutdown Project." After the deactivation activities have been completed, and a final shutdown state has been achieved, FFTF will be unoccupied and locked. A minimal amount of lighting, fire protection equipment, and ventilation will be maintained to support periodic surveillance (WHC 1994).

On April 20, 1994, the removal of fuel assemblies was begun as part of the shutdown activities. Refer to WHC (1994) for more information about planned shutdown activities for FFTF.

Table 4-1 provides a synoptic chronology of significant reactor activities and events.

Table 4-1. Synoptic Chronology of Fast Flux Test Facility Activities.

Year	Event
1965	The conceptual design development for FFTF was authorized.
1967	Hanford was picked as the location for FFTF.
1970	Groundbreaking.
1978	Construction of FFTF was completed, and the cooling system was filled with sodium.
1979	The Nuclear Regulatory Commission and ACRS licensing process was completed, and fuel loading began.
1980	FFTF achieved initial criticality in February, and full power was demonstrated later in the year.
1981	Natural circulation tests were completed.
1982	Operation at full power started.
1983	FFTF received an Outstanding Engineering Achievement Award.
1986	FFTF received an American Nuclear Society Award for Meritorious Performance in Reactor Operations.
1987	An operational efficiency factor of 100 percent was reached.
1988	FFTF operated 126 consecutive days at full power, and had a capacity factor of 78 percent.
1990	Fusion MOTA irradiation was begun.
1991	A long-term lead fuel assembly reached 228,000 MWd/MTM.
1992	On April 1, 1992, RL directed Westinghouse Hanford Company to place FFTF in standby status pending an investigation into potential missions. By December, the plant reached steady-state "hot" standby status.
1993	After exploring potential missions for FFTF, the Secretary of Energy announced in January that none were feasible and that a five-year process would be begun to place the reactor in "cold" standby. An independent review team later recommended that the reactor be placed into shutdown condition rather than standby, and DOE-HQ adopted this recommendation.
1994	On March 15, 1994, WHC submitted the Fast Flux Test Facility Shutdown Program Plan to RL. Reactor defueling began on April 20, 1994.

(Swaim et al. 1991b, WHC 1994)

4.2.1 Reactor Configuration

The FFTF reactor is located in a shielded cell that is filled with nitrogen gas. Dahl (1991) states that the reactor consists of the following components:

- Reactor vessel
- Reactor guard vessel
- Reactor head
- Reactor core
- Above-core, in-vessel components
- Ex-vessel neutron flux monitoring and surveillance equipment.

For more detailed information about these reactor components, including a drawing of the reactor assembly, refer to Dahl (1991).

4.2.2 Reactor Fuel Pins and Assemblies

FFTF reactor fuel is sealed in long, thin, stainless steel tubes that are known as fuel pins. Two hundred and seventeen of these pins are then assembled within a hexagonal duct that has a 6-in. diameter, and handling hardware is welded onto each end of the duct. This comprises a fuel assembly, which is then ready for insertion into the FFTF reactor core (DOE 1992).

The loading of fuel assemblies into FFTF is a complex procedure requiring several steps. Unirradiated fuel assemblies, also known as green fuel, are received at the Reactor Containment Building in a shipping container. A crane is used to move the assemblies from their shipping containers to the Core Component Conditioning Station, where "each assembly is inerted and preheated before entry into a sodium system." The bottom-loading transfer cask then interfaces with the conditioning station, "grapples the fuel assembly, and raises it into a heated and argon-inerted cask." It transports the assembly to the interim decay storage (IDS) vessel and inserts it into a sodium-filled core component pot (CCP) within the vessel basket.

Swaim et al. (1991a) states that a closed-loop ex-vessel machine then "interfaces with the IDS vessel, lifts the CCP that contains the new assembly, moves to the reactor vessel, and lowers the CCP into a transfer position within the vessel. The in-vessel handling machine . . . removes the new assembly from the CCP and inserts it into a preselected core position."

Irradiated fuel is removed from the reactor core by the in-vessel handling machine and "inserted into a storage location within the reactor vessel, where it can be radiologically cooled for at least one reactor operating cycle." After at least one cycle has passed, the closed-loop ex-vessel machine is again used to move the spent-fuel assembly in a core component pot to the IDS vessel. After a year, the decay heat has decreased enough that the fuel assembly may be moved to a storage facility outside of the Reactor Containment Building (Swaim et al. 1991a).

The interim examination and maintenance (IEM) cell is a vertical hot cell that is located within the Reactor Containment Building. Recently irradiated core components were examined in this cell within 50 days of removal from the reactor core. The primary activities conducted in this cell were duct measurement, remote core component disassembly, and fuel pin weighing. The cell was also used for processing long test assemblies; removing sodium from fuel assemblies, refueling equipment, and plant hardware; experiment reconstitution; and miscellaneous remote maintenance tasks (Swaim et al. 1991a). A forced-gas cooling system at all stations within the cell allowed experimental fuel pins to be examined or shipped within weeks of reactor shutdown. Because the IEM cell is remotely maintainable, no entry has been made into the cell since 1983 (Swaim et al. 1991b).

Four different enrichments were used in driver fuel for FFTF. These enrichments varied from 22 to 30% plutonium with an isotopic content of ^{240}Pu of approximately 12% in a mixture of plutonium and uranium. Uranium ranged from natural to depleted (Bennett et al. 1991). Additionally, experiments were performed at FFTF to test different types of reactor fuel. Bennett et al. (1991) provides more information about the types and configurations of

reactor fuels used at FFTF, and Pitner and Baker (1992) provides information about the metal fuel test program.

The Reactor Containment Building, the Reactor Service Building, and the Fuel Storage Facility in the FFTF complex "contain the fuel handling systems and components to receive, condition, store, and transfer reactor core components." Additionally, the Fuels and Materials Examination Facility--which houses the Fuel Assembly Area--was used for the processing and storage of special nuclear material produced during FFTF operations (DOE-RL 1993a).

4.2.3 Fuel Pin Breaches

During the first 10 years of reactor operation, in which nearly 50,000 pins were irradiated, a total of 12 fuel pin breaches occurred at FFTF. Eleven of those fuel pin breaches took place during 150 tests of experimental fuel assemblies (Bennett et al. 1991, Swaim et al. 1991a).

FFTF has a failed-fuel detection system that "provides rapid and reliable identification of any fuel pin failures" during operation (Swaim et al. 1991a). A cover gas gamma ray spectrometer is used to detect fuel pin cladding breaches. The krypton and xenon isotopic ratios in the cover gas are then measured and compared with the gas tag ratio that has been loaded into each fuel pin (Bennett et al. 1991).

The detection system once made an incorrect identification of a fuel cladding failure that had been detected. The incorrect identification occurred because no burnup adjustments had been made to the gas tag ratios. Modifications were made to routinely correct for gas tag burnup, and the system was then able to correctly identify the assembly with the cladding failure (Bennett et al. 1991, Swaim et al. 1991a).

4.2.4 Molten Sodium Heat Transport System

Unlike the plutonium production reactors at the Hanford Site, FFTF discharges heat to the atmosphere through air, via a molten sodium coolant system, rather than water.

Swaim et al. (1991a) reports that 2,744 L of molten sodium is circulated through three identical main heat transport loops in the reactor core. Dahl (1991) states, "Dry argon cover gas is used to blanket the sodium in the reactor vessel and throughout the Heat Transport System to avoid contact between [the] sodium and air. The Heat Transport System has three 133-MW thermal stainless-steel sodium filled piping circuits. Each circuit consists of both a primary loop and a secondary loop with a heat exchanger between to isolate the radioactive primary loop sodium within the containment." Heat is then removed from the secondary sodium systems by twelve dump heat exchangers that transfer the reactor heat to the ambient air (Swaim et al. 1991a).

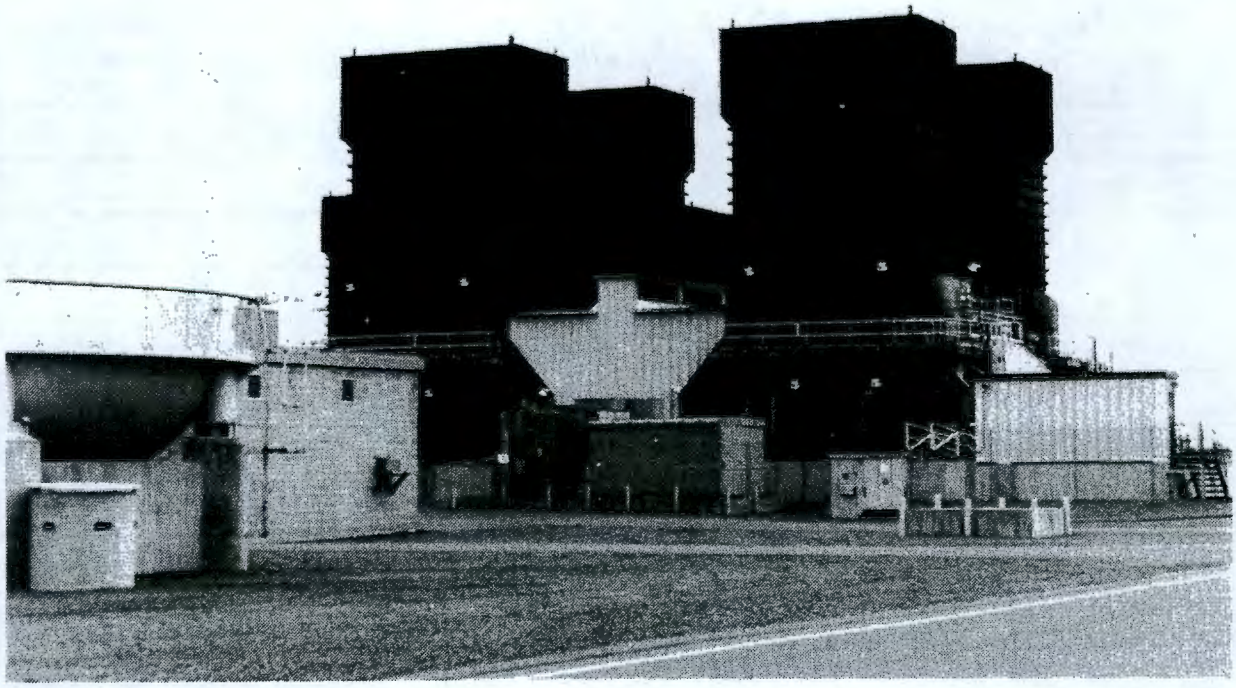
Dahl (1991) notes that "Nitrogen is used as the atmosphere for cells and pipeways that house piping and/or equipment containing primary-system sodium. Its purpose is to displace air and preclude a fire in the event of a primary-system sodium leak."

Molten sodium circulates through the operating reactor vessel at a nominal rate of 43,500 gal/min. The sodium enters the vessel at a nominal temperature of 680° F and leaves at a nominal temperature of 938° F. However, the exact inlet and outlet temperatures of the molten sodium depend upon the power generated by the reactor at any given time. The sodium flow rate is also varied. Because the reactor was operating at 291 MW thermal in November 1991, the outlet temperature was 875° F and the sodium passed through the reactor vessel at 38,400 gal/min (Dahl 1991). The coolant flow is by convection.

In the three primary sodium coolant loops, molten sodium enters the reactor vessel below the core bottom, flows up through the core and internal components of the reactor, and flows out "slightly above the midplane of the reactor vessel." Each of the three loops is entirely within the reactor containment (Dahl 1991).

The three secondary sodium coolant loops transport heat from an intermediate heat exchanger to an air-cooled dump heat exchanger. Each loop has an expansion tank "having a surge volume filled with argon gas at 90 lbf/in^2 . . . to accommodate sodium thermal expansion and to pressurize the system. Secondary-loop sodium pressure at the intermediate heat exchanger is always maintained above the primary-loop pressure so that if a leak occurs in the intermediate heat exchanger tubing, the leakage would be from the secondary loop into the primary loop" (Dahl 1991). The reactor has three sets of four dump heat exchangers: 408-A East DHX, 408-B South DHX, and 408-C West DHX. Refer to Figure 4-6 for a 1994 photograph of the 408-C West DHX structure.

Figure 4-6. 408-C West Dump Heat Exchangers, 1994.



Several Hanford Site drawings provide details about the layout and components of the heat transport system. Among these is Hanford Site Drawing H-4-11240, which provides a schematic of the main heat transport system that shows the reactor guard vessel, an intermediate heat exchanger, primary and secondary pumps, and lines associated with them. Additionally, Hanford Site Drawing H-4-11242 provides a schematic of the interim decay storage and primary sodium storage processing systems.

The purity levels for molten sodium in the reactor cooling system have been maintained and monitored by cold traps and plugging temperature indicators (Swaim et al. 1991a). Each of the primary and secondary sodium coolant loops has its own cold trap to remove impurities from the molten sodium (Dahl 1991). Tritium levels have been effectively controlled by the cold traps, and cesium levels have been drastically reduced since cesium trap operation began in 1987 (Brehm et al. 1991).

Grab samples of the sodium in the primary and secondary loops were taken monthly when the reactor was operating. The current frequency of sampling is unknown. Typically, these samples contained less than 3 ppm of oxygen, less than 10 ppm of nitrogen, less than 0.3 ppm of hydrogen, and less than 0.1 ppm of hydrocarbons. The primary loop typically contained 5×10^{-11} Ci/cc of tritium, and the secondary loop typically contained 1×10^{-11} Ci/cc. Metallic impurities were only found in trace quantities, and only low amounts of contamination were found. Uranium and plutonium were essentially absent from the sodium (Brehm et al. 1991).

Table 4-2 provides information from sodium coolant sampling performed from 1983 through 1991.

Table 4-2. Radiochemical Data from FFTF Sodium Coolant Sampling (Ci/g).

Species	Primary 4/5/83	Primary 5/28/87	Primary 3/5/90	Loop 3 Secondary 3/22/91
^{22}Na	1.7 E-07	5.8 E-07	6 E-07	--
^{86}Rb	5.2 E-08	4.6 E-08	3 E-08	--
^{131}I	<3.6 E-10	NR	NR	--
^{124}Su*	5.6 E-11	6.8 E-10	NR	--
^{134}Cs	NR	9.9 E-08	2 E-08	--
^{137}Cs	1.5 E-11	2.2 E-07	8 E-09	--
^{54}Mn	1.8 E-11	NR	2 E-09	--
^{58}Co	1.1 E-11	NR	NR	--
^{3}H	NR	1.9 E-07	1.9 E-07	3.3 E-08

* Site personnel report that the element "Su-124" does not exist. The table may have been referring to ^{124}Sb (Antimony-124). (Brehm et al. 1991)

Radionuclides deposited in primary coolant loop piping include ^{22}Na, ^{54}Mn, and ^{137}Cs. Radiation levels are 100 to 400 mR/hr from ^{22}Na, up to 400 mR/hr from ^{54}Mn, and up to 100 mR/hr from ^{137}Cs. Only trace amounts of ^{60}Co have been found to be deposited in the piping (Brehm et al. 1991).

Just one breach of the FFTF sodium coolant system piping occurred in the reactor's first 10 years of operation. The breach resulted from the failure of a small sodium pump. Approximately 600 lb of molten sodium were released to a lined, nitrogen-inerted cell. An investigation into the cause of the event was performed, and it was determined that the problem was unique to the pump involved (Nickels 1991, Dahl 1991).

Nickels (1991) states that, "due to the nature of the system design and operation, the release of sodium from the FFTF systems due to a breach in the pressure boundaries associated with normal operations is very unlikely." Additionally, all likely failure points have secondary containment through the use of guard vessels or cell containment systems (Nickels 1991).

An evaluation was performed, however, to determine the probability of sodium leaks at FFTF and the efficiency of leak detection systems. Refer to Saltos and Burke (1990) for more information about that evaluation.

The FFTF cooling towers, through which water circulates, do not dissipate reactor heat (WHC 1991). They are not part of the Heat Transport System, which involves only the molten sodium coolant circulating through the reactor vessel.

On April 1, 1992, RL directed WHC to place FFTF in standby status pending an investigation into potential missions. The plant achieved a steady-state "hot" standby condition in December 1992. Sodium coolant flow has been maintained at 400° F in the primary and secondary heat transport systems (WHC 1994).

After exploring potential missions for FFTF, the Secretary of Energy announced in January 1993 that none were feasible and that a five-year process would be begun to place the reactor into "cold" standby. An independent review team later recommended that the reactor be placed into a radiologically and industrially safe shutdown condition rather than standby, and DOE-HQ adopted this recommendation (WHC 1994).

Transitioning FFTF into a shutdown state will require the following deactivation activities: reactor defueling, dispositioning of unirradiated or "green" fuel, dispositioning special fuel, washing and dry cask storage of irradiated fuel, draining sodium systems and disposing of sodium residuals, shutting down auxiliary systems, and converting bulk sodium to a form suitable for disposition (WHC 1994).

Molten sodium will remain in the Heat Transport System until the fuel has been completely offloaded. Two new buildings, the Sodium Storage Facility and the Sodium Reaction Facility, will be designed and constructed to receive sodium from FFTF. Approximately 260,000 gal of sodium will be drained from the reactor and stored in four Clinch River Breeder Reactor vessels within the Sodium Storage Facility. Three of these vessels have individual capacities of 80,000 gal, and one has a capacity of 52,000 gal. The two facilities may also

receive approximately 44,000 gal of slightly radioactive Hallam sodium that is currently stored in five 16,000-gal tanks in the 200 Areas (WHC 1994).

Refer to WHC (1994) for more information about planned shutdown activities for FFTF, including the storage of sodium.

4.2.5 Cooling Towers

FFTF has eight cooling towers that are used to remove heat generated by the reactor building's auxiliary systems, including the heating, ventilating, and air conditioning (HVAC) system. The towers are mounted on a large concrete slab located northwest of the containment building.

The Fuels and Materials Examination Facility (FMEF) has three cooling towers that support its auxiliary systems.

According to Seamans (1994), "The cooling tower operations at FMEF and FFTF differ in demand, but the basic design of the towers and the chemicals used at both facilities are the same."

WHC (1992) states, "The cooling towers consist of closed-loop coils of galvanized steel pipe through which a 40% solution of ethylene glycol is circulated before returning to the auxiliary systems. Water is sprayed over the coils as fans blow air up the interior of the towers. The evaporation of the spray water cools the coils, which in turn cools the ethylene glycol solution. Each of the cooling towers has a sump capacity of approximately 7,520 L or 2,000 gal." The cooling towers and associated piping are shown in detail on Hanford Site Drawing H-4-11077.

Chemicals are routinely added to FFTF and FMEF cooling tower water to prevent biological growth and to inhibit scale formation. According to Seamans (1994), biological growth within the cooling tower is controlled "because detrimental biological species would thrive in a warm, moist environment, causing offensive odors or health risks to personnel." Additionally, the growth of algae in the cooling tower tubes "would inhibit heat transfer from the recirculated loop to the spray water." Protection against scale formation is required because the evaporation of the tower water causes an increasing concentration of naturally occurring salts such as calcium carbonate (Seamans 1994).

Dearcide 702, a biocide (a trademark of W.R. Grace and Company, Lake Zurich, Il), and sodium hypochlorite, a microbiocide, are added for biological control. The biocide is added to the sump water on a regular basis to maintain a 25 ppm concentration. At FFTF, the biocide is added continuously into the makeup water through a metering pump. At FMEF, it is added daily through a metered pump into a recirculated stream of water from each cooling tower sump. At FMEF, the microbiocide is added to each operating tower weekly by metering pump via the sump recirculation loop. The microbiocide is manually added at FFTF to "shock" the tower only when maintenance requires personnel to physically enter the cooling towers (normally during the spring and summer months). The concentration of the microbiocide in the FFTF cooling towers is 5 ppm during the shock treatment, and the concentration during

operations is 0.6 to 0.8 ppm when only the biocide is added (DOE-RL 1992b, WHC 1992, Seamans 1994).

Two methods are used for scale protection. The electrical conductivity of the water in the sump is monitored, and when the water conductivity approaches 1200 micromhos, automatic valving opens to discharge water. Water with a conductivity of 1200 micromhos has 3.5 to 4 times the average conductivity of the incoming water and at least 2.5 times the concentration of nonvolatile constituents of the incoming water. The tower sump water level control system will initiate the addition of makeup water as sump water is discharged. When the conductivity of the sump water has fallen to approximately 900 micromhos, the discharge and addition of water will cease. This is the primary method of protection against scale (Seamans 1994). Table 4-3 lists 400 Area process water chemical additives.

Table 4-3. Main 400 Area Process Water Chemical Additives. (Seamans 1994)

Chemical	Constituents	Use	Entry Location
Sodium hypochlorite	--	Chlorination, microbiocide	Injected into raw water, and added to cooling tower water
Dearcide 702[1]	$MgCl_2$, $Mg(NO_3)_2$, isothiazolines	Biocide	Added to FFTF makeup water and FMEF sump water
Dearborn 878[2]	Organophosphonic acid, potassium salt	Scale protection	Injected into FFTF and FMEF cooling tower water

[1] Dearcide 702 is a nonoxidizing microbicide for the control of bacteria, fungi, and algae. It is manufactured by Grace Dearborn, W. R. Grace and Company, Lake Zurich, Illinois.

[2] Dearborn 878 is a cooling water treatment chemical manufactured by Grace Dearborn, W. R. Dearborn and Company, Lake Zurich, Illinois.

Dearborn 878 (a trademark of Grace Dearborn, W.R. Dearborn and Company) is also added to prevent the formation of scale (DOE-RL 1992b, WHC 1992, Seamans 1994). WHC (1992) states that it was found to perform better than Dearborn 727 (a trademark of Grace Dearborn, W.R. Dearborn and Company), which was used until the early 1990's. Dearborn 878 "is added to the towers to a concentration of between 50 ppm and 75 ppm in order to prevent the formation of scale. Scale concentration control at FFTF is accomplished by metering the chemical into the makeup water at a rate of approximately 40 ppm. Evaporation in the towers helps bring the concentration to the desired range mentioned above. At FMEF, control is accomplished by metering the chemical directly into the tower when the conductivity control system opens the valve that blows

down the sump water. A chemical analysis is performed in the field by the operator to ensure a proper balance is maintained between addition to and discharges from the cooling towers" (DOE-RL 1992b).

Bloom (1990) states that other chemicals that are or have been used in conjunction with the cooling towers include Dearborn Code 550, a sodium thiosulfate/borate solution; Dearborn Code 562, a xylenol orange indicator; Dearborn Code 595, a hydrochloric acid solution; Dearborn 876; Dearborn Code 899, a beryllium sulfate solution; and Dearborn Code 904, a thorium nitrate solution.

DOE-RL (1992b) and Seamans (1994) state that Dearborn Code 595, Dearborn Code 904, Dearborn Code 550, Dearborn Code 562, and Dearborn Code 899 are used during the chemical testing for scale inhibitor concentration. The solution resulting from this testing is not designated a dangerous waste because its concentration of beryllium is less than 0.01%, the reportable concentration level. Each test yields approximately 50 ml of the solution, which typically contains a beryllium concentration of 0.00095%. Trace quantities of the chemicals used enter the 400 Area secondary cooling water stream when gloves, glassware, equipment, and hands are washed in sinks in the cooling tower water treatment building after each test (DOE-RL 1992b).

Additionally, prior to 1986, sulfuric acid was added to lower the pH of the cooling tower water from a range of 8.4 to 9.0 to a range of 7.5 to 8.5. That practice has been discontinued (WHC 1992).

The Water Treatment Building, which is located adjacent to and west of the cooling towers, contains the water treatment equipment, instrumentation for monitoring water quality, and the controls and process drain for the towers' blowdown valves (WHC 1992).

The *State Waste Discharge Permit Application for Industrial Discharges to Land: 400 Area Secondary Cooling Water* provides sampling data indicating constituents of the secondary cooling water (DOE-RL 1992b). Refer to Table 4-4 for that data.

Table 4-4. Constituents of the 400 Area Secondary Cooling Water. (sheet 1 of 2)

Parameter	Concentrations Measured	Detection Limit
pH J*	8.8 pH units	0.010 pH units
Conductivity J*	639 umhos/cm	1.0 umhos/cm
Total Dissolved Solids	536 µg/L	5.0 µg/L
Total Suspended Solids	16.0 µg/L	5.0 µg/L
BOD (5 day)	4.0 mg/L	2.0 mg/L
COD	30.0 µg/L	5.0 µg/L

Table 4-4. Constituents of the 400 Area Secondary Cooling Water. (sheet 2 of 2)

Parameter	Concentrations Measured	Detection Limit
Ammonia-N	0.10 mg/L	0.10 mg/L
TKN-N	1.06 mg/L	0.10 mg/L
Nitrate-N	0.96 mg-N/L	0.10 mg-N/L
Ortho-phosphate-P	2.5 mg/L	0.25 mg/L
Total-phosphate-P	0.86 mg/L	0.40 mg/L
Total Oil and Grease	5.5 mg/L	5.0 mg/L
Calcium	63,000 µg/L	5000 µg/L
Magnesium	18,800 µg/L	5000 µg/L
Sodium	72,700 µg/L	5000 µg/L
Potassium	16,600 µg/L	5000 µg/L
Chloride	26.6 mg/L	5.0 mg/L
Sulfate	77.1 mg/L	2.5 mg/L
Fluoride	0.61 mg/L	0.50 mg/L
Cadmium	<7.0 µg/L	7.0 µg/L
Chromium	<10.0 µg/L	10.0 µg/L
Lead	5.4 µg/L	3.0 µg/L
Mercury	<0.20 µg/L	0.20 µg/L
Selenium	<50.0 µg/L	50.0 µg/L
Silver	<10.0 µg/L	10.0 µg/L
Copper	<25.0 µg/L	25.0 µg/L
Iron	178 µg/L	100.0 µg/L
Manganese	31.4 µg/L	15.0 µg/L
Zinc	550 µg/L	20.0 µg/L
Barium	<200 µg/L	200 µg/L
Total Coliform	8 total/100 mL	2.0 total/100 mL

J = This validation flag means that the sample is estimated positive.
* = This data has been validated. (DOE-RL 1992b)

Concentrations of the chemicals currently found in the 400 Area secondary cooling water are below regulatory limits (Cramer 1987, WHC 1992, DOE-RL 1992b). The June 1994 issue of *Focus*, published by the Washington

State Department of Ecology, states that the 400 Area "secondary cooling effluent does not contain any dangerous wastes, as defined under Washington State regulations." A July 15, 1985 letter from the Washington State Department of Ecology to DOE-RL states that "cooling water additive solutions are not regulated as dangerous waste under chapter 173-303 of the Washington Administrative Code" (see Appendix C). And, according to DOE-RL (1992b), the BAT/AKART report confirms that the effluent is not a hazardous waste and recommends that the effluent stream continue to discharge to the ponds "in its current status."

The 400 Area secondary cooling water is not treated prior to its discharge to the 4608 Percolation Ponds.

4.2.6 Gaseous Emissions and the Combined Exhaust System

The Combined Exhaust System vents air from the Reactor Containment Building and its access control area, air from the unlined cells in the Reactor Service Building, and processed gas and air from the Radioactive Argon Processing System and the Cell Atmosphere Processing System. It is responsible for more than 99% of the releases to the atmosphere at FFTF (Nickels 1991). The combined exhaust effluent is monitored for beta-emitting particulates, beta-emitting noble gases, and tritium in the exhaust duct before being discharged to the atmosphere through a "louvered penthouse." The penthouse is 46 cm high and located on the Auxiliary Equipment Building--East, adjacent to the Reactor Containment Building and the Reactor Service Building (Dahl 1991).

FFTF was designed in such a way that the release of radioactive material to the environment would be prevented by containment rather than filtration. If excessive radiation were detected in plant exhaust systems, valves could be closed to prevent its release to the atmosphere (Nickels 1991). Dahl (1991) notes that "Radiation monitors and isolation valves are the plant radiation control devices. The reactor containment building heating and ventilation ducts, as well as all other systems penetrating the containment, have containment isolation system valves."

The FFTF exhaust systems do incorporate both tested and nontested filters, however. Those filters function as process devices rather than control devices, removing radioactivity that would otherwise trigger monitoring system alarms and close the isolation valves (Nickels 1991). Several different types of filters are used: HEPA, dacron fiber, sintered metal, and iodine-adsorbing charcoal. The only tested filters used are HEPA, and not all HEPA filters used have been tested (Dahl 1991).

Tritium and the radioactive noble gases ^{41}Ar and ^{85}Kr comprise more than 99% of the airborne releases from FFTF (Dahl 1991).

McCarthy (1989) notes that FFTF is the only WHC facility that releases noble gases to the environment. Most of the noble gases released to the environment at FFTF originate from the reactor cover gas argon. Argon "is used as the cover gas for the heat removal loops and as the atmosphere for cells were reactor components are handled . . . cover gas argon is purified by removal of sodium vapor and aerosol in a sodium vapor trap, by filtration in a

high-efficiency particulate air (HEPA) filter, and by delay of the gas in the Radioactive Argon Processing System (RAPS) in tanks and on cryogenically cooled charcoal to permit decay of short half-life radioactive noble gas isotopes. Processed reactor cover gas argon is released" via the Combined Exhaust System (Dahl 1991).

Another noble gas, nitrogen, "is used as the atmosphere for cells and pipeways that house piping and/or equipment containing the primary-system sodium. Its purpose is to displace air and preclude a fire in the event of a primary-system sodium leak. The cell atmosphere nitrogen is purified if necessary by the Cell Atmosphere Processing System (CAPS), which is similar to the RAPS" (Dahl 1991). Processed nitrogen is also released from CAPS via the Combined Exhaust System (Dahl 1991).

Surge and delay tanks, as well as cryogenic units, are the primary means by which RAPS and CAPS remove radionuclides from gases being processed. HEPA filters are not routinely used by the Reactor Containment Building and access control area heating and ventilation systems. Dahl (1991) states that "if excessive radioactivity is detected at the final combined exhaust monitor, the access control area flow is automatically redirected through a tested HEPA filter to remove particulate radioactivity."

Because FFTF began testing materials for fusion reactors in the early 1990's by irradiating lithium samples, the potential for a tritium release has also become a concern. A tritium monitor has thus been added to the final exhaust monitoring system to measure any tritium released to the atmosphere (Dahl 1991).

Tables 4-5 and 4-6 provide information about radioactive airborne effluent releases for calendar year 1988.

Table 4-5. Annual Average Fast Flux Test Facility Airborne Release Rates for 1988.

Isotope	Activity (Ci/yr)
^{41}Ar	3.7 E+01
^{85}Kr	7.6 E-01
^{131}I	1.0 E-05
^{137}Cs	1.5 E-05

(Dahl 1991)

Table 4-6. 400 Area Radioactive Airborne Effluent Release Data for Calendar Year 1988.

Facility	Exhaust Flow (ft^3/min)	Assumed Isotope	ACV ($\mu Ci/cm^3$)	Highest Weekly Concentration ($\mu Ci/cm^3$)	Average Concentration ($\mu Ci/cm^3$)	Total Curies Discharged
Combined Exhaust	24,150	^{90}Sr ^{85}Kr ^{131}I ^{41}Ar	9.0 E-12 N/A 4.0 E-10 N/A	2.6 E-14 1.1 E-08 4.5 E-14 1.8 E-07	4.3 E-14 8.5 E-10 3.5 E-14 1.0 E-07	1.5 E-05 7.6 E-01 1.0 E-05 3.8 E+01
Lower Reactor Service Bldg.	12,600	^{90}Sr	9.0 E-12	5.7 E-14	2.7 E-14	4.0 E-06
Heat Transport System (South)	4,175	^{90}Sr	9.0 E-12	8.4 E-14	2.3 E-14	1.4 E-06
437 Maintenance and Storage Facility	16,000	^{90}Sr	9.0 E-12	7.7 E-15	2.6 E-15	6.0 E-07

ACV = Administrative control value (McCarthy 1989)

4.2.7 Reactor Process Wastewater and Cooling Water Effluent

The 400 Area Process Pond and Sewer System began operation in 1979 to receive waste water from cooling systems and nonsanitary drains and sumps in the 400 Area (Cramer 1987). Most of the effluent wastewater that enters the system comes from the FFTF and FMEF cooling towers (Bloom 1990, Seamans 1994). Additionally, drains and sumps that discharge into the sewer system collect nonhazardous leaks, spills, and rainwater (Cramer 1987).

Although FFTF has been in "hot" standby status since 1992 and plans are being made to transition the reactor to a shutdown condition, the process sewer continues to receive effluent from the reactor building and other facilities (WHC 1992).

A WAC-173-276 permit application for the 400 Area Process Sewer was submitted to the Washington State Department of Ecology in December 1993. This met a Tri-Party Agreement milestone.

Refer to Section 4.10.13 for more information about the 400 Area Process Pond and Sewer System. Additionally, Hanford Site Drawing H-4-11071 provides a diagram of the piping and instruments associated with the Sanitary Water Service Piping System 23.

4.2.8 FFTF Radioactive Liquid Waste System

There are many sources of radioactive liquid waste throughout the 400 Area. Hanford Site Drawing H-4-11206, Sheets 1-3, describes several of these sources and provides information (such as the flow rate and average amount of wastes produced by a source each month).

The FFTF Radioactive Liquid Waste System operates to ensure that these wastes are properly collected and disposed of. The operating dates for this system are unknown.

Hanford Site Drawing H-4-11007 provides a detailed sketch of the radioactive liquid waste system. Two storage tanks are shown to be part of the system. The first is Tank T-132, the "Cell. Atm. Proc. Sys. Liq. Waste Drainage Tank," which has the capacity to hold 200 gal of liquid. The second is Tank T-103, the Liquid Waste Storage Tank, which has the capacity to hold 5,000 gal. Both tanks are located in the 4717 Building.

Hanford Site Drawing H-4-11007 states that radioactive liquid wastes are collected and temporarily stored in the 4717 Building tanks, then loaded into 8,000-gal railroad tank cars and transported to the 300 Area for disposition. DOE-RL (1992b), however, states that radioactive liquid waste is discharged to belowground 5,000-gal tanks; when the tanks are full, the liquid waste is transferred via rail car to the 204 AR Facility in the 200 West Area.

FFTF Regulatory Compliance personnel report that both of the above documents are incorrect. Instead, radioactive liquid wastes are transported to MASF via 8,000-gal tank cars, then transferred into 20,000-gal tank cars and transported to the 200 Areas for disposition.

Hanford Site Drawing H-4-11206, Sheets 1-3, shows the radioactive liquid waste system in further detail.

4.2.9 Problems Encountered During Operation

During reactor operation, several items of interest were encountered. These included power fluctuations induced by test control rods, swelling-induced partial core or core zone lockup, and gas expansion modules. Refer to Bennett et al. (1991) for more information about these items. Swaim et al. (1991b) notes that sodium vapor deposition was another problem encountered during FFTF operation.

In November 1987, a problem with one of the three fuel transfer ports was discovered during a routine outage. The plug in the second port could not be removed for normal refueling activities. This problem happened again during an outage in October 1988. Investigation into the problem showed that the nozzle had been distorted when depleted uranium in the plug oxidized. The plug was modified, clearing the distortion, and dimensional monitoring of all three ports was begun. Refer to Swaim et al. (1991a) and Swaim et al. (1991b) for more information about the problem and its solution.

Pressure in the reactor core during operation declined steadily from 1986 until 1992. This pressure drop was believed to be the result of "the deposition of silicon-based compounds in the inlet orifice region of core assemblies, which, in turn, increased the surface roughness and the resistance to coolant flow" (Swaim et al. 1991a).

4.2.10 Storage of Unirradiated Fuel

A recent issue of concern is the location for the storage of unirradiated FFTF fuel. For years, the fabrication of fuel for FFTF took place in the 308 Building of the 300 Area; the fuel was then stored below grade in that same building until shipped to the 400 Area. However, concerns arose about the ability of the fuel fabrication portion of the 308 Building to withstand a seismic event, and it was decided to cease operations in the entire facility.

DOE-RL (1992) reports that, in 1992, enough fuel assemblies and fuel pins to make up approximately one half of an FFTF core load remained in the 308 Building. During FFTF operation, it was predicted that storage would be required for an additional 20 to 25 complete fuel assemblies. The FFTF Interim Decay Storage vessel, which was used for the temporary storage of pins and assemblies before they were loaded into the core, was found to be of insufficient size to contain all of the fuel stored in the 308 Building (DOE-1992).

DOE (1992) states that, if FFTF were to have resumed operations, an alternate location for the storage of unirradiated fuel would have been required. This was one reason that options for the storage of FFTF fuel were considered. Another reason is that the shutdown of the 308 Building "was directed and planned prior to the FFTF standby directive" (WHC 1994). WHC (1994) states that the "impetus for the shutdown [of the 308 Building] was the previous direction to cease fuel fabrication operations in the building."

DOE (1992) recommended that Room 192A of the Plutonium Finishing Plant be modified slightly to accommodate the fuel that needs to be stored. The unirradiated fuel pins and fuel assemblies would be stored in the shipping containers used to transport them to PFP. It was estimated that security considerations alone would result in a $6.5M savings from storing the fuel at PFP rather than the 308 Building (DOE 1992). Refer to the *308 Building Shutdown Plan*, WHC-SD-FL-SSP-001, for more detailed information about the shutdown of that facility.

Alternate locations that were considered for the storage of unirradiated FFTF fuel include the FFTF complex; FMEF; and Rooms 185, 235, 236, 641, and 642 of PFP. Offsite storage at other DOE sites was also considered, although such locations would not provide ready access to the fuel assemblies for routine shipment to FFTF (DOE 1992).

The Plutonium Finishing Plant was the option chosen for the storage of unirradiated fuel assemblies and fuel pins. WHC (1994) states that "FFTF fuel, in the form of 24 finished unirradiated assemblies and several thousand individual unirradiated fuel pins, is stored in a vault at the Plutonium Finishing Plant. No attempt has been made to address the final disposition of these fuel rods and assemblies. It will be a significant task and the subject of future planning."

According to the *Fast Flux Test Facility Shutdown Program Plan*, there are three types of regular fuel that need to be removed from FFTF and dispositioned: Category IVE Irradiated Fuel, Category IC/IIID Irradiated Fuel, and Category IC/IIID Unirradiated Fuel (WHC 1994).

There are 333 highly irradiated fueled components that are classified as Category IVE Irradiated Fuel. Disposition of these components, as defined by DOE Order 5633.3A, involves interim storage that could last for as many as 50 years. WHC (1994) states that the fueled components, which are "currently stored in a sodium environment, will be washed in the Interim Examination and Maintenance Cell, placed in Interim Storage Casks, and then transferred to the Interim Storage Area . . . [which] will be located in the northeast corner of the FFTF complex."

WHC (1994) states that "there are 11 irradiated fueled components that by the year 2030 will be either Category IC or IIID Special Nuclear Material as defined per DOE Order 5633.3A." Plans have been made "to intermix one each of these type components with five highly irradiated Category IVE fueled components in a single Core Component Container/Interim Storage Cask." Storing the casks outside a Protected Area is being considered (WHC 1994).

There are 32 unirradiated fueled assemblies that are Category IC. Plans have been made to send these assemblies to the Plutonium Finishing Plant for interim storage, in accordance with DOE Order 5633.3A. WHC (1994) states that "these assemblies will be washed in the Interim Examination and Maintenance Cell and transported to the Plutonium Finishing Plant. The assemblies will either be stored on qualified racks or downloaded to pellets for container storage at an appropriate vault. A decision has not been made at this time regarding this disposition."

There is one unirradiated fueled assembly that has been classified as Category IIID in accordance with DOE Order 5633.3A. WHC (1994) states that the disposition of this assembly has not yet been determined, noting that "it is assumed that this assembly will be sent to the Plutonium Finishing Plant for interim storage as defined above [in the description of the disposition of the unirradiated Category IC fuel assemblies]. This IIID assembly does not require washing as it has never been sodium wetted."

There are three types of special fuel involved in the defueling of FFTF: DNM/Gas Leaker Fuel, Sodium Bonded Test Assemblies, and Lithium Bonded Assemblies. Refer to the *Fast Flux Test Facility Shutdown Program Plan*, WHC-SD-FF-SSP-004 (WHC 1994), for more information about these.

Because a five-year process has begun to transition FFTF into a shutdown condition, the future of the proposal for fuel storage at PFP is uncertain.

4.2.11 Hazardous Materials stored at FFTF

Dahl (1991) provides information about the "typical" types and amounts of hazardous substances that were stored in the FFTF Reactor Containment Building at the time the report was written. This information is presented in Table 4-7.

Table 4-7. Hazardous Substances Stored at FFTF, 1991. (sheet 1 of 2)

Product	Maximum quantity of product on hand	Regulated chemical in product	Quantity of regulated chemical (lb)	Quantity of chemical release per year (lb)	RQ for chemical (lb)	% of RQ on hand	Notes
Sodium (Na)	1,940,000 lb	Sodium (Na)	1,940,000	0	10	100	Currently stored in ASME coded systems
Waste sodium (Na)	5 lb	RCRA Waste D001/D002/ D003	5	0	10	50	Would likely use sodium RQ of 10 in the event of spill
Emergency batteries	3,179 lb	Sulfuric acid	3,179	0	1,000	100	Largest battery contains 47 lb
PCB	102,000 lb	PCB	102,000	0	1	100	Contained in 19 TSCA compliant PCB trans-formers
Cooling tower chemical (scale inhibitor)	2,856 lb	Potassium hydroxide (10%)	286	1,144	1,000	28.56	N/A
Freon (R-12) dichlorodifluo romethane	24,000 lb	Freon (R-12)	24,000	1,000	5,000	100	R-12 used in 8 chillers, each containing 3,000 lb
Sodium-potassium alloy	6,330 lb	No RQ listed	N/A	N/A	N/A	N/A	N/A

Table 4-7. Hazardous Substances Stored at FFTF, 1991. (sheet 2 of 2)

Product	Maximum quantity of product on hand	Regulated chemical in product	Quantity of regulated chemical (lb)	Quantity of chemical release per yr (lb)	RQ for chemical (lb)	% of RQ on hand	Notes
Lead (installed in facility and components)	666,000 lb	N/A due to form	N/A	N/A	N/A	N/A	N/A
Diesel fuel	105,800 gal	NR	N/A	N/A	N/A	N/A	N/A
Ethylene glycol (45% glycol, 55% demineralized water)	94,000 gal	NR	N/A	N/A	N/A	N/A	N/A
Isopropyl alcohol	2 gal	NR	N/A	N/A	N/A	N/A	N/A
1,2 propanediol (propylene glycol)	4 gal	NR	N/A	N/A	N/A	N/A	N/A
Algicide used in cooling towers	90 gal	NR	N/A	N/A	N/A	N/A	N/A
Heat transfer oil	14,700 lb	NR	N/A	N/A	N/A	N/A	N/A
Rheostat electrolyte (3% to 4% sodium carbonate	4,200 gal	NR	N/A	N/A	N/A	N/A	In 6 liquid rheostat

(Dahl 1991)

ASME = American Society of Mechanical Engineers
PCB = polychlorinated biphenyl
RCRA = Resource Conservation and Recovery Act of 1976
RQ = reportable quantity
TSCA = Toxic Substances Control Act of 1976
NR = not regulated

4.3 FUELS AND MATERIALS EXAMINATION FACILITY

The Fuels and Materials Examination Facility (FMEF), is located in the 400 Area, west of the FFTF Reactor Containment Building. The facility was originally designed for the fabrication of FFTF experiments and the reprocessing of reactor fuel. Due to changes in program and funding, however, most of the specialized equipment necessary to perform those tasks was never installed. FMEF has never received any radioactive material; instead, it is currently being used for personnel offices (WHC 1992).

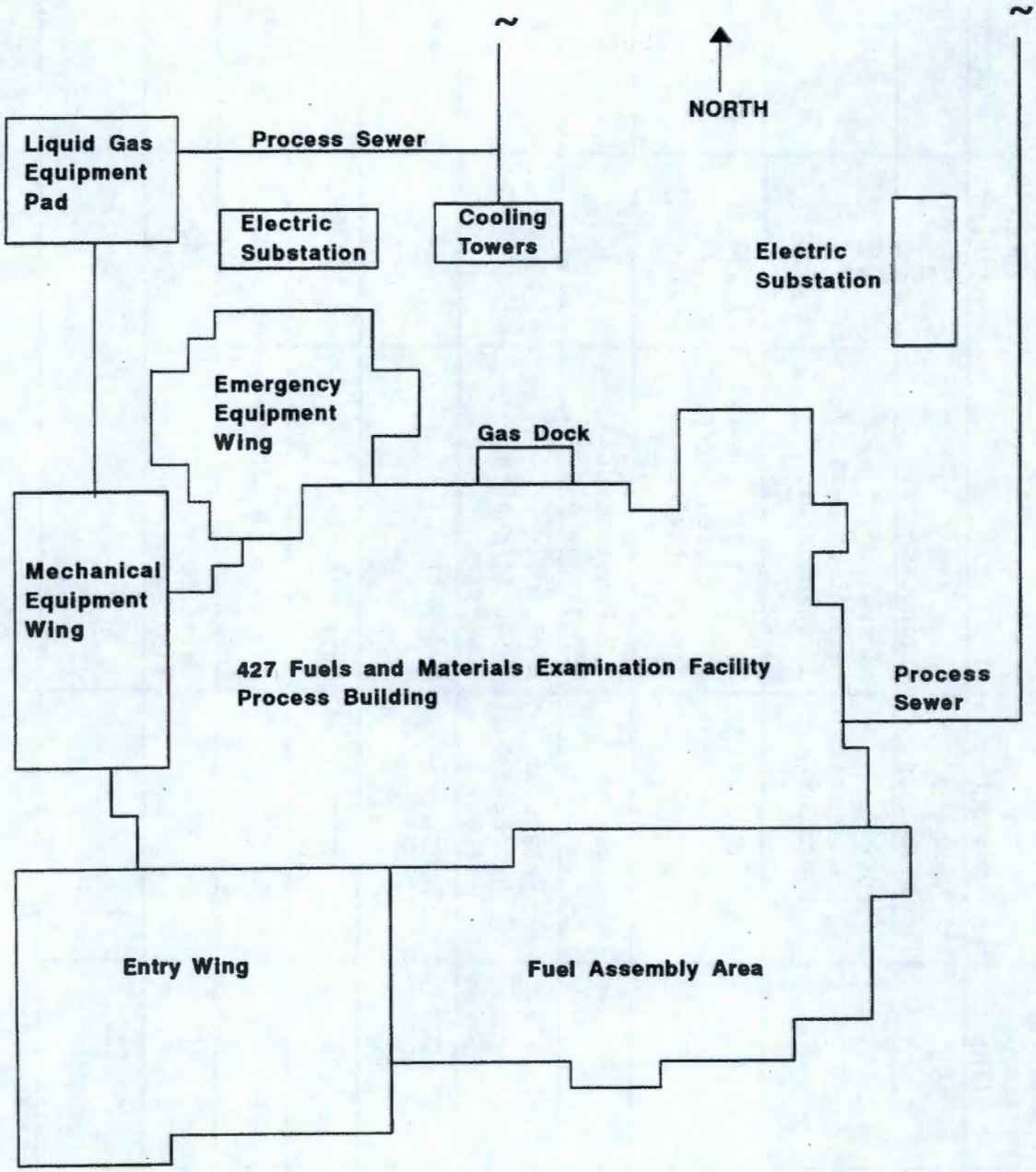
The fuel assembly area within FMEF was originally constructed as a replacement for the 308 Building, which provided storage for unirradiated fuel pins and fuel assemblies prior to their shipment to FFTF. However, it has never been used for that purpose. FMEF would require upgrades to security systems, HVAC equipment, and radiological and environmental monitoring equipment before it could be used for fuel storage (DOE 1992). Because of the time and cost associated with such modifications, as well as the fact that FMEF would no longer be radiologically clean once used to store fuel, DOE (1992) recommends that the facility not be used for future fuel storage and handling.

The hazardous waste engineer for FMEF reports that there are five hazardous waste satellite storage areas at FMEF. One, located in Room 352, contains ethylene glycol, ethylene glycol-soaked rags, and absorbent. Another, in Room 224, contains non-PCB light ballasts, alkaline and Ni-Cd batteries, low-pressure sodium vapor light bulbs, computer circuit boards containing lead, lead for recycling, and batteries for recycling. A third, in Room 413, contains ammonium hydroxide. A fourth, in the 427-A Building, contains diesel fuel absorbed in rags and absorbent. And a fifth, outside and at the northwest corner of the 4862 Building, contains used copy machine liquid toners. Additionally, a fenced-off pad known as the Reusable Oil and Empty Drum Storage Area is located near FMEF. Refer to Section 4.10.20 for more information about this site.

Cooling water and other nonsanitary, nonhazardous effluents from FMEF flow into the process sewer for disposal. Because areas of FMEF were originally designated for the handling of radioactive materials, however, drains in areas that would have been contaminated are discharged into a retention liquid waste system (RLWS). The RLWS consists of two 22,700-L tanks that allow effluent "to be sampled for radioactivity and verified to meet acceptable discharge limits prior to release to the process sewer. Routine fire system tests, heating and ventilation systems, and electric water coolers are the only current sources of effluent to the RLWS. Due to the low volume of these sources, the tanks' contents are released to the process sewer only once or twice a year" (WHC 1992).

FMEF currently appears as a large, unpainted concrete building. Figure 4-7 is a drawing of the facility. Table 4-8 provides an inventory of hazardous substances that have been stored in FMEF.

Figure 4-7. Fuels and Materials Examination Facility.



(Bloom 1990)

Table 4-8. Inventory of Hazardous Substances Stored in FMEF.

Product	Maximum quantity stored (lb)	Regulated chemical in product	Product	Maximum quantity stored (lb)	Regulated chemical in product
Ammonium hydroxide in water solution (28%)	51	Ammonium hydroxide	Halon (in fire extinguishers)	1,820	NR
Waste ammonium hydroxide solution (12%)	88	D002 Waste (12% ammonium hydroxide)	Mineral oil (in capacitors used in pulse magnetic welder)	750	NR
Emergency batteries	2,492	Sulfuric acid	Nitrogen gas (in "K" bottles used as cover gas on ethylene glycol systems)	1,500 ft^3 (air cylinder)	NR
Solvent	2	Toluene	1,2 Propanediol (propylene glycol)	17	NR
Solvent	1,160	Potassium hydroxide (10%)	Algicide (used in cooling towers)	734	NR
Trichloro-fluoromethane (R-11)	2,700	Trichloro-fluoromethane (R-11)	Hydraulic oil	64	NR
Solvent	425	Benzene (<0.01%)	Lubricating oil	2,748	NR
Lead (bricks and sheet)	128,387	NR	Algicide (in diesel fuel)	33	NR
Diesel fuel	21,010	NR	Desiccant (in the air dryers)	740	NR
Ethylene glycol (40% glycol, 60% demineralized water)	91,695	NR			

NR = Not regulated (Nickels 1991)

4.4 400 AREA WATER SUPPLY

The 400 Area sanitary water supply system depends upon groundwater pumped from three onsite production wells that are from 200 to 390 ft deep (BNI 1993, WHC 1992). These wells have a combined pump capacity of 37,200 gal/h, and data from February 1993 indicate an average water usage rate of 85,000 gal/day. Water flow records from 1988 to 1993 indicate an average water usage rate of 106 gal/min. The wells are located approximately 1,000 ft south of the 4607 Sanitary Sewer septic tank and within the northern portion of the 400 Area (BNI 1993).

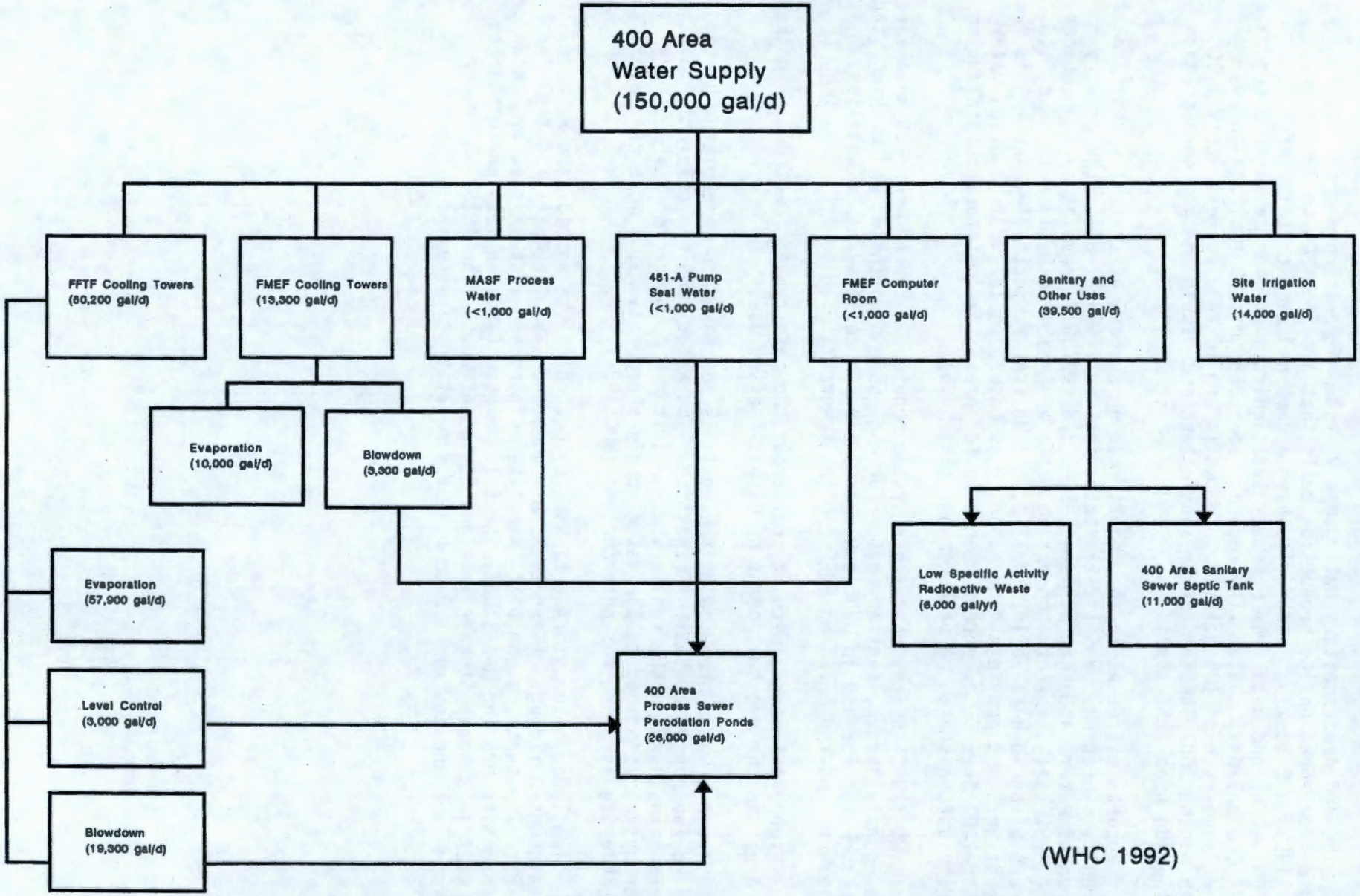
Reports differ as to the identification numbers of the wells that are currently operating. WHC (1992) states that well 499-S1-8J is the primary source of water, and that wells 499-S0-8 and 499-S0-7 serve as backup sources. BNI (1993) states that the operating wells are numbered P-14, P-15, and P-16, and are also known as Well 1, Well 2, and Well 4, respectively. Well 4 is the deepest well and provides "the majority of both potable and irrigation water for the 400 Area . . . except when down for preventive maintenance and during the irrigation season at peak demand" (BNI 1993).

WHC (1992) states that "this system provides water for the 400 Area fire water supply system, sanitary water for uses such as drinking and washing, and process water for use in HVAC equipment, air compressors, other auxiliary equipment, and the FFTF and FMEF cooling towers."

Figure 4-8 is a flowchart that shows the main types of water use in the 400 Area and the eventual means of disposal after use.

The raw water produced by the wells is monitored for impurities by the Hanford Environmental Health Foundation. The water requires only chlorination before being used in the sanitary water system. As water for the sanitary water system is pumped to the water supply storage tanks, 1 mg/L of sodium hypochlorite is added for chlorination (WHC 1992).

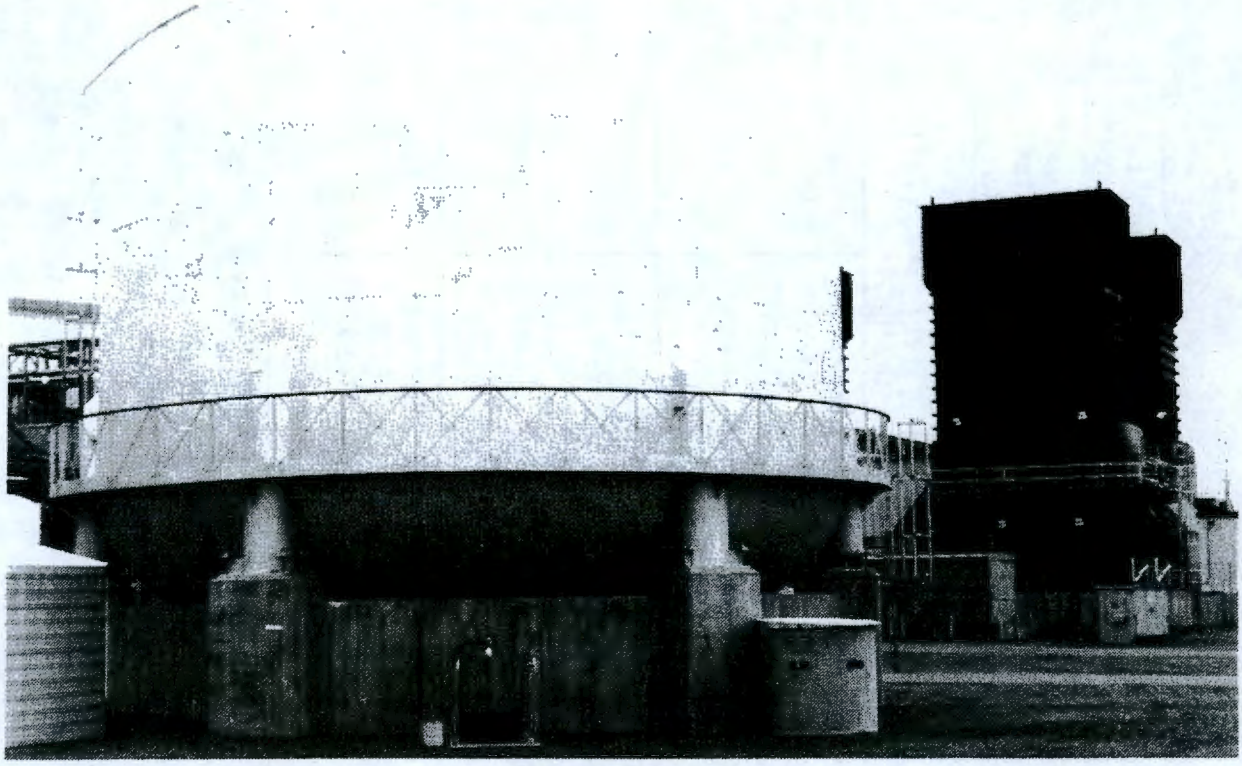
Two large water storage tanks are located to the west of the Reactor Containment Building. These tanks are numbered T-58 (or 482A) and T-87 (or 482-B). The tanks, along with associated piping and instruments, are shown on Hanford Site Drawing H-4-11008, Sheet 1. Figure 4-9 is a 1994 photograph of the 482A/T-58 Water Storage Tank and Equipment Room. The 482B/T-87 Water Storage Tank and Equipment Room have a similar appearance.



(WHC 1992)

Figure 4-8. Flow Diagram for the 400 Area Water Supply.

Figure 4-9. 482A/T-58 Water Storage Tank and Equipment Room, 1994.



4.5 UNDERGROUND PETROLEUM TANKS

4.5.1 Documented Information About 400 Area Underground Petroleum Tanks

There are several underground petroleum tanks located in the 400 Area. Many of these tanks are now inactive, and many remain active. Table 4-9 gives information about the underground petroleum storage tanks that remain active, and Table 4-10 gives information about the inactive tanks.

Table 4-9. Active Underground Petroleum Storage Tanks in the 400 Area, May 1994.

Tank ID	Alias	Location	Date installed	Size (gal)	Const. mat'l.	Lined?	Function	Substance Stored
400-FFTF-T17	East Diesel Generator Storage Tank	4621E	1974	20,247	Carbon steel	No	Emergency (fuel storage)	Diesel (fuel oil)
400-FFTF-T18	West Diesel Generator Storage Tank	4621W	1974	20,247	Carbon steel	No	Emergency (fuel storage)	Diesel (fuel oil)
400-FFTF-T24	Emergency Diesel Engine Driven Fire Pump P-28 Fuel Supply Tank	481	1974	550 or 556	Carbon steel	No	Emergency (fuel storage)	Diesel (fuel oil)
400-FS-40 (Temp. Closed)	--	--	1986	500	--	--	Fuel	Unleaded
400-FS-41 (Temp. Closed)	--	--	1986	500	--	--	Fuel	Diesel
400-FFTF-T303	Gas Turbine Driven Generator Fuel Supply Tank	4721	1980	49,820	Carbon steel	No	Emergency (fuel storage)	Diesel (fuel oil)
400-FMEF-T17	--	427	1983	5,000	--	--	Emergency	Diesel

("Active Petroleum USTs at the Hanford Site, 05/02/94," and "FFTF Underground Storage Tank Data," see Appendix C)

Table 4-10. Inactive Underground Petroleum Storage Tanks in the 400 Area.

Tank ID	Alias	Location	Date installed	Size (gal)	Const. mat'l.	Lined?	Function	Substance Stored
400-FFTF-T19	HTS East Preheater Oil Storage Tank	408A	1974	5,593	Carbon steel	No	Fuel storage	Fuel oil
400-FFTF-T20	HTS South Preheater Oil Storage Tank	408B	1974	5,593	Carbon steel	No	Fuel storage	Fuel oil
400-FFTF-T21	HTS West Preheater Oil Storage Tank	408C	1974	5,593	Carbon steel	No	Fuel storage	Fuel oil
400-FFTF-T305	Fuel Supply Centrifuge Water Collection Tank	4721	1980	300	Carbon steel	No	Emergency spill	Fuel oil (NEVER FILLED)
400-T-Bubble Building	Bubble Building Fuel Tank	Southeast of Building 4732B (assoc. with Bubble Building spare parts warehouse)	Unknown	Unknown	Unknown	Unknow n	Fuel storage	Fuel oil

("FFTF Underground Storage Tank Data," see Appendix C)

Hanford Site Drawing H-4-12710 describes the G-1 Diesel Generator Fuel Oil Day Tank, numbered T-15. Another drawing, H-4-12711, describes the G-2 Diesel Generator Fuel Oil Day Tank, numbered T-16. Both tanks are "5-ft O.D. horizontal" vessels. Their locations, measurements, and burial depths are not shown on the drawings. Neither tank is found in "Active Petroleum USTs at the Hanford Site, 05/02/94" or "FFTF Underground Storage Tank Data," two tables that list active and inactive tanks in the 400 Area (see Appendix C).

Two other fuel oil tanks, numbered T-17 and T-18, are described by Hanford Site Drawing H-4-12705. Both tanks are 10 ft, 2 in. high and are of identical construction. They are buried horizontally with their bottoms 15 ft, 6 in. below grade. The instrument nozzle for each tank is 3 ft, 6 5/8 in. above grade. Tanks T-17 and T-18 are described further by Hanford Site Drawings H-4-13596 and H-4-13806, respectively. The locations and measurements of these tanks are not shown on the drawings.

Tanks 400-FFTF-T17 (T-17) and 400-FFTF-T18 (T-18) are both included in the "FFTF Underground Storage Tank Data" table. Tank T-17, also known as the East Diesel Generator Storage Tank, is located at 4621E, and Tank T-18, also known as the West Diesel Generator Storage Tank, is located at 4621W. Both are carbon steel, unlined tanks that were installed in 1974 and store 20,247 gal of diesel or fuel oil for emergency use.

Hanford Site Drawing H-4-12704 describes three additional fuel oil tanks, numbered T-19, T-20, and T-21. These tanks are 7 ft, 5 in. high and are of identical construction. They are buried horizontally with their bottoms 12 ft, 2 in. below grade. The instrument nozzle for each tank is 3 ft, 11 3/4 in. above grade. Tanks T-19, T-20, and T-21 are described further in Hanford Site Drawings H-4-13724, H-4-13732, and H-4-13760, respectively. The locations and measurements of these tanks are not shown on the drawings.

Tanks 400-FFTF-T19 (T-19), 400-FFTF-T20 (T-20), and 400-FFTF-T21 (T-21) are all included in the "FFTF Underground Storage Tank Data" table. Tank T-19, also known as the HTS East Preheater Oil Storage Tank, is located at 408A. Tank T-20, also known as the HTS South Preheater Oil Storage Tank, is located at 408B. And Tank T-21, also known as the HTS West Preheater Oil Storage Tank, is located at 408C. All are carbon steel, unlined tanks that were installed in 1974. Each stores 5,593 gal of fuel oil. The three tanks are now inactive.

"Active Petroleum USTs at the Hanford Site, 05/02/94" and "FFTF Underground Storage Tank Data" list five more 400 Area tanks that are currently active. (See Appendix C.) These are Tanks 400-FS-40, 400-FS-41, 400-FFTF-T303, and 400-FMEF-T17. Tanks 400-FS-40 and 400-FS-41, built in 1986 to hold 500 gal of unleaded and diesel, respectively, have been temporarily closed. Tank 400-FFTF-T303, also known as the Gas Turbine Driven Generator Supply Tank, is located near the 4721 Building; the unlined carbon steel tank was installed in 1980 to store 49,820 gal of diesel or fuel oil for emergency use and remains active. Tank 400-FMEF-T17 is located near the 427 Building and was installed in 1983 to store 5,000 gal of diesel fuel for emergency use and remains active.

Additionally, the tables list one more inactive 400 Area tank: Tank 400-FFTF-T305, known as the Fuel Supply Centrifuge Water Collection Tank. This unlined, carbon steel tank is near the 4721 facility and was installed in 1980 to receive up to 300 gal of fuel oil in the case of a spill. It has reportedly never been filled.

Site personnel report that another underground storage tank was located near the Spare Parts Warehouse Bubble Building, southeast of Building 4732B. This tank was numbered 400-T-Bubble Building and was known as the Bubble Building Fuel Tank. It contained fuel oil for a blower that kept the Bubble Building inflated. When the building was damaged by wind and subsequently removed in 1980 or 1981, the tank was no longer needed. It was emptied of fuel and filled with sand in 1980 or 1981.

4.5.2 Visual Observations

Each tank typically has a sign identifying it as a "Fuel Oil Tank." Several of the tanks have concrete pads, nozzles, and other instruments that are visible above ground.

One tank is located approximately 4 ft away from the east side of the fence that surrounds the sodium cooling towers and 20 ft north of the southeast corner of the 408-C West DHX structure. The site appears as a concrete pad measuring 7 ft by 15 ft. Several pipes protrude from the pad. Refer to Figure 4-10 for a 1994 photograph of the site.

Figure 4-10. Underground Fuel Oil Tank East of the 408-A East Dump Heat Exchangers, 1994.

Another tank is located approximately 40 ft south of the 4710 Building. The site appears as a concrete pad measuring 10 ft by 25 ft. Several pipes protrude from the pad, which is surrounded by yellow steel posts and a chain barricade. Refer to Figure 4-11 for a 1994 photograph of the site.

Figure 4-11. Underground Fuel Oil Tank South of the 4710 Building, 1994.

Two fuel oil tanks are located on the west side of the reactor building. The first is just east of the two water tanks, and the second is southeast of them. Figures 4-12 and 4-13 are 1994 photographs of the fuel oil tank sites.

Figure 4-12. Underground Fuel Oil Tank East of the T-58 and T-87 Water Tanks, 1994.

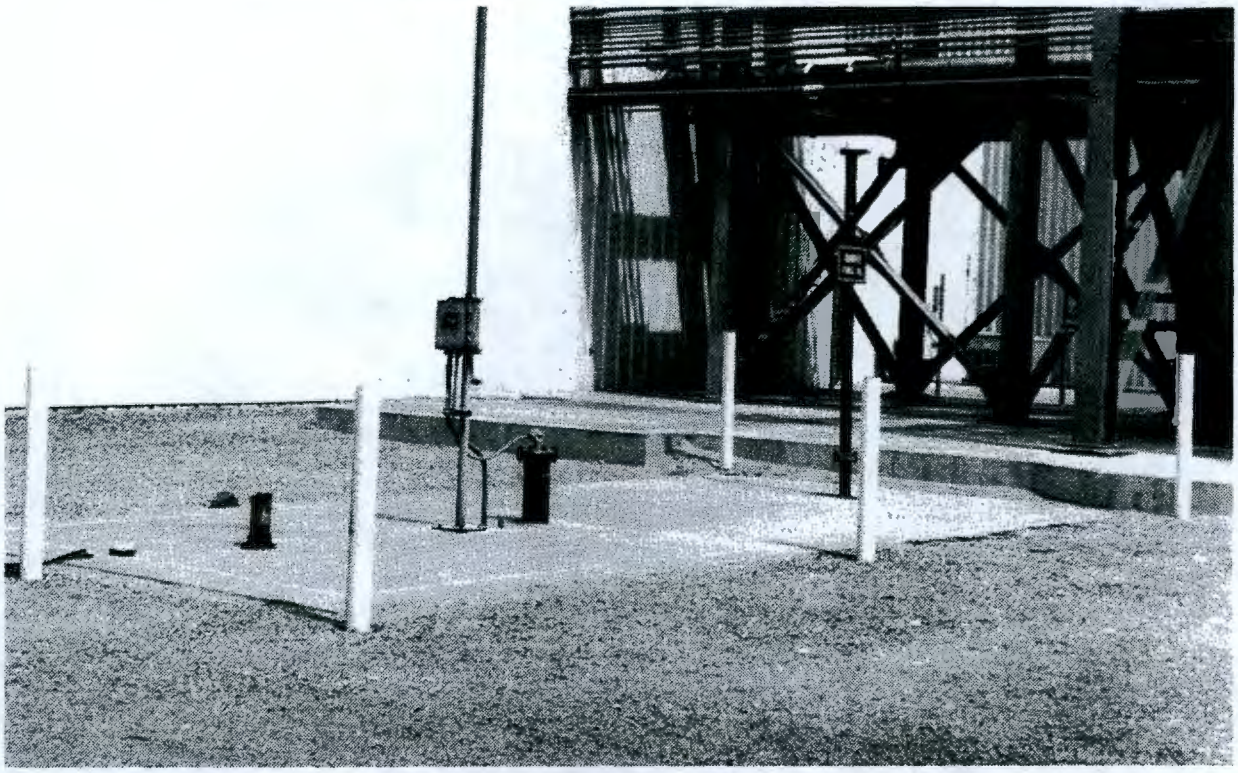
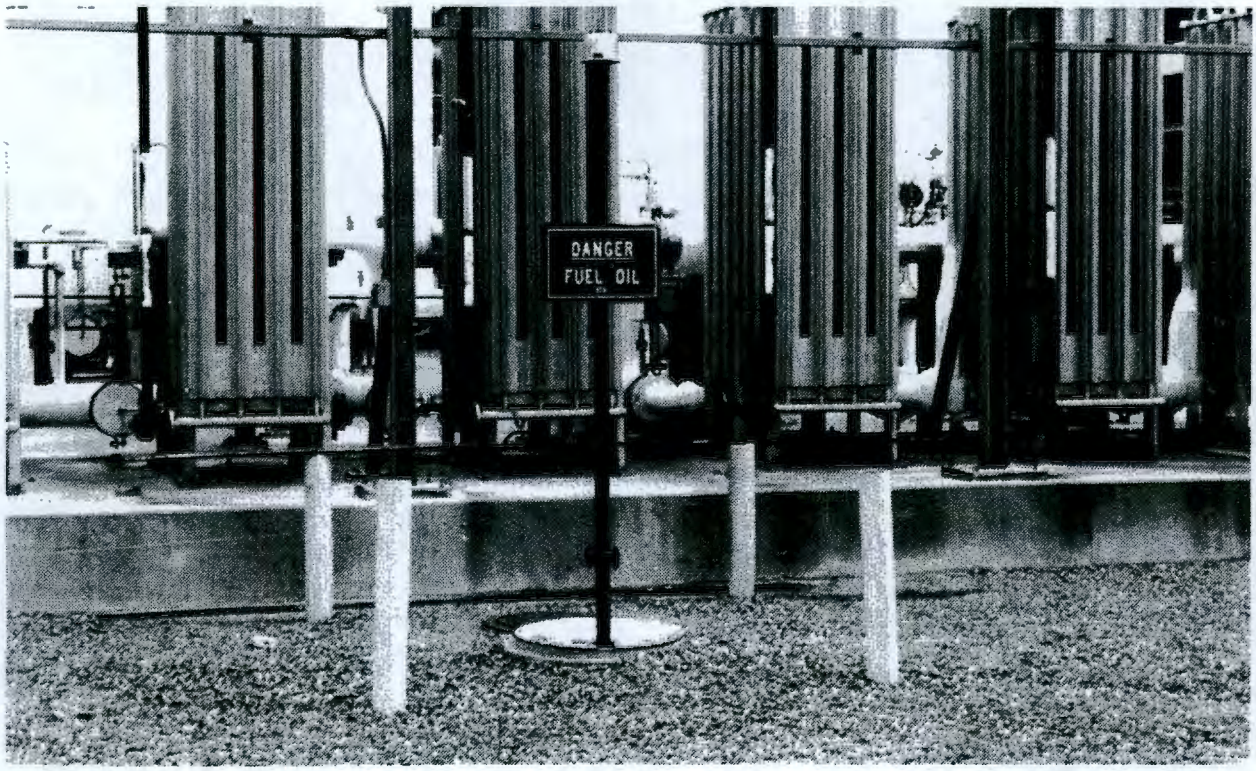


Figure 4-13. Underground Fuel Oil Tank Southeast of the T-58 and T-87 Water Tanks, 1994.



Another fuel oil tank is located to the south of the 408-B South DHX structure, approximately 5 ft away from the protective fence. Figure 4-14 is a 1994 photograph of this site.

Figure 4-14. Underground Fuel Oil Tank South of the 408-B South Dump Heat Exchangers.

4.6 400 AREA SANITARY WASTES

Sanitary wastes are produced in various 400 Area buildings that are equipped with toilet facilities. Four separate sanitary sewer systems in the 400 Area have been used over the years to dispose of such waste.

A portable sanitary sewage treatment plant and sanitary pond were used to treat sanitary wastes from 400 Area facilities during a period of heavy construction in the 1970's. The plant apparently received wastes from several toilet facilities and drains in the eastern and southern portions of the 400 Area through an underground 8-in. line (Hanford Site Drawing H-4-14602). Aqueous wastes from the 400 Area Retired Portable Sanitary Sewage Treatment Plant were deposited in the 400 Area Retired Sanitary Pond, and nonhazardous sludges were hauled offsite for disposal. It is believed that the portable treatment plant operated between 1972 and 1979, since those are the dates of operation that documents provide for the retired sanitary pond (Cramer 1987). Hanford Site Drawing H-4-152051, Sheet 6, shows a "temporary sewer treatment plant" with underground lines that were "abandoned in place." The plant also

appears on Hanford Site Drawings H-4-14600, H-4-14601, and H-4-14602. For more information about the portable treatment plant and its pond, refer to Sections 4.11.17 and 4.10.14.

This sanitary sewer system was inadequate to receive sanitary wastes from the increasing number of personnel based in satellite offices and constructing area facilities in the mid-1970's. WHC (1992) reports that leakage was discovered "at sanitary sewer system manholes and, occasionally, at the outfall" and states that "sampling of the soil to determine type and level of contaminants was not believed to have been done at the time of leakage, or prior to backfill activities, due to the type of spill." Backfill material was used to cover leak locations, and blacktop or concrete was also poured in certain areas. The number of personnel in the 400 Area decreased in late 1975 and early 1976, stabilizing the sanitary sewer system (WHC 1992).

Three septic tanks, located on the west and south sides of the 4702 Building, were installed in 1979. These tanks operated until 1983, receiving sanitary wastes from several office buildings in the 400 Area (Cramer 1987). They were used as a supplement to the 4607 Sanitary Sewer, the main sewer system for the 400 Area. Hanford Site Drawing H-4-152051, Sheet 1, shows the locations of the septic tanks and associated underground lines. Refer to Section 4.10.16 for more information about these retired septic tanks.

Effluent from the tanks may have been discharged to the 400 Area Retired Sanitary Pond, since reports and drawings do not indicate the existence of separate tile fields for the tanks. However, the tanks began operation in 1979, the same year that the pond was deactivated. This conflict indicates that either the pond did not receive effluent from the 400 Area Retired Septic Tanks or the reported operating dates for the pond or the tanks are incorrect.

Site personnel report that the 4607 Sanitary Sewer began operation in early 1978 as a replacement for the portable treatment plant and its pond. The majority of liquid wastes discharged in the 400 Area are sanitary wastes, and this septic system now receives the sanitary wastes from all 400 Area buildings except those few serviced by the 4608 Sanitary Sewer. Discharges from the system are routed through an underground 12-in. PVC pipe to a 4,445-gal dosing chamber and then into a 45,780-gal septic tank (BNI 1993, WHC 1992). Refer to Hanford Site Drawing H-4-38163 for a detailed schematic of the septic tank that shows its construction, measurements, and related structures. Additionally, Hanford Site Drawing H-4-152051, Sheet 14, provides a schematic of the septic tank and its underground sewer lines. And Hanford Site Drawing H-4-38165 provides a drawing of the route that the underground sanitary sewer main follows, focusing on its changing elevation.

Reports differ as to the amount of sanitary wastes received by the 4607 Sanitary Sewer in a given period of time. Cramer (1987) states that the system received waste at a rate of approximately 6×10^6 gal/yr in 1987. McCarthy (1989) states that the system received an average of 15,000 gal of sanitary liquid wastes each day in 1989. WHC (1992) states that the system received about 42,000 to 49,200 L of wastes each day in 1992. And BNI (1993) reports that the average flow rate for the septic tank influent and effluent was 23,100 gal/day in 1993. The differences between these flow rate estimates

may have been caused by changes in the number of 400 Area personnel from 1987 to 1993. Refer to Section 4.11.20 for more information about the 4607 Sanitary Sewer.

From 1978 to 1986, the waste stream flowed by gravity through an underground 8-in. PVC pipe from the septic tank to the 4607 Sanitary Tile Field. Hanford Site Drawing H-4-38162 shows the locations of the 4607 Sanitary Sewer septic tank and the tile field in relation to other 400 Area structures, and also includes diagrams and construction details for both. Numerous problems were encountered with the tile field. Septic tank effluent frequently surfaced in the area of the tile field and overflowed into a natural depression nearby (WHC 1992). Refer to Section 4.11.21 for more information about the sanitary tile field.

WHC (1992) states that the problems with the tile field occurred because it had been installed above a caliche layer that apparently confined the liquids discharged. However, WHC-EP-087 states that a caliche layer did not exist underneath the tile field. Site personnel report that the existence of a caliche layer was not investigated and verified when the field failed.

In 1986, the drain field failed completely, causing effluent to overflow through a manhole and enter the natural depression through a drainage ditch (WHC 1992). WHC (1992) states that the drain field clogged, causing its failure, but Site personnel report that the cause of failure is unknown. A valve pit diversion box was subsequently installed at Hanford coordinates N1471 W7231 (Hanford Site Drawing H-4-159041) to divert the waste stream to the depression, which came to be known as the sanitary sewer lagoon. The lagoon was deepened, a berm was constructed around it, and the existing drainage ditch was backfilled (WHC 1992).

Since 1986, all sanitary effluent from the 4607 Sanitary Sewer has discharged from the sanitary sewer system to the unlined and aboveground sanitary sewer lagoon, which is located approximately 100 ft west of the 4608 Percolation Ponds. Refer to Section 4.11.22 for more information about the 4607 Sanitary Sewer Lagoon.

Hanford Site Drawing H-4-159041 provides a detailed sketch that shows the retired 4607 Sanitary Tile Field, the backfilled drainage ditch, the new diversion box, and the 4607 Sanitary Sewer Lagoon.

Bovay Northwest, Inc., conducted an engineering study of the 400 Area sanitary sewer system in 1993 "to investigate alternatives that would eliminate the current practice of disposing primary-treated sewage to an unlined pond north of the 400 Area," the sanitary sewer lagoon. An alternative is required because the current lagoon cannot be permitted under WAC 173-216 regulations for continuing operation. The resulting report, BNI (1993), stated that the best option would be to use an underground tie-line that was constructed in 1991 to connect the 400 Area sanitary sewer main to the Supply System sewage treatment facility, bypassing the 4607 Sanitary Sewer septic tank and the 4607 Sanitary Sewer Lagoon.

The 8-in. gravity flow tie-line begins at the inlet to the 4607 Sanitary Sewer septic tank. It connects the 400 Area sanitary sewer main with the Supply System sewage treatment facility, which is approximately 3 mi northeast

of the 400 Area. Hanford Site Drawing H-6-1801 shows a sketch of the underground line from the 400 Area to the Supply System. The line has never intentionally been used and is currently inactive. If it were to become operational, it would replace the 4607 Sanitary Sewer septic tank and the 4607 Sanitary Sewer Lagoon (BNI 1993).

According to the Bovay Northwest report, however, the tie-line "may never be [used] due to regulatory and political constraints between the government and the utility" (BNI 1993). Negotiations are currently underway to determine whether or not the underground tie-line will ever be activated and, if so, under what conditions. Refer to Section 4.11.9 for more information about the tie-line.

An alternate recommendation presented in the Bovay Northwest report was that an evaporative lagoon be constructed to replace the current sanitary sewer lagoon. The evaporative lagoon would have the capacity to receive 26,000 gal of sanitary wastes per day (BNI 1993). Site personnel report that plans are currently being made for such a lagoon, but construction has not yet begun.

BNI (1993) reports that, if the decision is made to proceed with these plans, the evaporative lagoon will become operational and replace the current sanitary sewer lagoon by mid-1996. However, Site personnel state that the date that the lagoon will be operational remains in question due to funding questions.

Site personnel report that the 4607 Sanitary Tile Field was partially broken up during excavation for the underground tie-line. Pieces of the tile field are evident above ground.

A smaller sanitary sewer system, commonly known as the 4608 Sanitary Sewer, serves trailers MO-353, MO-378, MO-379, and MO-908 in the southwest corner of the 400 Area, according to Site personnel. Hanford Site Drawing H-4-152051, Sheet 6, indicates that the system may also have received wastes from the T-100, T-101, T-102, T-103, T-104, T-105, T-106, T-107, T-108, and T-109 trailers. The system consists of a 3,000-gal septic tank and a drain field. It receives approximately 750 gal of sanitary wastes each day. The system remains active; it began operation around 1983. Refer to Sections 4.10.21 and 4.10.22 for more information about the 4608 Sanitary Sewer septic tank and the 4608 Sanitary Tile Field, respectively.

Several underground sanitary sewer lines throughout the 400 Area have been abandoned in place over the years. Some of these are shown on Hanford Site Drawing H-4-152051, Sheets 1, 2, and 6.

All 400 Area sanitary waste effluents have been routinely monitored since 1980 for ammonia, chloride, phosphate, lead, zinc, cadmium, mercury, and pH levels (WHC 1992).

4.7 NONRADIOACTIVE LIQUID WASTES

Nonradioactive liquid chemical wastes, including detergents and other nonhazardous substances, were disposed of in 400 Area liquid waste sites. These sites are described in later sections of this report.

Additionally, contamination from liquids such as gasoline, diesel fuel, and solvents might be present near storage tanks and their piping systems, as well as in areas where those materials were used or stored. Such releases may have resulted from leakage or spillage.

The only tank leak that has been detected in the 400 Area is the Diesel Fuel Tank Fitting Leak, which is described in Section 4.11.7 of this report. And the only unplanned release that has been reported for the 400 Area is UPR-400-1, a coolant spill that is described in Section 5.22.

4.8 NONRADIOACTIVE SOLID WASTES

Nonradioactive solid wastes generated in the 400 Area have primarily included miscellaneous materials used in the facilities and offices, such as paper, trash, pieces of metal, and plastic parts. These wastes are taken away from the 400 Area for disposal.

4.9 RADIOACTIVE SOLID WASTES

Hanford Site Drawing H-4-11204, which was drawn in 1970 and last updated in the mid-1970's, details three different types of radioactive solid wastes that are produced in the 400 Area. These types are low-level waste; high-level waste; and non-buriable, sodium-bearing waste.

Low-level wastes are trucked to the 200 Areas and deposited in low-level burial trenches, and high-level wastes are transported to the 200 Areas by truck or rail for disposal in a high-level burial caisson. At the time that the drawing was completed, however, methods of disposal for non-buriable, sodium-bearing wastes were still being explored (Hanford Site Drawing H-4-11204).

The 4843 Alkali Metal Storage Facility has operated since 1986 as a storage area for dangerous and mixed alkali metal wastes generated by FFTF and various other operations across the Hanford Site. The facility has the capacity to store 22,000 gal or 185,000 lb of alkali metal wastes, including sodium-bearing wastes. Site personnel report that the facility is currently in interim status. Refer to Section 4.10.31 for more information about the 4843 Alkali Metal Storage Facility.

4.10 DOCUMENTED 400 AREA WASTE SITES

4.10.1 400 FD1A (400 Area French Drain 1A)

400 FD1A is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1082 W7539 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587622 N123202. Hanford Site Drawing H-4-14647 indicates that the french drain is between the 403 and 4703 Buildings and approximately 33 ft west of 400 FD1B. This site is commonly known as 400 Area French Drain 1A, although it has also been known as French Drain 1-A and as French Drain Number 1A. The french drain began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) state that the drain has received water condensate from building air cooling systems, as well as janitorial solutions of water and detergents. Millikin (1988) states that the drain has received Culligan demineralizer backwash and HVAC system condensate from the 4717 Facility Reactor Service Building. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has received condensate from HVAC systems in the 4717 Facility Reactor Service Building.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Cramer (1987) reports that approximately 1.6 L of effluent were received by the french drain each hour as of 1987. However, Millikin (1988) reports that the drain now receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. The conflict between the reported flow rates remains unresolved.

WHC (1993a) states that, since 1989, the french drain has received a total of 2,500 gal per year of effluent.

Effluent discharged to this drain is monitored regularly for certain radioactive and nonradioactive constituents. Millikin (1988) states that there is "no possibility of radioactive contamination."

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

400 FD1A cannot be visually identified. The area between the 403 and 4703 Buildings is a vegetation-free, gravel-covered field.

4.10.2 400 FD1B (400 Area French Drain 1B)

400 FD1B is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1082 W7506 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587656 N123196. Hanford Site Drawing H-4-14647 indicates that the french drain is between the 403 and 4703 Buildings and approximately 33 ft east of 400 FD1A. This site is commonly known as 400 Area French Drain 1B, although it has also been known as French Drain 1-B and as French Drain Number 1B. The french drain began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) state that the drain has received water condensate from building air cooling systems and janitorial solutions of water and detergents. Millikin (1988) states that the drain has received sump water and HVAC system condensate from the 4703 Facility, which is the FFTF Control Building. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has received condensate from HVAC systems in the 4703 Facility.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Cramer (1987) reports that the french drain received approximately 0.6 L of effluent each hour as of 1987. However, Millikin (1988) states that the drain now receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. The conflict between the reported flow rates remains unresolved.

WHC (1993a) states that the total amount of effluent that the drain receives each year is approximately 1,500 gal.

Effluent discharged to this drain is monitored regularly for certain radioactive and nonradioactive constituents. Millikin (1988) states that there is "no possibility of radioactive contamination."

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

400 FD1B cannot be visually identified. The area between the 403 and 4703 Buildings is a vegetation-free, gravel-covered field.

4.10.3 400 FD2 (400 Area French Drain 2)

400 FD2 is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area, just off the southwest corner of the 4710 Building. It is at Hanford coordinates S1160.28 W7420.11 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C;

Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E687665 N123162. The site is commonly known as 400 Area French Drain 2, although it has also been known as French Drain 2 and as French Drain Number 2 (WHC 1991). The french drain began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) state that the drain has received water condensate from building air cooling systems and janitorial solutions of water and detergents. And Millikin (1988) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) report that the drain has received rainwater and HVAC system condensate from the 4621-E Auxiliary Equipment Building.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Cramer (1987) and WHC (1993a) state that the french drain receives approximately 0.2 L of effluent per hour. However, Millikin (1988) reports that the drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. The conflict between the reported flow rates remains unresolved.

Refer to Figure 4-15 for a 1994 photograph of the site.

Millikin (1988) states that there is "a low possibility of radioactive contamination" in the effluent discharged to this french drain, but deems such contamination unlikely. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

400 FD2 currently appears as a rusty, 3-ft-tall metal pipe that is approximately 10 ft south of the 4710 Building and 20 ft east of that structure's southeast corner. The 6-in-diameter pipe is surrounded by landscaping rocks and shrubs, and is 3 in. away from a paved sidewalk. It is capped with a metal plug.

Figure 4-15. 400 Area French Drain 2 (400 FD2), 1994.

4.10.4 400 FD3 (400 Area French Drain 3)

400 FD3 is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1417.83 W7303.15 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587701 N123083. The site, which is surrounded by a gravel-covered field, is located approximately 42 ft east of the southeast corner of the 408-A East DHX structure, outside the protected area fence. The site is commonly known as the 400 Area French Drain 3, although it has also been known as French Drain 3 and as French Drain Number 3 (WHC 1991). The french drain began operation in 1979 (Cramer 1987).

Cramer (1987) and WHC (1993a) state that the french drain at this site has received rainwater. Millikin (1988) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) report that the drain receives rainwater from the 408-A East DHX structure, which houses the easternmost set of four FFTF dump heat exchangers.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Figure 4-16. 400 Area French Drain 3 (400 FD3), 1994.

Reports provide conflicting information about the rate at which effluent is received by the drain. Millikin (1988) states that the drain receives only intermittent discharges and has a normal flow rate of zero. Cramer (1987) and WHC (1993a) state that the average amount of rainwater received over a one-hour period is 0.22 L. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. The conflict between the reported flow rates remains unresolved.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this french drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

400 FD3 currently appears as two rusty metal posts that are surrounded by four 4-ft-high yellow steel posts. One of the rusted metal posts is 2 ft tall and the other is 3 ft tall, and both are approximately 5 in. in diameter. The posts are capped with metal plugs that have raised squares on top. The french drain is surrounded by a vegetation-free, gravel-covered field. Refer to Figure 4-16 for a 1994 photograph of the site.

4.10.5 400 FD4 (400 Area French Drain 4)

400 FD4 is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1510 W7455 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587648 N123057. Surrounded by a gravel-covered field, it is 95 ft south of the 408-A East DHX structure, between the 408-A and 4713-A Buildings. The site is commonly known as 400 Area French Drain 4, although it has also been known as French Drain 4 and as French Drain Number 4 (WHC 1991). The french drain began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) state that the french drain has received dilute sodium carbonate, condensate, and floor drain effluents. Millikin (1988) reports that the drain has received effluent from the 491-E Heat Transport Building that consists of rainwater off the roof of HTS-E and condensate from the building's HVAC system. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has received effluent from the 491-E Heat Transport Building that consists of rainwater off the roof of HTS-E, condensate from the building's HVAC system, rheostat water, and nonregulated quantities of sodium carbonate.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

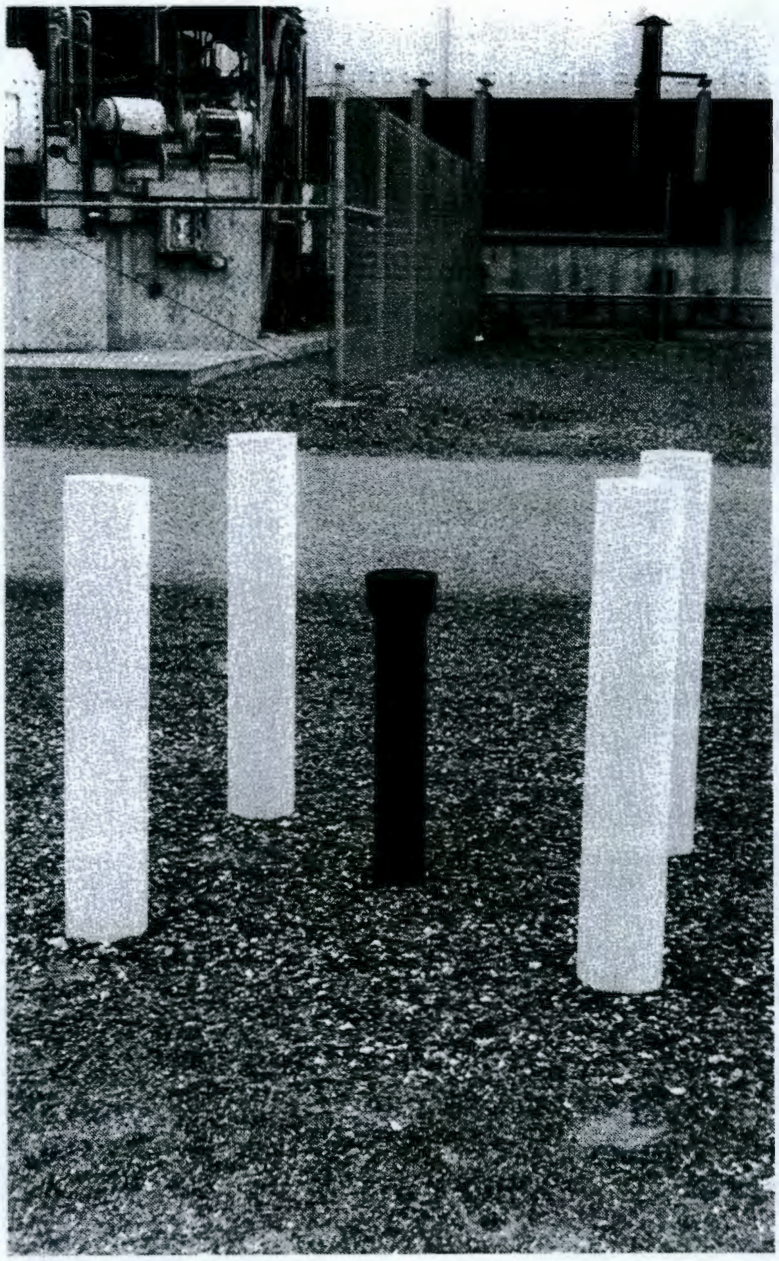
Reports provide conflicting information about the average flow rate of effluent received by this french drain. Cramer (1987) reports that the drain received approximately 2,000 gal/yr of effluent. However, Millikin (1988) reports that the drain now receives only intermittent discharges and has a normal flow rate of zero. The *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. And WHC (1993a) states that the drain has received 0 gal of effluent per year since 1989.

Effluent discharged to this drain is monitored regularly for certain radioactive and nonradioactive constituents. Millikin (1988) states that there is "no possibility of radioactive contamination."

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score. Figure 4-17 is a 1994 photograph of the site.

400 FD4 currently appears as a rusty, 3-ft-high metal pipe that protrudes from the middle of a gravel-covered field. The pipe is capped with a metal plug that has a slot-like depression on top. It is surrounded by four 4-ft-high yellow steel posts.

Figure 4-17. 400 Area French Drain 4 (400 FD4), 1994.

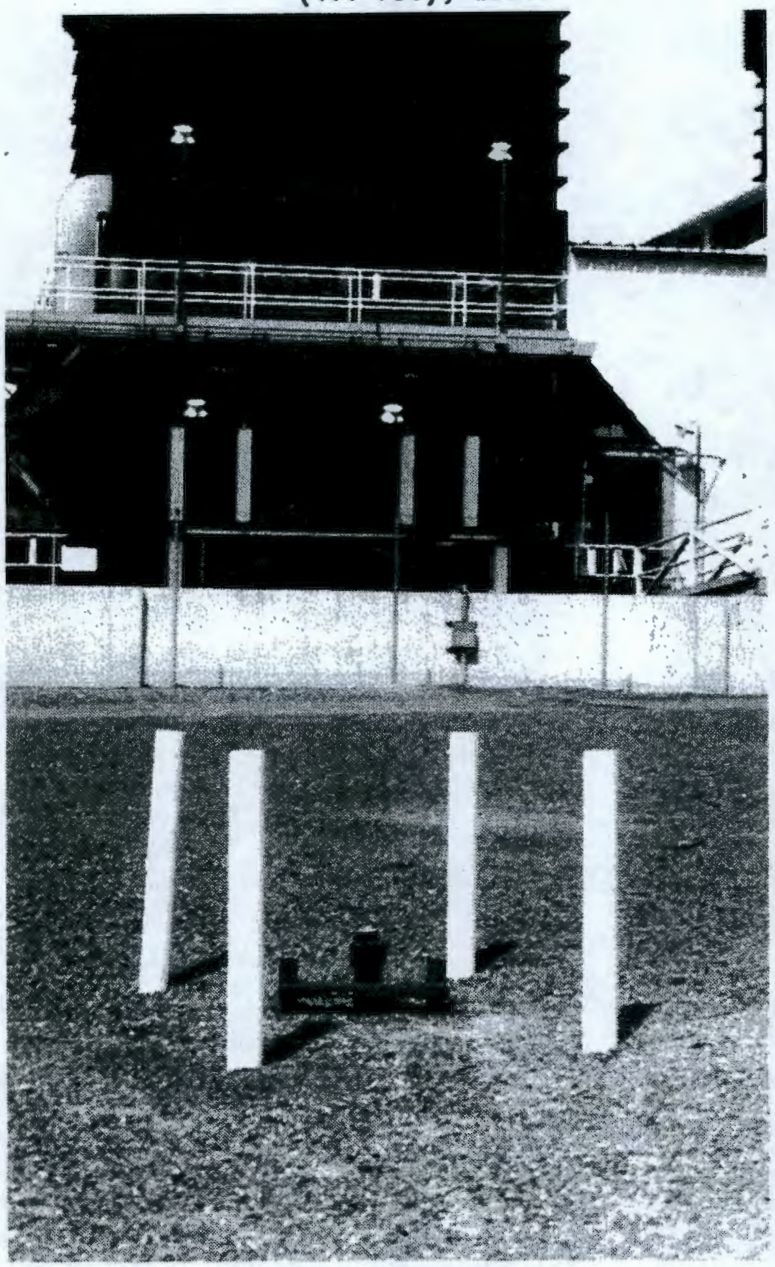


4.10.6 400 FD5 (400 Area French Drain 5)

400 FD5 is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1501.6 W7835 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587522 N123077. The site is 130 ft south of the 408-C West DHX structure, 88 ft west of the 408-B DHX structure, and southwest of the Reactor Containment Building. It is commonly known as 400 Area French Drain 5, although it has also been known as French Drain 5 and as French Drain Number 5 (WHC 1991). The french drain began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) reports that the drain has received rainwater, water condensate from building air cooling systems, janitorial solutions of water and detergents, and 2% sodium carbonate solution. WHC (1993a) similarly states that the drain has received rainwater, condensate from building air cooling systems, janitorial solutions, and sodium carbonate solution. Millikin (1988) reports that the drain has received rainwater, effluent from the dump heat exchangers, and rheostat water; the sources of these effluents are the 408-B South DHX structure, which houses the southernmost dump heat exchangers, and the 491-W Heat Transport Building. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has received rainwater and rheostat water, containing nonregulated quantities of sodium carbonate, from the 408 South DHX and the 491-W Heat Transport Building.

Figure 4-18. 400 Area French Drain 5 (400 FD5), 1994.



The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Cramer (1987) reports that the french drain received approximately 0.22 L of effluent per hour as of 1987. However, Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. WHC (1993a) reports that the drain has received 0 L of effluent per hour since 1989. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. The conflict between the reported flow rates remains unresolved.

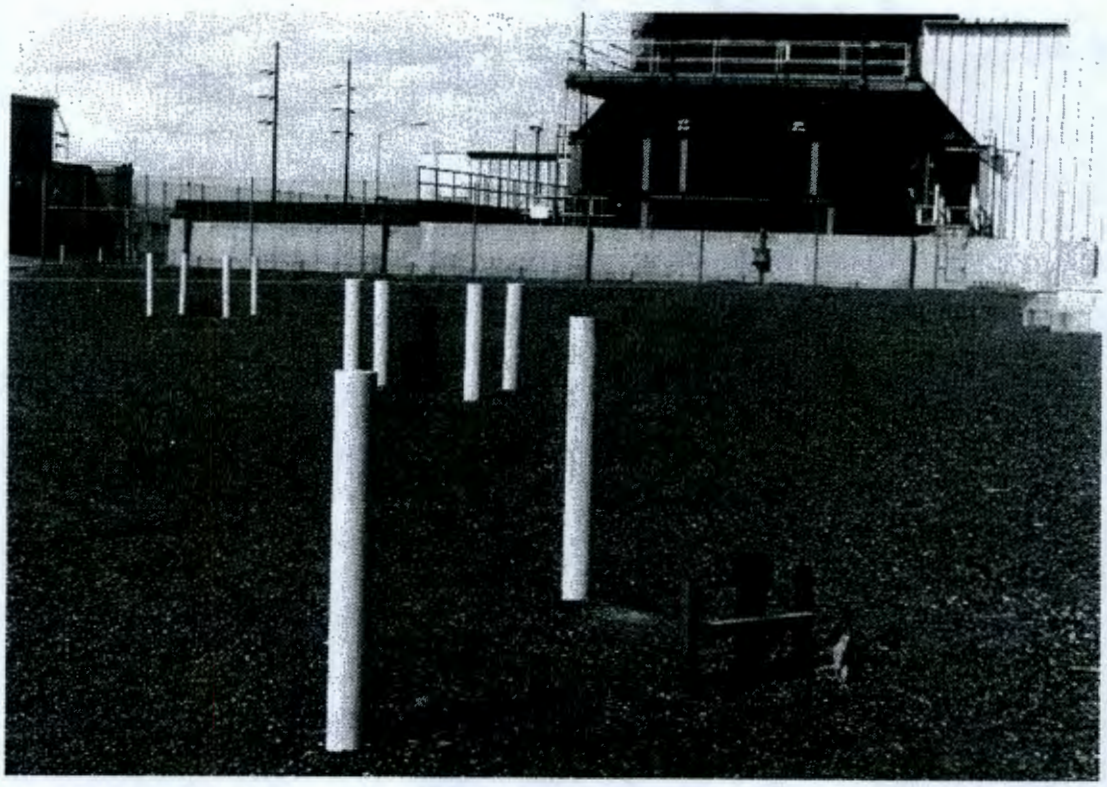
Effluent discharged to this drain is monitored regularly for certain radioactive and nonradioactive constituents. Millikin (1988) states that there is "no possibility of radioactive contamination."

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

400 FD5 currently appears in the middle of a gravel- and cobble-covered field. It consists of a rusty metal pipe, with a diameter of 4 in., that is surrounded by four 4-ft-tall yellow steel posts. The pipe is 15 in. tall and is capped with a metal plug that has a raised square on top. Two 8-in-tall metal bars protrude from the ground approximately 1 ft to the east and west sides of the pipe; they are connected to each other, and to the pipe, by a horizontal metal bar. Refer to Figure 4-18 for a 1994 photograph of the site.

Additionally, Figure 4-19 shows a 1994 photograph of 400 FD5, 400 FD6, and 400 FD11; 400 FD5 is near the upper left corner.

Figure 4-19. 400 Area French Drains 5, 6, and 11 (400 FD5, 400 FD6, and 400 FD11), 1994.

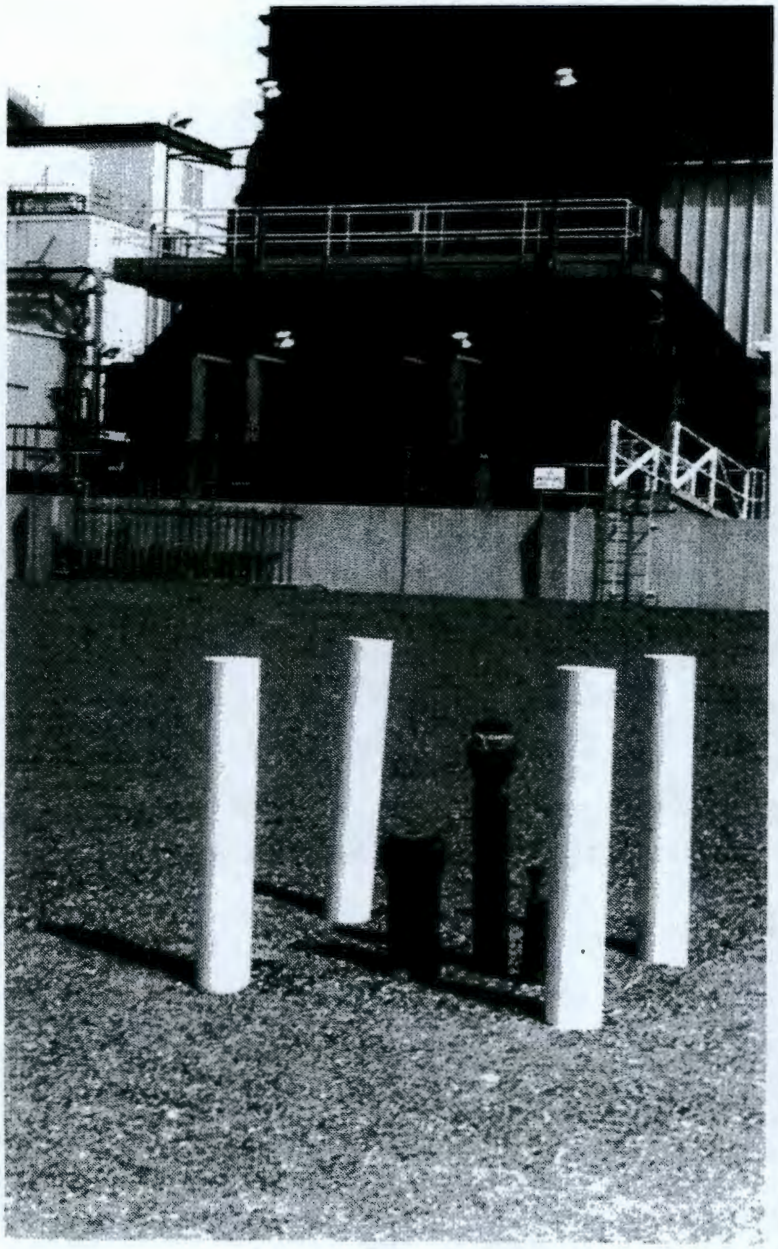


4.10.7 400 FD6 (400 Area French Drain 6)

400 FD6 is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1452 W7860 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587534 N123064. The french drain at this site is 80 ft south of the 408-C West DHX and 113 ft west of the 408-B South DHX (Hanford Site Drawing H-4-14647). Although reports state that the french drain is directly south of 400 FD6, drawings and a visual inspection of the site indicate that the drain is located approximately 55 ft southeast. The drain is commonly known as 400 Area French Drain 6, although it has also been known as French Drain 6 and as French Drain Number 6 (WHC 1991). It began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) states that the french drain at this site began operation in 1979 to receive condensate from building air cooling systems and floor drain effluents. WHC (1993a) reports that the effluent originates from rainwater. And Millikin (1988) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) state that the drain receives rainwater from the 408-C West DHX structure, which houses the westernmost four dump heat exchangers.

Figure 4-20. 400 Area French Drain 6 (400 FD6), 1994.



The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Cramer (1987) and WHC (1993a) state that approximately 100 gal of effluent are received at this site each year. Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

400 FD6 currently appears as three rusty metal pipes that are surrounded by four 4-ft-tall yellow steel posts. One pipe has a diameter of 4 in. and is 2 ft high, and another has a diameter of 6 in. and is 3 ft high. The third pipe is 1 ft high and has a thin metal pipe, which branches east and west and then stops abruptly, protruding from its center. Refer to Figure 4-20 for a 1994 photograph of this french drain. Additionally, Figure 4-19 in Section 4.10.6 shows a 1994 photograph showing 400 FD5, 400 FD6, and 400 FD11; 400 FD6 is in the center.

4.10.8 400 FD7 (400 Area French Drain 7)

400 FD7 is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area, approximately 50 ft north of the 408-C West DHX structure. It is at Hanford coordinates S1218 W7768 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587543 N123141. The site is commonly known as 400 Area French Drain 7, although it has also been known as French Drain 7 and as French Drain Number 7 (WHC 1991). The french drain began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) state that the drain has received water condensate from building HVAC air cooling systems and janitorial solutions of water and detergents. Millikin (1988) states that the drain has received condensate from HVAC coolers and water from roof and floor drains in the 4621-W Auxiliary Equipment Building--West. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has received rainwater from the 453-C Switch Gear Pad, as well as condensate from HVAC coolers and water from roof and floor drains in the 4621-W Auxiliary Equipment Building--West.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. However, Cramer (1987) and WHC (1993a) state that approximately 0.2 L of effluent are received at this site each hour. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. The apparent conflict between the reported flow rates remains unresolved.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

400 FD7 appears on Hanford Site Drawing H-4-14647 to be in the middle of a paved area west of the FFTF Reactor Containment Building and south of the water tanks. Visual inspection of the site shows a 6-in-diameter metal pipe that is capped with a metal lid at grade. The outside circular lip of the pipe is a rusty metal color. The metal lid has a raised square on top and is a green color, probably from oxidation.

Refer to Figure 4-21 for a 1994 photograph of this french drain.

Figure 4-21. 400 Area French Drain 7 (400 FD7), 1994.

4.10.9 400 FD8 (400 Area French Drain 8)

400 FD8 is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1115 W7745 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587552 N123199. Drawings, including Hanford Site Drawing H-4-14647, indicate that the french drain at this site is south of the 484 Building and approximately 25 ft east of the 482B/T-87 Water Storage Tank. The drain is commonly known as 400 Area French Drain 8, although it has also been known as French Drain 8 and as French Drain Number 8 (WHC 1991). It began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) state that the drain has received water condensate from building air cooling systems and janitorial solutions of water and detergents. And Millikin (1988) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) report that the drain has the potential to receive condensate from HVAC coolers in the 4621-W Auxiliary Equipment Building--West.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Millikin (1988) reports that the french drain received only intermittent discharges and had a normal flow rate of zero as of 1988. However, Cramer

(1987) reports that the french drain received approximately 7 L of effluent per hour as of 1987. WHC (1993a) states that the drain has received 700 gal/yr of effluent since 1989. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. The apparent conflict between the reported flow rates remains unresolved.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. Monitoring is performed regularly for radioactive and nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

400 FD8 cannot be visually identified. Hanford Site Drawing H-4-14647 shows this french drain to be located in an asphalt-covered area 25 ft east of the 482B/T-87 Water Storage Tank and slightly to the south. The area is west of the FFTF Reactor Containment Building. A 6-in-diameter metal pipe emerges from the ground in that vicinity, but it is topped at grade with a metal lid stamped "Water" and is probably not related to the french drain. Figure 4-22 is a 1994 photograph of the metal pipe.

Figure 4-22. Potential Site of 400 Area French Drain 8 (400 FD8), 1994.

4.10.10 400 FD9 (400 Area French Drain 9)

400 FD9 is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1148.70 W7892.80 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587542 N123185. Hanford Site Drawing H-4-14647 shows the french drain at this site to be approximately 624 ft north of the 408-C West DHX structure and southwest of the 482A/T-58 and 482B/T-87 Water Tanks. The drain is commonly known as 400 Area French Drain 9, although it has also been known as French Drain 9 and as French Drain Number 9 (WHC 1991). It began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) reports that the drain has received drinking water, water softener wastewater, and janitorial solutions of water and detergents. And Millikin (1988) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) state that the drain receives effluent from the 481 Pumphouse, including sanitary water from pump seal leaks and salt water from water softener regeneration.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

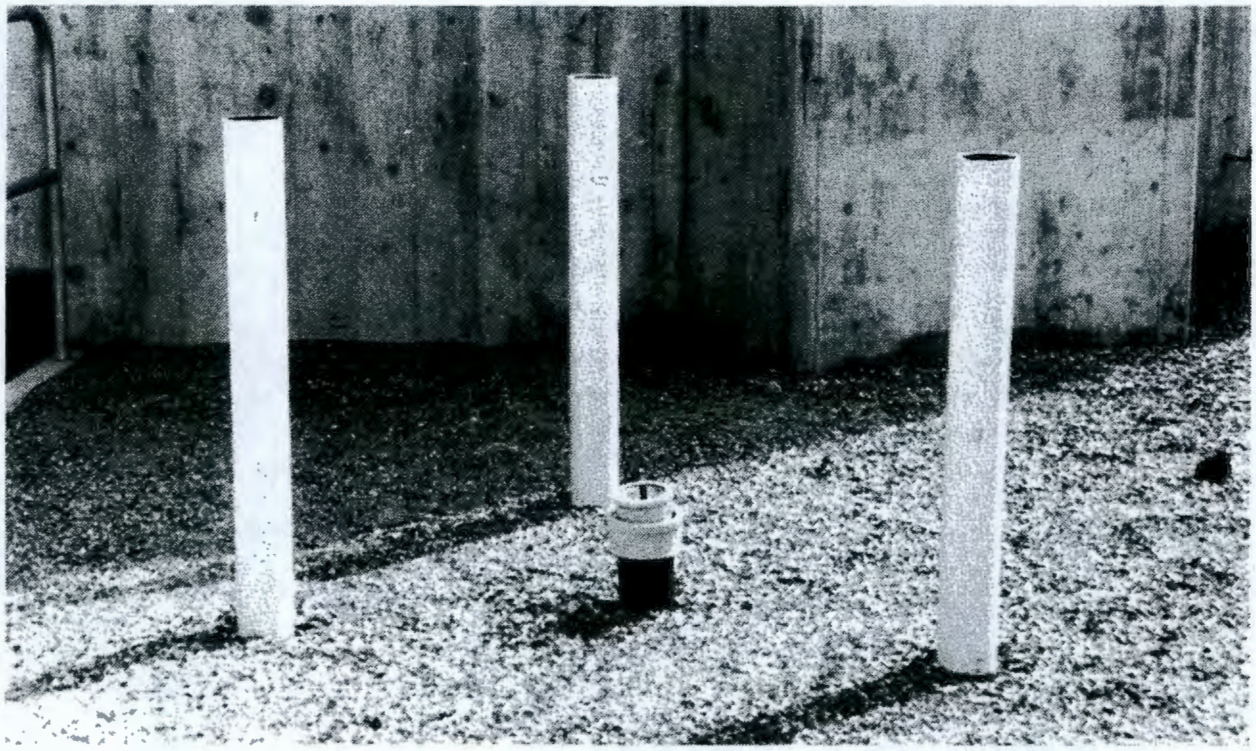
Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. Additionally, the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.1 gal/min. However, Cramer (1987) and WHC (1993a) state that the drain receives approximately 4.8 L of effluent each hour. The conflict between the reported flow rates remains unresolved.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

400 FD9 cannot be identified at the location in which it appears on drawings. However, a 1-ft-tall metal pipe protrudes from a vegetation-free, gravel-covered field to the north of the 482A and 482B water tanks. It is surrounded by three yellow steel posts that are 4 ft tall. The pipe has a diameter of approximately 5 in. The top third of the pipe is flared and has been painted yellow, while the remainder of the pipe is a rusty metal color. The pipe is capped with a loose-fitting, easily removed lid that has a slot in the top. This pipe may or may not be part of 400 FD9. Figure 4-23 is a 1994 photograph of this site.

Figure 4-23. Potential Site of 400 Area French Drain 9 (400 FD9), 1994.



4.10.11 400 FD10 (400 Area French Drain 10)

400 FD10 is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1090.60 W7909.60 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587528 N123185. The french drain at this site is commonly known as 400 Area French Drain 10, although it has also been known as French Drain 10 and as French Drain Number 10 (WHC 1991). Hanford Site Drawing H-4-14647 indicates that the drain is located approximately 30 ft west, and slightly north, of the 482A/T-58 Water Storage Tank and Equipment Room structure. However, the location is in question. The drain began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) state that the drain has received water from leaking valves and other sources in two water storage tank buildings. Cramer (1987) and WHC (1993a) state that these two storage tank buildings are numbered 482A and 482E, but Hanford Site Drawing H-4-11008, Sheet 1, indicates that they are numbered 482A and 482B. Additionally, Millikin (1988) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) state that the drain has received rainwater runoff from the 482A/T-58 Water Storage Tank and Equipment Room.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. However, Cramer (1987) and WHC (1993a) state that the drain receives approximately 0.043 L of effluent each hour. The conflict between the reported flow rates remains unresolved.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

Hanford Site Drawing H-4-14647 indicates that 400 FD10 is located approximately 30 ft west, and slightly north, of the 482A/T-58 Water Storage Tank and Equipment Room structure. A french drain could not be visually identified at that site. However, a drain was observed in the basement level of the 482A/T-58 Water Storage Tank and Equipment Room structure, the westernmost of two water tanks that are located on the west side of the FFTF Reactor Containment Building. The drain is located at the bottom of stairs that lead downward in the base of the water tank. It appears as a 4-in. steel pipe with a metal grate cover that is level with the paved surface surrounding it. There are no identification signs or markings on the drain; it may or may not be 400 FD10.

Refer to Figure 4-24 for a 1994 photograph of the water storage tank drain.

Figure 4-24. 482A/T-58 Water Storage Tank Drain, Possibly 400 Area French Drain 10 (400 FD10), 1994

4.10.12 400 FD10A (400 Area French Drain 10A)

400 FD10A is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1074.20 W7811 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587549 N123185. The french drain at this site is commonly known as 400 Area French Drain 10A, although it has also been known as French Drain 10A and as French Drain Number 10A (WHC 1991). Hanford Site Drawing H-4-14647 indicates that the drain is located approximately 21 ft west, and slightly north, of the 482B/T-87 Water Storage Tank and Equipment Room structure. However, the location is in question. The drain began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) state that the drain has received water from leaking valves and other sources in two water storage tank buildings. Cramer (1987) and WHC (1993a) state that these two storage tank buildings are numbered 482A and 482E, but Hanford Site Drawing H-4-11008, Sheet 1, indicates that the buildings are numbered 482A and 482B. And Millikin (1988) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) state that the drain receives water storage tank runoff from the 452A/T-87 Water Storage Tank and Equipment Room.

This site consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. However, Cramer (1987) and WHC (1993a) state that the drain receives approximately 0.043 L of effluent each hour. The conflict between the reported flow rates remains unresolved.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

Hanford Site Drawing H-4-14647 indicates that the drain is located approximately 21 ft west, and slightly north, of the 482B/T-87 Water Storage Tank and Equipment Room structure. A french drain could not be visually identified at that site. However, a drain was observed in the basement level of the 482B/T-87 Water Storage Tank and Equipment Room structure, the easternmost of two water tanks that are located on the west side of the FFTF Reactor Containment Building. The drain is located at the bottom of stairs that lead downward in the base of the water tank. It appears as a 4-in. steel pipe with a metal grate cover that is level with the paved surface surrounding it. There are no identification signs or markings on the drain; it may or may not be 400 FD10A. Refer to Figure 4-24, in Section 4.10.11, for a 1994 photograph of a similar drain.

4.10.13 400 PPSS (400 Area Process Pond and Sewer System)

400 PPSS is an active, nonhazardous and nonradioactive liquid waste site that is located within and north of the 400 Area. This system is commonly known as the 400 Area Process Pond and Sewer System (WHC 1991), although it was also referred to as the 400 Area Secondary Cooling Water system during the Phase II stream effluent studies. It consists of underground piping (known as the 4904 Process Sewer System), a control structure (known as the 4608B Control Structure and Process Sewer Sampling Station), and two percolation ponds. The process pond and sewer system began operation in 1979 to receive waste water from cooling systems and nonsanitary drains and sumps in the 400 Area (Cramer 1987). Effluent wastewater enters the process sewer system from the FFTF and FMEF cooling towers. Additionally, drains and sumps that collect nonhazardous leaks, spills, and rainwater discharge to this system (Cramer 1987). Although FFTF has been in "hot" standby status since 1992, and plans are being made to transition the reactor to a shutdown condition, the process sewer continues to receive effluent from the reactor building and other facilities (WHC 1992).

The four main facilities contributing to the process sewer effluent are FFTF, FMEF, the Maintenance and Storage Facility (MASF), and the 481-A Water Pumphouse. Each of these facilities has its own 6-in.-diameter underground pipeline that connects with the 12-in.-diameter process sewer pipeline that is

located in the central 400 Area (WHC 1992). WHC (1992) reports that, together, the four facilities have 74 potential points of entry for effluent to be introduced into their underground pipelines and, thus, the process sewer. Seamans (1994), a more recent report, states that the four facilities have 76 potential points of entry to the process sewer.

Cooling water and other nonsanitary, nonhazardous effluents from FMEF flow into the process sewer for disposal. Because areas of FMEF were originally designated for the handling of radioactive materials, however, drains in areas that would have been contaminated are discharged into a retention liquid waste system (RLWS). Radioactive materials have never been introduced into the FMEF facility. The RLWS consists of two 22,700-L tanks that allow effluent "to be sampled for radioactivity and verified to meet acceptable discharge limits prior to release to the process sewer. Routine fire system tests, heating and ventilation systems, and electric water coolers are the only current sources of effluent to the RLWS. Due to the low volume of these sources, the tanks' contents are released to the process sewer only once or twice a year" (WHC 1992).

Seamans (1994) states that FMEF has 62 points of entry to the 400 Area Process Sewer. Three are routine, and 59 are inactive or have very infrequent use. The points of entry at FMEF "are innocuous . . . [because they] would not come into contact with any radioactive materials even if any radioactive material were in the facility" (Seamans 1994).

MASF contains 4 points of entry to the process sewer. One is routine, and 3 are infrequent. Seamans (1994) notes that "points of entry to the process sewer are not located in areas with the potential for radioactive contamination. All contaminated liquid waste is collected in radioactive liquid waste tanks and is not in contact with the process sewer effluent at any point." The routine contributor is the cooling water from the building service and instrument air compressor (Seamans 1994).

The 481-A Water Pumphouse contains 5 points of entry to the process sewer, all of which are related to pumps housed in the facility. One point of entry is a routine contributor, and 4 are infrequent. The frequent contributor is a floor drain that is used for weekly fire pump testing; it is protected from potential contamination because its inlet is installed above floor level. The infrequent contributors are all floor drains that are protected from contaminants by "detailed maintenance procedures and administrative controls" (Seamans 1994). Seamans (1994) notes that "there is a very minor risk of the introduction of diesel fuel or equipment oil into the process sewer due to maintenance or an emergency in this building."

The FFTF cooling towers have 3 points of entry to the process sewer, all of which are routine contributors. The first point of entry is the equipment drain in the water treatment building that receives effluent wastewater discharged by the cooling tower blowdown system. The second point of entry is the Cooling Tower Overflow Trench, which is located on the north side of the cooling tower pad and "handles overflow or draining of the towers and precipitation runoff." This trench is described in Section 4.10.17. And the third point of entry is a sink in the water treatment building that is used by operators to wash their hands, gloves, glassware, small equipment, and similar

items; the only chemicals that could be discharged into the sink are those already used to treat the cooling towers, as no other chemicals are in the building (Seamans 1994).

Seamans (1994) states that "There are five intermittent sources that result in batch discharge to the Secondary Cooling Water System. Three of these sources are drums of water, the fourth is the Large Diameter Cleaning Vessel (LDCV) in MASF, and the fifth is the mitigation pump bearing cooling water." According to Seamans (1994), these intermittent sources include the following:

- FMEF Heating and Ventilation System Condensate, which consists of moisture condensed from ambiant air as it passes through the heating and ventilation unit

- FFTF Containment Heating and Ventilation Condensate, which consists of moisture condensed from ambient air as it passes through the heating and ventilation unit

- MASF Large Diameter Cleaning Vessel, in which water is used for the testing of mitigation pumps for Tank Waste Remediation Support (TWRS)

- Bearing Cooling Water, at approximately 25 gal/min (once-through cooling), from mitigation pump test runs.

FFTF Regulatory Compliance personnel report that drains with the potential to discharge hazardous constituents have been identified during the Phase II stream evaluations and the miscellaneous stream inventory revision. These drains have been plugged, bermed, or dammed. Refer to WHC-EP-0587 (WHC 1992a) for additional information.

The 12-in. process sewer pipeline leads north from the 400 Area to the 4608 Percolation Ponds, two unlined ponds that are located in the 600 Area (WHC 1992). Refer to Section 4.10.13.1 for more information about the percolation ponds.

Hanford Site drawings show a corrugated metal building, located within the fenced 4607 Sanitary Sewer septic tank site at the southeast corner, that is located over a section of the process sewer pipeline. This building is the 400 Area Process Sewer Control Structure, also known as the 4608B Control Structure and Process Sewer Sampling Station, and is not associated with the 4607 Sanitary Sewer septic tank. It contains the flow meter, pH meter, and conductivity meter for the 400 Area Process Sewer.

Hanford Site Drawing H-4-38162 provides a sketch that shows the 12-in. process sewer pipeline route, the location of the process sewer control building, and the percolation ponds.

Drywells associated with the FFTF process sewer are shown on Hanford Site Drawing H-4-14647. The drawing also provides a description and drawing of a typical drywell. Figure 4-25 is a 1994 photograph of the sewer system control building.

Figure 4-25. 400 Area Process Pond and Sewer System Control Structure, 1994.

McCarthy (1989) reports that flow through the process sewer system is low, approximately 10 to 15 gal/min. However, FFTF Regulatory Compliance personnel report that the flow rate in July 1994 runs between 18 and 36 gal/min. WHC (1991) states that approximately 6 million gal of wastewater flow through this system each year.

Water received from the FFTF and FMEF cooling towers contains algicides and other treatment chemicals, including biocides and softening agents. Dearcide 702, a biocide, and sodium hypochlorite, a microbicide, are added to the cooling tower water for biological control. And Dearborn 878 is added to the cooling tower water for the prevention of scale formation (DOE-RL 1992b, WHC 1992, and Seamans 1994).

DOE-RL (1992b) and Seamans (1994) state that the following chemicals are currently used during chemical testing of the secondary cooling water for scale inhibitor concentration: Dearborn Code 550, a sodium thiosulfate/borate solution; Dearborn Code 562, a xylenol orange indicator; Dearborn Code 595, a hydrochloric acid solution; Dearborn Code 899, a beryllium sulfate solution; and Dearborn Code 904, a thorium nitrate solution.

Concentrations of the chemicals currently found in the 400 Area secondary cooling water are below regulatory limits (Cramer 1987, WHC 1992, DOE-RL 1992b). The June 1994 issue of *Focus*, published by the Washington State Department of Ecology, states that the 400 Area "secondary cooling effluent does not contain any dangerous wastes, as defined under Washington State regulations" (see Appendix C). And a July 15, 1985 letter from the

Washington State Department of Ecology to DOE-RL states that "cooling water additive solutions are not regulated as dangerous waste under chapter 173-303 of the Washington Administrative Code" (see Appendix C).

WHC (1992) states that "there are no significant hydrologic or contaminant impacts from the disposal of process sewer effluent in the 400 Area ponds."

WHC (1992) states that Dearborn 727 was added to the secondary cooling water until the early 1990's. Additionally, prior to 1986, sulfuric acid was added to lower the pH of the cooling tower water from a range of 8.4 to 9.0 to a range of 7.5 to 8.5. That practice has been discontinued (WHC 1992). And Bloom (1990) states that Dearborn 876 was used in conjunction with the cooling towers at one time.

McCarthy (1989) provides data from 400 Area Process Sewer sampling that was performed in calendar year 1979. These data are presented in Table 4-11.

Site personnel report that, in the Phase II stream characterization sampling program established for the 400 Area Process Sewer, four complete U.S. Environmental Protection Agency sampling evolutions were completed in 1993. The data obtained during the sampling are available through the LEMIS database.

Cramer (1987) reports that inspections of the process pond and sewer system are performed weekly, and notes that sump contents are sampled and analyzed prior to discharge if hazardous chemicals are suspected to be present.

More detailed information about sample criteria is provided in WHC-SD-FF-PLN-002, Rev. 4 (Seamans 1994). That report states that 400 Area Process Sewer routine effluent samples will be analyzed for the following: barium, cadmium, chromium, fluoride, lead, nitrate (as N), chloride, copper, sulfate, pH, gross alpha particle activity, and gross beta particle activity. It also states that liquid effluent characterization samples will be analyzed for the following:

- Volatile organics (VOA)
- Semi-volatile organics (semi-VOA)
- Polychlorinated biphenyls (PCB) and organochlorine pesticides
- Sulfate, fluoride, phosphate, and chloride anions (IC)
- pH
- Nitrate and nitrite
- Alkalinity
- Total dissolved solids (TDS)
- Total suspended solids (TSS)
- Ammonia
- Chemical oxygen demand (COD)
- Inductive coupled plasma (ICP) metals, including tin, selenium, arsenic, lead, and mercury
- Total recoverable oil and grease
- Total phenols
- Phosphorus
- Total cyanide

Table 4-11. 400 Area Process Sewer Analytical Summary for Calendar Year 1989.

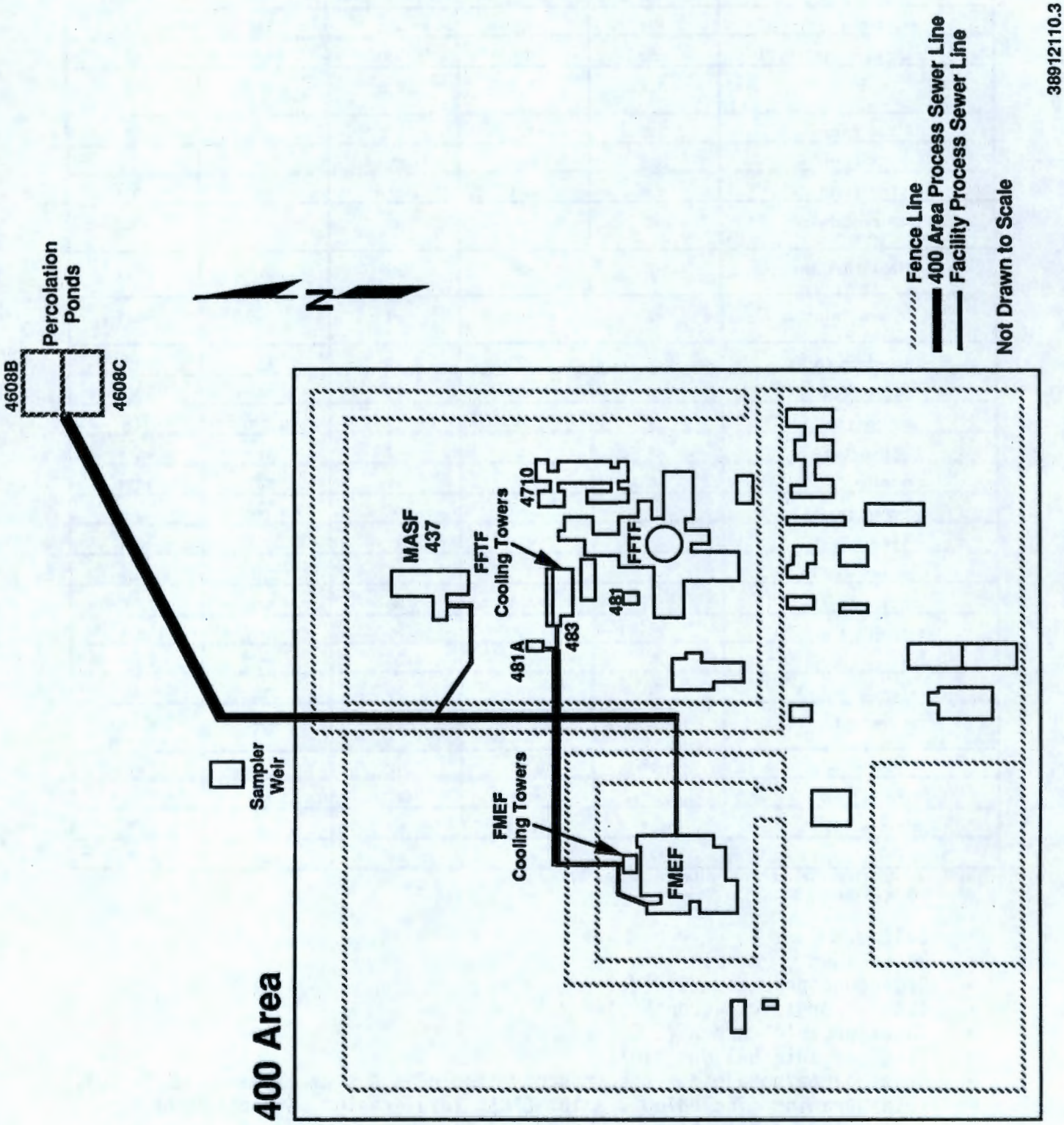
Analysis	Minimum	Maximum	Average	ACV	Release (kg/yr)
Gross Alpha (pCi/L)	<20	<20	<20	120	NA
Gross Beta (pCi/L)	<40	72	45	120	NA
pH	8.5	9.2	8.8	2.0 to 12.5	NA
TOC (p/m)	2.0	3.1	2.4	NA	35
TOX (p/b)	20.5	36.2	27.1	NA	0.4
POX (p/b)	0.5	<1.0	<1.0	NA	<0.1
Perchloroethylene (p/b)	<2	<2	<2	NA	<0.1
Trichloroethane (p/b)	<2	<2	<2	200	<0.1
Methylene Chloride (p/b)	<2	<2	<2	NA	<0.1
Chloroform (p/b)	<2	<2	<2	NA	<0.1
Arsenic (µg/L)	<5	<5	<5	50	<0.1
Barium (µg/L)	27	48	39	1,000	0.6
Cadmium (µg/L)	<5	<5	<5	10	<0.1
Chromium (µg/L)	<5	<5	<5	50	<0.1
Copper (µg/L)	<5	7	6	1,000	<0.1
Lead (µg/L)	<1	<1	<1	50	<0.1
Mercury (µg/L)	<1	<1	<1	2.0	<0.1
Sodium (mg/L)	98.5	64.3	88	NA	1,370
Selenium (µg/L)	<5	<5	<5	10	<0.1
Silver (µg/L)	<5	<5	<5	50	<0.1
Chloride (mg/L)	19	37	24	250	340
Analysis	Minimum	Maximum	Average	ACV	Release (kg/yr)
Fluoride (mg/L)	0.91	0.55	0.73	2.0	11
Nitrite (mg/L)	<0.2	<0.2	<0.2	NA	<4
Nitrate (mg/L)	17.2	1.1	2.8	45	37
Sulfate (mg/L)	87	66	74	250	1,080

ACV = Administrative control value (McCarthy 1989)
NA = Not applicable

- Sulfides
- Herbicides
- Organophosphorus pesticides
- Total inorganic carbon
- Total organic carbon (TOC)
- Total organic halides (TOX)
- Gross alpha/beta/gamma spectroscopy (includes Cesium-137 and Cobalt-60), total uranium (including Uranium-238), total radium, Strontium-90, Iodine-129, and tritium.

This site has not been assigned an HRS migration score. Figure 4-26 is a drawing of the 400 Area Process Pond and Sewer System.

Figure 4-26. 400 Area Process Pond and Sewer System (400 PPSS).



4.10.13.1 4608 Percolation Ponds B and C

4608 Percolation Ponds B and C are located northeast of the 400 Area. These two ponds are part of the 400 Area Process Pond and Sewer System, described above. They are also known as Percolation Ponds 4608B and 4608C, and as the 4608 Percolation Ponds. The north pond is Percolation Pond 4608B, and the south pond is Percolation Pond 4608C.

WHC (1992b) refers to the 400 Area Percolation Ponds as both "Ponds 4608 B and C" and "Ponds A and B." The former is believed to be correct, as other documentation describing the two ponds refers to Ponds B and C or Ponds 4608B and 4608C.

Figure 4-27 is a drawing of the two percolation ponds, the diversion box, and the process sewer inlet pipe. The unlined percolation ponds are documented as being 100 ft long and 50 ft wide at the base, with a depth of approximately 4 ft (Seamans 1994). They are approximately 75 ft wide at the top and have 4-ft-thick earth walls. Hanford Site Drawing H-4-38162 provides a detailed drawing of these percolation ponds, along with a drawing showing the location of the ponds in relation to other 400 Area structures.

The 400 Area Process Sewer empties into an uncovered, concrete diversion box that is built into the wall that separates the two ponds. The box is approximately 2 ft long and 2 ft wide. The use of the ponds is alternated so that only one pond is used at any given time (Jacques 1990). Bloom (1990) notes that "manually-operated slide gates located on either side of the diversion box determine the direction of flow. The ability to isolate either pond is provided to allow for maintenance, should it be required." Wastewater discharged into the ponds is released to the environment by natural evaporation and percolation into the soil column (WHC 1992b).

The 400 Area secondary cooling water is not treated prior to its discharge to the 4608 Percolation Ponds. DOE-RL (1992b) states that the BAT/AKART report confirms that the effluent is not a hazardous waste and recommends that the effluent stream continue to discharge to the ponds "in its current status." WHC (1992b) states that effluent is discharged to the ponds at an average rate of 18 gal/min.

These percolation ponds are currently surrounded by an 8-ft-high chain-link fence with three rows of barbed wire at the top. The single gate to the fence, which is at the west side of the bounded area, is unlocked and open. A sign near the gate reads "Hanford Engineering Development" and also displays the number "4608." Each pond appears as a vegetation-covered area that is recessed about 6 ft. The south pond, Percolation Pond 4608C, appeared to be in use in May 1994 and had visible water and green vegetation at its surface. The north pond, Percolation Pond 4608B, had dried vegetation and, apparently, was not being used at the time. The diversion box is located at the northwest corner of the south pond. Each pond is fed by a 14-in. vitrified clay pipe. A cobble- and vegetation-covered area approximately 30 ft wide separates the two ponds, and a similar area approximately 15 ft wide separates the ponds from the fence. Refer to Figure 4-28 for a 1994 photograph of the south percolation pond and the diversion box.

Figure 4-27. The 4608B and 4608C Percolation Ponds (400 PPSS).

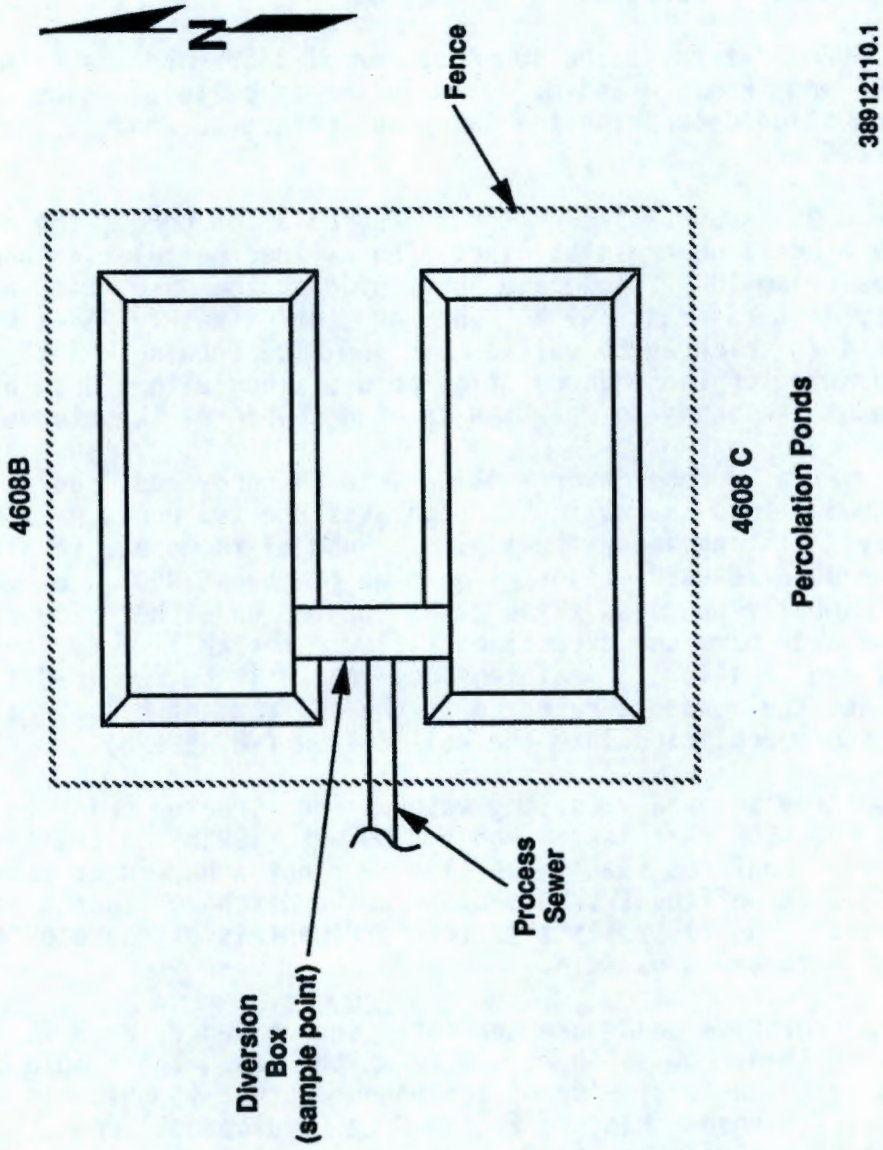


Figure 4-28. Diversion Box and the 4608C Percolation Pond (400 PPSS), 1994.

4.10.14 400 RFD (400 Area Retired French Drains)

400 RFD comprises inactive, nonhazardous and nonradioactive liquid waste sites that are located throughout the 400 Area. WIDS lists the Hanford coordinates for this site as S850 W8000, and the corresponding Washington State plane coordinates are E587488 N123254. Together, the sites are commonly known as the 400 Area Retired French Drains (WHC 1991). During construction work, these french drains received water used for washing components prior to their installation. Their dates of operation are unknown, although their use was discontinued prior to 1980 (Cramer 1987, DOE-RL 1988a).

An unknown amount of water was received by these drains (DOE-RL 1988a). DOE-RL (1988a) reports that the combined hazardous chemical inventory for the retired french drains includes 40 kg of sodium dichromate.

These drains are registered class V underground injection wells (DOE-RL 1988a). They have not been assigned HRS migration scores.

400 RFD cannot be visually identified. The area at which 400 RFD appears on drawings is a vegetation-free field that is covered with areas of asphalt and gravel. A 6- or 7-in. pipe emerges from one of the asphalt-covered areas just west of the 483 Building and is covered at grade level with a metal lid stamped "Water." This may or may not be one of the french drains. Refer to Figure 4-29 for a 1994 photograph of the potential drain.

Figure 4-29. The Possible Location of a 400 Area Retired French Drain (400 RFD), 1994.

4.10.15 400 RSP (400 Area Retired Sanitary Pond)

400 RSP is an inactive, nonhazardous and nonradioactive liquid waste site that is located in the 400 Area, immediately west of the 4706 Building. It is at Hanford coordinates S1800 W8650 and approximate Washington State plane coordinates E587274 N122960. The 400 Area Retired Sanitary Pond was located at this site (WHC 1991). It operated from approximately 1972 to 1979, receiving sanitary liquid wastes from a portable sanitary sewage treatment plant (Cramer 1987) that was located several hundred feet away at approximate Hanford coordinates S1694 W8483 (Hanford Site Drawing H-4-152051, Sheet 6).

Hanford Site Drawing H-4-152051, Sheet 6, shows the "temporary sewer treatment plant" with underground lines that were "abandoned in place." The lines travel from the portable sanitary sewage plant site to end in a field west of the "Future 4706" building site. Hanford Site Drawings H-4-14600, H-4-14601, and H-4-14602 also show the "sewage treatment plant" and its associated underground lines in this approximate location.

The sanitary pond received approximately 12,000 gal of aqueous wastes from the portable sanitary sewage treatment plant every day during its operation. Nonhazardous sludges from the treatment plant were hauled offsite for disposal (Cramer 1987).

Together, the sanitary pond and the portable sanitary sewage treatment plant comprised the original sanitary sewer system for the 400 Area. Refer to Section 4.11.17 for more information about the treatment plant. During a period of heavy construction in the early 1970's, the system was found to be

inadequate to receive sanitary wastes from the increasing number of personnel based in satellite offices and constructing area facilities. WHC (1992) reports that leakage was discovered "at sanitary sewer system manholes and, occasionally, at the outfall," and states that "sampling of the soil to determine type and level of contaminants was not believed to have been done at the time of leakage, or prior to backfill activities, due to the type of spill." Backfill material was used to cover leak locations, and blacktop or concrete was also poured in certain areas. The number of personnel in the 400 Area decreased in late 1975 and early 1976, stabilizing the sanitary sewer system, but plans were made for a replacement system (WHC 1992).

Site personnel report that a new sanitary sewer system, commonly known as the 4607 Sanitary Sewer, was constructed in 1978 to replace the portable treatment plant and its pond. It is currently the main system for the treatment of sanitary wastes in the 400 Area. Three separate septic tanks were also constructed in 1979 to supplement that sanitary sewer system. These tanks, now known as the 400 Area Retired Septic Tanks, operated until 1983.

Effluent from the 400 Area Retired Septic Tanks may have discharged to the retired sanitary pond, since reports and drawings do not indicate the existence of separate tile fields for the tanks. However, the tanks began operation in 1979, the same year that the pond was deactivated. This conflict indicates that either the pond did not receive effluent from the 400 Area Retired Septic Tanks or the reported operating dates for the pond or the tanks are incorrect.

Refer to Section 4.10.16 for more information about the retired septic tanks, and Sections 4.11.20, 4.11.21, and 4.11.22 for more information about the 4607 Sanitary Sewer, its original drain field, and the sanitary sewer lagoon.

After the portable sanitary sewage treatment plant was retired, it was removed from the site (Cramer 1987). No visible evidence of its existence exists. Refer to Section 4.11.17 for more information about the plant. The retired sanitary pond was backfilled and abandoned.

This site has not been assigned an HRS migration score.

No clear sign of 400 RSP is visible. The area immediately west of the 4706 Building currently appears as a vegetation-free, cobble-covered field that is approximately 500 ft long and 500 ft wide. Three square manholes are located in the field. A review of drawings and documents failed to indicate whether or not these manholes were associated with the retired sanitary pond. Each manhole is adjacent to two 3-ft-high metal posts. One manhole is approximately 50 ft west of the building, another is 30 ft northwest, and the third is 500 ft west. The manholes are not labeled.

4.10.16 400 RST (400 Area Retired Septic Tanks)

400 RST is an inactive, nonhazardous and nonradioactive liquid waste site that is located in the 400 Area, on the west and south sides of the 4702 Building. The site consists of three septic tanks in different locations. The three tanks are at approximate Washington State plane

coordinates E587720 N122947, E587736 N122938, and E587650 N122977. One tank is at Hanford coordinates S1780 W7450, another is at S1860 W7240, and a third is at S1890 W7190 (WHC 1991). Hanford Site Drawing H-4-152051, Sheet 1, shows the locations of these septic tanks with regard to 400 Area buildings and underground sewer lines. The three septic tanks are commonly known as the 400 Area Retired Septic Tanks (WHC 1991). These tanks operated from approximately 1979 to 1983, receiving sanitary wastes from buildings throughout the 400 Area (Cramer 1987).

Effluent from the tanks may have discharged to the 400 Area Retired Sanitary Pond, since reports and drawings do not indicate the existence of separate tile fields. However, the tanks began operation in 1979, the same year that the pond was deactivated. This conflict indicates that either the pond did not receive effluent from the retired septic tanks or the reported operating dates for the pond or the tanks are incorrect.

The three tanks were constructed to supplement the 4607 Sanitary Sewer and 4607 Sanitary Tile Field, which had been built in 1978 to replace a portable sanitary sewage treatment plant that operated from 1972 to 1979 (WHC 1992). Aqueous wastes from the portable treatment plant had been deposited in a sanitary pond, now known as the 400 Area Retired Sanitary Pond, and nonhazardous sludges had been hauled offsite for disposal (Cramer 1987). However, the portable treatment plant was found to be inadequate to receive sanitary wastes from the increasing number of personnel based in the 400 Area. Although the number of 400 Area personnel decreased in late 1975 and early 1976, stabilizing the old sanitary sewer system, replacement systems were constructed (WHC 1992). Refer to Sections 4.11.20, 4.11.21, and 4.11.22 for more information about the 4607 Sanitary Sewer, its original drain field, and the sanitary sewer lagoon. Additionally, Sections 4.11.17 and 4.10.14 provide more information about the portable sanitary sewage treatment plant and its sanitary pond.

An unknown amount of sanitary wastes were received by the retired septic tanks during their operation (Cramer 1987).

This site has not been assigned an HRS migration score.

The 400 RST tanks appear on drawings in three separate areas, all of which can be visually identified in the field. The areas are located near the 4702 Building, which has a main section and six perpendicular wings. They are surrounded by a vegetation-free, gravel- and cobble-covered field.

The first area is located approximately 40 ft west of the southeast wing of the 4702 Building and 40 ft south of that building's main section. The septic tank at that location appears as a steel manhole with a "Danger: Limited Access, Confined Space, Class II" sign posted on top. A steel lid or cover, partially buried with gravel, is located approximately 4 ft to the east; it is bolted down in the center and has perforated holes around its perimeter, perhaps for ventilation. Refer to Figure 4-30 for a 1994 photograph of this septic tank site.

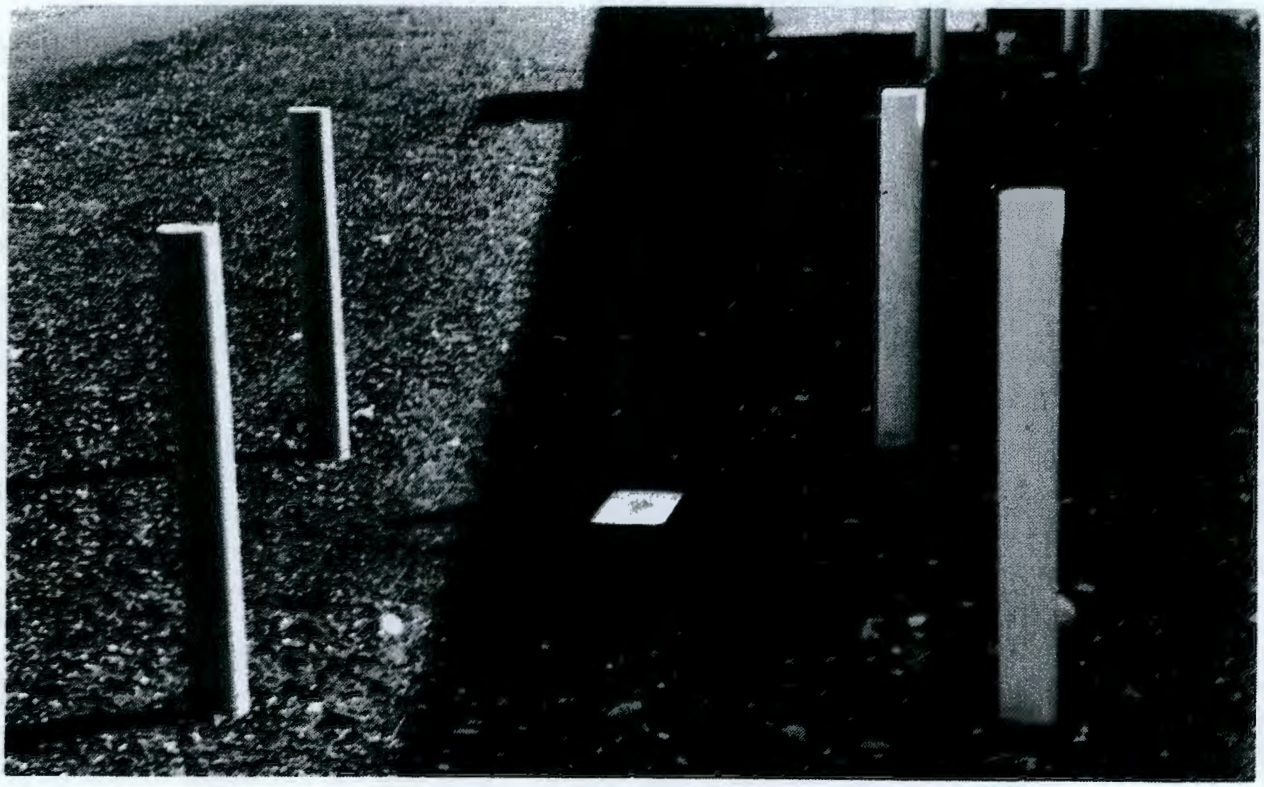
Figure 4-30. 400 Area Retired Septic Tanks (400 RST): First Tank Site, 1994.

The second area is located approximately 5 ft east of the central south wing of the 4702 Building. The septic tank at that location appears as a 2-ft-square concrete pad surrounded by a strip of wood that is 1 in. wide. A white PVC vent pipe with a diameter of 4 to 5 in. protrudes from the center of the concrete pad. Refer to Figure 4-31 for a 1994 photograph of this septic tank site.

A steel manhole is located approximately 10 ft east of the 4734-D Building's northeast corner. The manhole is posted with a "Danger: Limited Access, Confined Space, Class II" sign and is surrounded by four 3-ft-high yellow steel posts. This is believed to be the third septic tank site, although drawings indicate that the tank may instead be under a vegetation-free, cobble-covered field nearby. Refer to Figure 4-32 for a 1994 photograph of this potential septic tank site.

Figure 4-31. 400 Area Retired Septic Tanks (400 RST): Second Tank Site, 1994.

Figure 4-32. 400 Area Retired Septic Tanks (400 RST): Probable Third Tank Site, 1994.



4.10.17 400 SBT (400 Area Sand Bottom Trench)

According to Cramer (1987), a sand-bottomed trench is located north of the 483 Building in the 400 Area. WIDS describes the 400 SBT as an inactive, nonhazardous and nonradioactive liquid waste site that is located at Hanford coordinates S820 W7800 (DSI from Mike Cramer to Nancy Homan, dated 23 August 1988, see Appendix C). The site is commonly known as the 400 Area Sand Bottom Trench, although it has also been known as the 400 Area Retired Sand Bottom Trench. The dates of operation for this trench are unknown, although WIDS reports that its use was discontinued after 1980 (WHC 1991, Cramer 1987).

Cramer (1987) reports that the sand bottom trench is concrete-lined and is connected to the process sewer. Additionally, Cramer (1987) states that an unknown amount of cooling tower blowdown was received at this site during its operation.

Concentrations of the chemicals currently found in the 400 Area secondary cooling water are below regulatory limits (Cramer 1987, WHC 1992, DOE-RL 1992b). The June 1994 issue of *Focus*, published by the Washington State Department of Ecology, states that the 400 Area "secondary cooling effluent does not contain any dangerous wastes, as defined under Washington State regulations" (see Appendix C). A July 15, 1985 letter from the Washington State Department of Ecology to DOE-RL states that "cooling water additive solutions are not regulated as dangerous waste under chapter 173-303 of the Washington Administrative Code" (see Appendix C). And, according to DOE-RL (1992b), the BAT/AKART report confirms that the effluent is not a hazardous waste and recommends that the effluent stream continue to discharge to the ponds "in its current status."

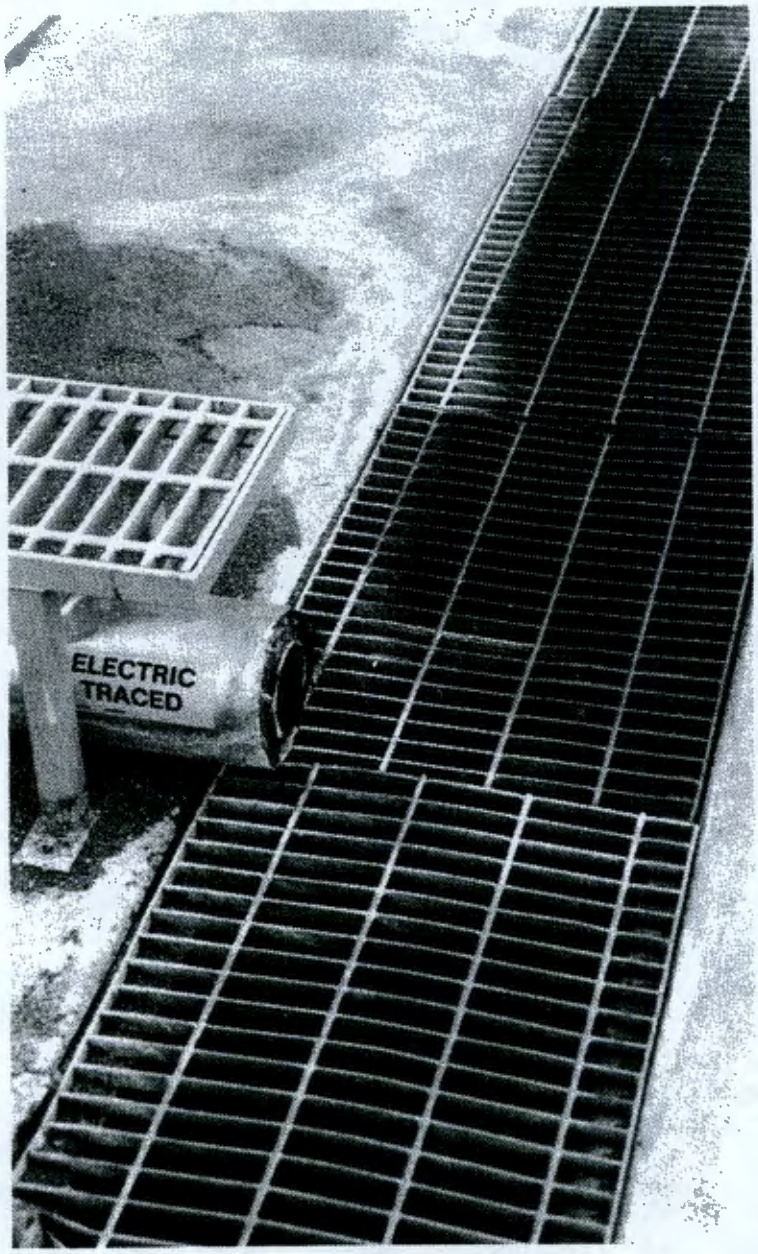
Refer to Section 4.2.5 for detailed information about the constituents of 400 Area secondary cooling water.

This site has not been assigned an HRS migration score.

400 SBT cannot be visually identified north of the 483 Cooling Towers. FFTF Regulatory Compliance personnel report that a sand-bottomed trench never existed to receive cooling tower blowdown.

According to FFTF Regulatory Compliance personnel, an active Cooling Tower Overflow Trench runs along the north end of the concrete pad that holds the 483 Cooling Towers. This trench receives nonhazardous cooling tower blowdown and discharges it into the 400 Area Process Sewer. The site currently appears as a long, concrete trench that is 200 ft long, 16 in. wide, and 12 in. deep. The trench is covered with steel grating and contains water. Although sand at the bottom of the trench is visible, FFTF Regulatory Compliance personnel report that the bottom of the trench is concrete-lined; the sand was simply blown into the trench by the wind. Refer to Figures 4-33 and 4-34 for 1994 photographs of the Cooling Tower Overflow Trench.

Figure 4-33. Cooling Tower Overflow Trench, 1994.



Because the Cooling Tower Overflow Trench simply transports nonhazardous, overflow cooling tower blowdown from the 483 Cooling Towers to the 400 Area Process Sewer, it has not been included in WIDS (WHC 1991) as a waste site and will not be described as such in this report.

Site personnel report that, prior to the construction of the Cooling Tower Overflow Trench, nonhazardous cooling tower blowdown was discharged directly to a gravel-covered field near the 483 Cooling Towers. The precise location of the discharge cannot be visually identified.

Figure 4-34. Cooling Tower Overflow Trench, 1994.

4.10.18 400-1 (400-1 Dump Site)

400-1 is an active, nonhazardous and nonradioactive solid waste dumping area that is located in the 400 Area, near the northeast corner of the Fast Flux Test Facility perimeter fence, approximately 75 yd from the fence corner and outside the protected area (WHC 1991). The dumping area is at approximate Washington State plane coordinates E587828 N123539. It is commonly known as the 400-1 Dump Site. The date that the site began operating is unknown.

This dumping area measures approximately 300 ft long and 100 ft wide.

Wastes present at the site include piles of soil, concrete, and rubble; a small amount of miscellaneous materials, including traffic markers and landscaping rocks; a few pieces of concrete asbestos board; and approximately 6 1/2 barrels of 55-gal drums, cut in half (WHC 1991).

The site has not been assigned an HRS migration score.

400-1 currently appears as an area with mounds of waste material. Some of the mounds, particularly those at the north of the site, appear to contain only backfill material: soil and rocks. Other mounds contain chunks of concrete, red volcanic landscaping rocks, metal piping, rebar, chunks of asphalt, and signs. The mounds are from 2 to 5 ft high. Some are partially covered with natural vegetation. The entire site is raised approximately 5 ft from the perimeter road. Figure 4-35 is a 1994 photograph of the dumping area.

Figure 4-35. 400-1 Dump Site, 1994.

4.10.19 403 FD (403 French Drain)

WIDS reports that 403 FD is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at approximate Hanford coordinates S975 W7475 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C) and approximate Washington State plane coordinates E587616 N123224. Documents state that the site is located on the east side of the 403 Fuel Storage Facility. It is commonly known as the 403 French Drain, although it has also been known as the 400 Area French Drain Discharge from 403 (WHC 1991) and as the 400 Area Drain Discharge from 403 (WHC 1993a). The french drain began operation in 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) state the french drain has received air washer blowdown and janitorial solutions of water and detergents. Millikin (1988) states that the drain receives air washer blowdown from the 403 Building, and notes that it has the potential to receive condensate water from that facility's HVAC system. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain receives rainwater from the 403 Fuel Storage Facility.

The french drain consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Cramer (1987) and WHC (1993a) report that approximately 0.043 L of effluent are received at this site each hour. However, Millikin (1988) states

that the site receives 0 L of effluent each hour. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gpm. The conflict between the reported flow rates remains unresolved.

Monitoring of the effluent is conducted regularly for selected radioactive and nonradioactive constitutents. Millikin (1988) states that there is "no possibility of radioactive contamination."

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

A french drain cannot be visually identified on or near the 403 Building. The area surrounding the building appears as vegetation-free, gravel- and asphalt-covered fields.

Site personnel report that a french drain does not actually exist to receive 403 Building effluents. They state that liquid effluents are discharged from the 403 Building through a pipe that exits the building approximately 2 ft above ground level, runs vertically along the building's east wall, then stops about 1 ft above an asphalt chute. The pipe is approximately 10 ft from the northeast corner of the building, near door 910. Effluent runs through the 15- to 20-ft-long chute, travels across approximately 8 ft of a sloped asphalt roadway, and flows through a manhole-sized drain in the center of the roadway. The drain is part of the 400 Area storm sewer system. The asphalt chute and the flow path from the chute to the drain are thinly covered with a white material that, presumably, was deposited when effluent covered the area and then evaporated. Figure 4-36 is a 1994 photograph of this site.

A single document, Millikin (1988), states that effluent from the 403 Building drains to the ground rather than to a french drain. That document states that these effluents "should consist of only water" and include only air washer blowdown and, potentially, condensate water from the building's HVAC system (Millikin 1988). This supports the theory that the 403 Building does not have a french drain. However, Millikin (1988) also states that the site is registered as a class V underground injection well and that it receives intermittent discharges, a description given for many of the other french drains.

If a french drain does exist at the 403 Building, it is likely to be underneath an asphalt-covered area that surrounds the north, east, and west sides of the building.

Figure 4-36. Drain From the 403 Building (403 FD), 1994.

4.10.20 427 HWSA (427 Building Fuels and Materials Examination Facility HWSA)

WIDS (WHC 1991) states that an active, hazardous liquid waste site known as 427 HWSA is located north of FMEF in the 400 Area. The site is reportedly at Hanford coordinates S1180 W8850 and approximate Washington State plane coordinates E587240 N123188. It is commonly known as the 427 Building Fuels and Materials Examination Facility HWSA, although it has also been known as the 427 Building Fuel Cycle Plant Hazardous Waste Staging Area, or HWSA. Cramer (1987) and Jacques (1990) report that the hazardous waste staging area began operating in 1985 as a staging area for hazardous liquid wastes.

Jacques (1990) reports that wastes staged at this site include ethylene glycol and ammonium hydroxide. However, Cramer (1987) states that the 427 HWSA site is a staging area for oils and lubricants.

Cramer (1987) states that inspections of the hazardous waste staging area are performed weekly and documented. The site has not been assigned an HRS migration score.

The hazardous waste engineer for FMEF reports that no site known as the 427 Building Fuels and Materials Examination Facility Hazardous Waste Staging Area exists at that facility. He states that there are five hazardous waste satellite storage areas at FMEF. One, located in Room 352, contains ethylene glycol, ethylene glycol-soaked rags, and absorbent. Another, in Room 224, contains non-PCB light ballasts, alkaline and Ni-Cd batteries, low-pressure sodium vapor light bulbs, computer circuit boards containing lead, lead for recycling, and batteries for recycling. A third, in Room 413, contains ammonium hydroxide. A fourth, in the 427-A Building, contains diesel fuel

absorbed in rags and absorbent. And a fifth, outside and at the northwest corner of the 4862 Building, contains used copy machine liquid toners.

According to the hazardous waste engineer, a fenced-off pad known as the Reusable Oil and Empty Drum Storage Area is located near FMEF. This may be the site described by WIDS (WHC 1991), Jacques (1990), and Cramer (1987) as the 427 HWSA. The Reusable Oil and Empty Drum Storage Area is located just north of FMEF, and those documents state that the 427 HWSA is located on the north side of the building. Additionally, as noted earlier, Cramer (1987) describes the 427 HWSA as a staging area for oils and lubricants; that description certainly fits the Reusable Oil and Empty Drum Storage Area.

The Reusable Oil and Empty Drum Storage Area currently appears as a concrete pad, approximately 30 ft long and 15 ft wide, surrounded by a 7-ft-high chain-link fence that has a single gate at the south side. The fence has red wooden strips woven vertically into the chain links. It is posted with two signs, one reading "Danger: No Smoking, Matches, or Open Lights" and another reading "Reusable Oil and Empty Drum Storage, Contact FMEF Ops for Access." Four wooden pallets are located just inside the north wall of the fenced area, and one is located in the southeast corner. Eleven 55-gal steel drums and one plastic 55-gal drum are located on the wooden pallets. Two of the drums are stored on the westernmost pallet; one is labeled "Waste: Reusable Oil" and the other is labeled "Reusable Waste Oil." The rest of the drums are unlabeled and, presumably, empty. All of the drums are intact and in good condition, although some rust is visible on their surfaces. The drums all have lids. Three wooden pallets without drums are stacked in the southwest corner of the staging area, and a funnel has been placed atop them. The fenced concrete pad is surrounded by a vegetation-free, cobble-covered field that holds other stored materials. The pad is within and 15 ft south of the FMEF perimeter fence, and is 8 ft north of an asphalt road that surrounds FMEF. A concrete ramp leads from the asphalt road to the concrete pad. Refer to Figure 4-37 for a 1994 photograph of the Reusable Oil and Empty Drum Storage Area.

Figure 4-37. The Reusable Oil and Empty Drum Storage Area, 1994.

4.10.21 437 MASF (437 Maintenance and Storage Facility)

The 437 Maintenance and Storage Facility is located in the northeast corner of the 400 Area, north of the FFTF Reactor Containment Building. It is at Hanford coordinates S400 W7780 and approximate Washington State plane coordinates E587555 N123391. Aliases for the facility include MASF, 437 MASF, and the 400 Area Maintenance and Storage Facility (WHC 1991).

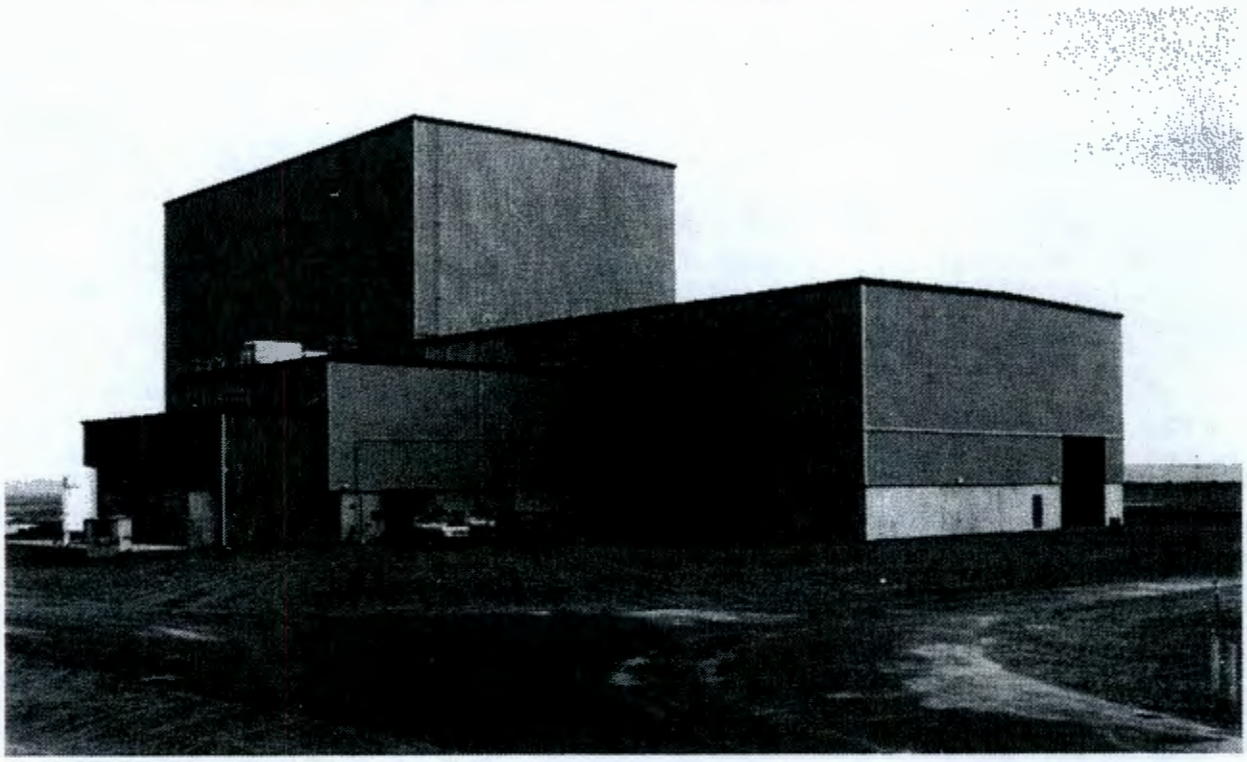
The MASF facility consists of a main building and a two-story service wing with approximately 3,022 m^2 of ground-level floor space. Refer to Figure 4-38 for a 1985 photograph of the facility.

MASF was constructed to provide for the storage, maintenance, and repair of the radioactive and specialized equipment that is used for the maintenance of FFTF. It was also constructed "to treat dangerous wastes by removing residual sodium from waste materials" (DOE-RL 1993a).

Because a dangerous waste permit application was submitted for MASF in 1987, the facility is required to be listed as a waste site in the Waste Information Data System (WIDS, or WHC 1991). WIDS describes MASF as an inactive, never-used waste treatment facility.

DOE/RL-88-21 (DOE-RL 1993a) contains a copy of the dangerous waste permit application, which projected a startup date of 1989 for the facility. The permit application stated that MASF "[would] be used for the maintenance and repair of equipment used in the Fast Flux Test Facility . . . [and] to treat dangerous wastes by removing residual sodium from waste materials." The

Figure 4-38. 437 Maintenance and Storage Facility (437 MASF).



permit application further stated that MASF would be used to treat up to 20 L/day of dangerous alkali metal wastes in the future, removing residual sodium, which is reactive. Sodium-contaminated material was to be placed in a tank, and the surface sodium contamination was to be reacted with water. The permit application stated that approximately 25,000 kg of both radioactive and nonradioactive wastes would be treated at MASF each year (DOE-RL 1993a).

According to FFTF Regulatory Compliance personnel, however, the MASF facility has never operated to treat dangerous waste and will not do so in the future. MASF has been an active facility since 1982, according to Site personnel, but has never been used as a waste treatment facility.

The mission of MASF has changed since the facility's dangerous waste permit application was submitted. Site personnel report that MASF is currently used for the decontamination of FFTF equipment; the repair of contaminated manipulators from the FFTF Reactor Containment Building; the staging of large pieces of equipment to be stored, repaired, or tested; and the temporary storage of low-level radioactive solid and liquid wastes prior to shipment.

According to Site personnel, MASF contains two decontamination suites for the radioactive decontamination of FFTF equipment. One decontamination suite was designed to perform decontamination via remote means until the contamination is reduced to levels low enough that decontamination can be performed hands-on in the adjoining suite. Additionally, MASF contains a contaminated manipulator repair shop, which services manipulators that are operated in the Interim Examination and Maintenance Cell of the FFTF Reactor

Containment Building. MASF also contains a high and low bay area where large pieces of equipment are staged to be stored or repaired. This area is where the 101-SY mitigation pump was tested prior to its insertion in Tank 101-SY at the 200 West Area. Several future Tank Farm pumps are also scheduled to be tested in MASF. And MASF is used for the temporary storage of low-level radioactive solid and liquid wastes before they are shipped to other Hanford Site central storage areas. Site personnel state that the quantity of radioactive waste generated by the FFTF and MASF facilities has historically been very small compared to that generated by other Hanford Site facilities. WHC (1992) similarly reports that all radioactively contaminated liquid waste generated in MASF is collected and sent via rail tank car to the 200 Areas for disposal.

An August 27, 1992 letter from M. T. Jansky of Westinghouse Hanford Company to J. E. Mecca of the U.S. Department of Energy, Richland Field Office, requests that the RCRA Part B permit application for MASF be deferred because the facility never operated to treat dangerous wastes (Letter 9256310, see Appendix C). The letter states that "A RCRA Part A permit application was originally submitted November 1985, for washing residual sodium from Fast Flux Test Facility (FFTF) spent nonfuel components prior to their storage/disposal. Two tanks are included in the permit: the Large Diameter Cleaning Vessel and the Small Diameter Cleaning Vessel. The former would be used for major sodium components and the latter for spent control rods and reflectors. To date, the MASF systems have never been operated for any dangerous waste management activities." The letter also states that, "Until the DOE-HQ reaches a final determination on the future of the FFTF, a decision on whether to proceed with the submittal of the Part B application, or petition to withdraw the Part A, cannot be finalized." Now that FFTF is being defueled, a petition will presumably be submitted to have the Part A permit application withdrawn.

This site has not been assigned an HRS migration score.

MASF currently appears as a large, rust-colored building with corrugated metal siding and concrete.

4.10.22 4608 SS (4608 Sanitary Sewer)

4608 SS is an active liquid waste site located in the southwest corner of the 400 Area, just east of the 4608 Sanitary Tile Field, at approximate Washington State plane coordinates E587080 N122887. This site is commonly known as the 4608 Sanitary Sewer, although it has also been known as the 400 Area Sanitary Sewer and as 400 SS. According to Site personnel, this sanitary sewer system began operating in 1983.

The septic tank at this site receives sanitary effluent from trailers MO-353, MO-378, MO-379, and MO-908 in the southwest corner of the 400 Area, according to Site personnel. Hanford Site Drawing H-4-152051, Sheet 6, indicates that the system may also have received wastes from the T-100, T-101, T-102, T-103, T-104, T-105, T-106, T-107, T-108, and T-109 trailers. This septic system is smaller than the 4607 Sanitary Sewer, which serves the majority of the 400 Area buildings. The tank has the capacity to hold 3,000 gal and receives 750 gal of sanitary wastes each day.

Effluent from this septic tank is discharged to the 4608 Sanitary Tile Field, which is shown on Hanford Site Drawing H-4-152051, Sheet 6. Refer to Section 4.11.21 for more information about the tile field.

The 400 Area buildings that are not connected to this septic system discharge sanitary wastes to the 4607 Sanitary Sewer, a larger system that is located just north of the 400 Area. Sections 4.11.20, 4.11.21, and 4.11.22 provide more information about the 4607 Sanitary Sewer, its original tile drain field, and the 4607 Sanitary Sewer Lagoon.

The 4608 SS site has not been assigned an HRS migration score.

4608 SS currently appears as two manholes covered with fiberglass covers. One of the manhole covers is posted with a "Danger: Confined Space" sign. The sanitary sewer is within a vegetation-covered area, measuring 120 ft by 100 ft, that is bounded by steel posts and barricade chain. It is at the east end of the bounded area. The 4608 Sanitary Tile Field is also located within the bounded area, at the west end. A blue-and-white sign that reads "No Vehicles--Septic Field" is posted at the site. Figure 4-39 is a 1994 photograph of this septic tank and its drain field.

Figure 4-39. 4608 Sanitary Sewer Septic Tank and Tile Drain Field (4608 SS and 4608 STF), 1994.

4.10.23 4608 STF (4608 Sanitary Tile Field)

4608 STF is an active liquid waste site that is located in the southwest corner of the 400 Area, just inside the perimeter fence. Hanford Site Drawing

H-4-152051, Sheet 6, shows this sanitary tile field to be located at approximate Hanford coordinates W9550 S2190. It is at approximate Washington State plane coordinates E587056 N122887. The site consists of a drain field that is commonly known as the 4608 Sanitary Tile Field, although it has also been known as the 400 Area Sanitary Tile Field and as 400 STF. According to Site personnel, this sanitary tile field began operating in 1983.

This sanitary tile field receives liquid effluent wastes from the 4608 Sanitary Sewer, which, according to Site personnel, serves trailers MO-353, MO-378, MO-379, and MO-908 in the southwest corner of the 400 Area. Hanford Site Drawing H-4-152051, Sheet 6, indicates that the system may also have received wastes from the T-100, T-101, T-102, T-103, T-104, T-105, T-106, T-107, T-108, and T-109 trailers.

The septic tank associated with this tile field has the capacity to hold 3,000 gal and receives 750 gal of sanitary wastes each day.

This site has not been assigned an HRS migration score.

4608 STF currently appears as a vegetation-covered area that is bounded by steel posts and barricade chain. The chained area is approximately 120 ft long and 100 ft wide. The 4608 Sanitary Sewer, which appears as two manholes with fiberglass covers, is located at the east end of the chained area. The site is posted with a blue-and-white sign that reads "No Vehicles--Septic Field." Additionally, a "Danger: Confined Space" sign is posted on one of the manhole covers. Figure 4-39 in Section 4.10.22 is a 1994 photograph of this drain field and the associated septic tank.

4.10.24 4713-B FD (4713-B French Drain)

4713-B FD is a nonhazardous and nonradioactive liquid waste site that is located in the 400 Area at Hanford coordinates S1475 W8075 (WHC 1991) and approximate Washington State plane coordinates E587471 N123039. The site is commonly known as the 4713-B French Drain, although it has also been known as one of the French Drains Near 4713-B, 4722-B, and 4722-C. Cramer (1987) reports that the french drain has operated since 1979 to receive wastewater from lunchroom sinks, and WIDS (WHC 1991) reports that the french drain remains active.

This site consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Cramer (1987) states that approximately 1,000 gal of wastewater was received at this site each year as of 1987. However, Millikin (1988) reports that the french drain received only intermittent discharges and had a normal flow rate of zero as of 1988. The apparent conflict between the reported flow rates remains unresolved.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

Figure 4-40. 4713-B French Drain (4713-B FD), 1994.

This french drain is a registered class V underground injection well (DOE-RL 1988a). The site has not been assigned an HRS migration score.

A 24-in. concrete pipe is located approximately 4 ft away from the east side of the 4713 Building. The pipe is filled with gravel and covered with metal grating. Three parallel metal pipes emerge horizontally from the east side of the 4713 Building, then bend 90 degrees downward and end approximately 1 ft above the concrete pipe. Those parts may comprise the 4713-B French Drain.

WHC (1993a) states that 1,000 gal of wastewater from lunchroom sinks in the 4713-B Building is discharged to "400 Area Sanitary Disposal Sites," not to a french drain. Although both WHC (1993a) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) claim to list all active liquid waste streams in the 400 Area, neither lists this french drain. Because other documents state that the 4713-B French Drain exists, it may be that the wastewater used to be discharged to the 4713-B French Drain, but is now discharged to the "400 Area Sanitary Disposal Sites," believed to be the 4607 Sanitary Sewer. Refer to Figure 4-40 for a 1994 photograph of the site.

4.10.25 4713-B HWSA (4713-B Hazardous Waste Staging Area)

4713-B HWSA is an active, hazardous liquid waste site that is located on the west side of the 4713-B Building in the 400 Area. WHC (1991) states that it is located at Hanford coordinates S1475 W8075, although Jacques (1990) states that it is located at coordinates S1525 W8100. It is at approximate

Washington State plane coordinates E587446 N123070. The site is commonly known as the 4713-B Hazardous Waste Staging Area (WHC 1991). It has operated since 1980 as a staging area for hazardous liquid wastes (Cramer 1987).

Small quantities of oils and lubricants, and some solvents, are staged at this site (Cramer 1987).

No HRS migration score has been assigned to this site.

4713-B HWSA currently appears as a concrete pad that is approximately 20 ft long and 20 ft wide. The site is posted with a sign that reads, "Satellite Accumulation Area." Five metal cabinets are located on the concrete pad. One is posted with a sign reading, "Fluorescent Bulbs Only." Another is posted with a sign reading, "Flammable: Keep Fire Away." A third is posted with signs reading, "Hazardous Rags Only" and "Flammable: Keep Fire Away." A fourth is posted with signs reading, "Solvents Only" and "Flammable: Keep Fire Away." No signs are posted on the fifth cabinet. Three drums are located against the building's west wall, and they are posted with "Hazardous Waste" signs. One of the drums is posted, "Suspect PCB Ballasts and Capacitors." The second is posted, "Persistent Carcinogen: Toxic." And the third is posted, "Non-Suspect-PCB Ballasts and Capacitors." Another drum with an inlet chute is located at the north side of the concrete pad, and it is labeled "Incandescent Bulbs, Mercury Vapor Lamps, and Printed Circuit Boards Only." A wooden storage box labeled "Equipment Storage" is located at the pad's northeast corner. And two more drums are located at the southeast corner of the pad; one is labeled "Absorbent."

Figures 4-41 and 4-42 are 1994 photographs of the north and south ends of the hazardous waste staging area, respectively.

Figure 4-41. 4713-B Hazardous Waste Staging Area (4713-B HWSA), North Portion, 1994.

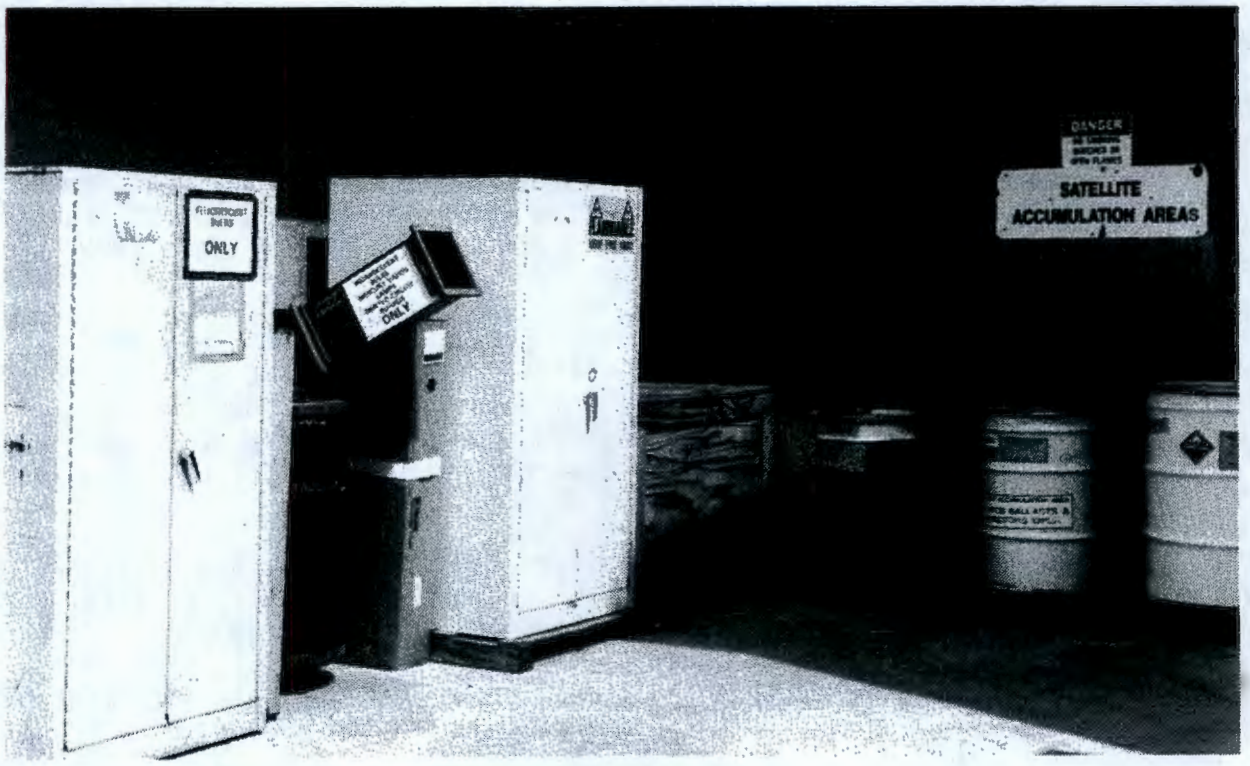


Figure 4-42. 4713-B Hazardous Waste Staging Area (4713-B HWSA), South Portion, 1994.

4.10.26 4721 FD (4721 French Drain)

4721 FD is an active, nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area at Hanford coordinates S1240 W8050 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C) and approximate Washington State plane coordinates E587473 N123135. Drawings and other documents indicate that the french drain is near the 4721 Gas Turbine Building. The site is commonly known as the 4721 French Drain, although it has also been known as the 400 Area French Drain Discharge from 4721 Building (WHC 1991). This french drain has operated since 1979 (Cramer 1987).

Reports differ in the information they provide about the types of effluents received by this french drain. Cramer (1987) and WHC (1993a) report that the drain has received janitorial solutions of water and detergents. Millikin (1988) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) state that the drain has received rainwater from the 4721 Building.

This site consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min. However, Cramer (1987) and WHC (1993a) state that approximately 0.043 L of effluent are received at this site each hour. The conflict between the reported flow rates remains unresolved.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). It has not been assigned an HRS migration score.

4721 FD cannot be visually identified. The french drain appears on maps and drawings to be west of the 4721 Building, where a vegetation-free, gravel-covered field is located.

4.10.27 4722 PSHWSA (4722 Paint Shop HWSA)

4722 PSHWSA is an active, hazardous liquid waste site that is located in the 400 Area at Hanford coordinates S1910 W8150 and approximate Washington State plane coordinates E587460 N122923. It is located on the north side of the 4722-C Building, just off the northeast corner. The site is commonly known as the 4722 Paint Shop HWSA, although it has also been known as the 4722 Paint Shop Hazardous Waste Staging Area and as the 4722-C Hazardous Waste Staging Area (WHC 1991). It began operation in 1980 as a staging area, primarily for paint solvents (Cramer 1987).

Spill pans have been placed under accumulation drums to prevent the release of wastes. Inspections of the site are performed weekly and documented (Cramer 1987).

This site has not been assigned an HRS migration score.

4722 PSHWSA currently appears as two metal cabinets that are shielded by an open metal structure attached to the 4722-C Building. The structure has metal walls on the west and east sides and is covered with a metal roof. The easternmost cabinet is posted with signs reading, "Flammable: Keep Fire Away" and "Hazardous Waste." The westernmost cabinet has signs reading, "No Smoking--Hazardous--Keep Fire Away," "Hazardous Waste Satellite Accumulation Area," "Solvent Rags," and "Antifreeze, Rags, Absorbent." A "Danger" sign is also posted on an inside wall of the metal structure. Figure 4-43 is a 1994 photograph of this site.

Figure 4-43. 4722 Paint Shop Hazardous Waste Staging Area (4722 PSHWSA), 1994.

4.10.28 4722-B FD (4722-B French Drain)

4722-B FD is a nonhazardous and nonradioactive liquid waste site that is located in the 400 Area at Hanford coordinates S1900 W7850 and approximate Washington State plane coordinates E587535 N122934. This site is commonly known as the 4722-B French Drain, although it has also been known as one of the French Drains Near 4713-B, 4722-B, and 4722-C (WHC 1991). Cramer (1987)

reports that the french drain at this site began operation in 1979 to receive wastewater from lunchroom sinks, and WIDS (WHC 1991) states that the drain remains active.

Jacques (1990) states that this site consists of a concrete or vitrified clay pipe that is filled with gravel. Also, according to Jacques (1990), the pipe has a diameter of 4 ft, is at least 5 ft long, and discharges into a gravel-filled drainage area.

Cramer (1987) states that approximately 1,000 gal of wastewater are received at this site each year. Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. The apparent conflict between the reported flow rates remains unresolved.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain is a registered class V underground injection well (DOE-RL 1988a). No HRS migration score has been assigned to this site.

4722-B FD could not be visually identified on or near the 4722-B Building. It may or may not be within a gravel- and cobble-covered field that surrounds the building.

WHC (1993a) states that 1,000 gal of wastewater from lunchroom sinks in the 4722-B Building are discharged to the sanitary sewer line, not to a french drain. Both WHC (1993a) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) claim to list all active liquid waste streams in the 400 Area, but neither mentions a french drain associated with the 4722-B Building. However, several documents (Cramer 1987, Jacques 1990, Millikin 1988, DOE-RL 1988a) state that the 4722-B French Drain does exist. It is thus likely that the wastewater used to be discharged to a french drain, but is now discharged to the sanitary sewer line. Site personnel support the latter theory by reporting that the 4722-B Building lunchroom was remodeled a few years ago and that the sinks were tied in to the 4607 Sanitary Sewer system rather than a french drain.

4.10.29 4722-C FD (4722-C French Drain)

4722-C FD is a nonhazardous and nonradioactive liquid waste site (WHC 1991) that is located in the 400 Area, on the south side of the 4722-C Building. It is at Hanford coordinates S1965.31 W8066 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C) and approximate Washington State plane coordinates E587460 N122909. The site is commonly known as the 4722-C French Drain, although it has also been known as the French Drain South of 4722-C and as one of the French Drains Near 4713-B, 4722-B, and 4722-C (WHC 1991).

Cramer (1987) and DOE-RL (1988a) state that the site is currently inactive, having operated from 1979 to 1985 to receive intermittent discharges

of wastewater from a sink that was used to wash soluble, latex paint from hands, rollers, and brushes. However, WIDS (WHC 1991), WHC (1993a), and Site personnel state that the french drain remains active. The *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain receives wastewater from an employee sink in the 4722-C Building.

This site consists of a concrete or vitrified clay pipe that is filled with gravel. The pipe, which has a diameter of 4 ft and is at least 5 ft long, discharges into a gravel-filled drainage area (Jacques 1990).

Cramer (1987) and WHC (1993a) report that the french drain receives intermittent discharges of wastewater, a total of approximately 2,000 gal/yr. Millikin (1988) states that the normal flow rate is zero, and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988). However, a sample of wastewater taken from the french drain unit was analyzed and found to contain no hazardous constituents. The latex paints received by the drain have been determined to be nonhazardous (Cramer 1987).

DOE-RL (1988a) reports that the hazardous chemical inventory for this site includes 1,000 kg of sodium dichromate.

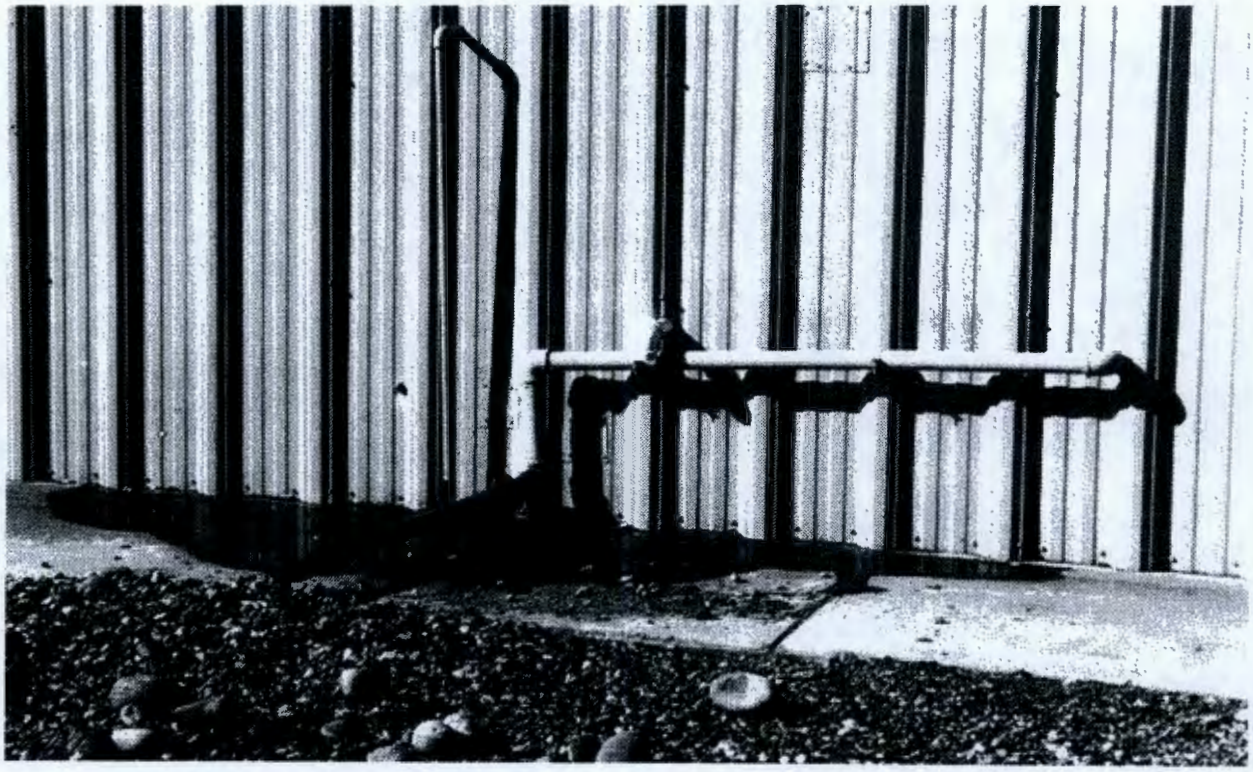
No HRS migration score has been assigned to this site.

4722-C FD currently appears as a pipe with a diameter of 1 to 2 in. that protrudes from the south side of the 4722-C Building. The pipe emerges from a point 1 ft high on the building's south side, travels west for 3 ft, then takes a 90-degree turn downward, continues in that direction for 6 in., takes another 90-degree turn to the south, continues in that direction for 2 ft, and then disappears in a gravel- and cobble-covered field beside the building. The french drain is connected to a sink that is located in an office-type room inside the building.

Another pipe emerges from the building about 6 in. west of the pipe described above. The pipe makes a 90-degree turn downward and stops just short of the gravel- and cobble-covered field. A puddle of green liquid is located beneath the pipe.

Figure 4-44 is a 1994 photograph of this french drain.

Figure 4-44. 4722-C French Drain (4722-C FD), 1994.



4.10.30 4831 LHWSA (4831 Laydown HWSA)

The 4831 LHWSA is an inactive, hazardous liquid waste site that is located at Hanford coordinates S600 W8560 and approximate Washington State plane coordinates E587299 N123327. It borders a portion of Texas Street at the street's end and is approximately 10 ft north of the 4831 Flammable Storage Facility; the two facilities are separated by the street. The site is commonly known as the 4831 Laydown HWSA, although it has also been known as the 4831 Laydown Hazardous Waste Staging Area (WHC 1991). Cramer (1987) reports that the 4831 LHWSA began operation in 1984 as a staging area for miscellaneous hazardous wastes produced and collected in the 400 Area. Site personnel report that it was a less-than-90-day hazardous waste staging area that ceased operation in December, 1993, when the 440 Hazardous Waste Temporary Storage Facility began operation (see Section 4.11.26).

This staging area consists of a concrete pad with a metal berm around its edges (Cramer 1987). The pad is 50 ft long and 20 ft wide. The metal berm, which is approximately 2 in. tall and 2 in. wide, runs around the pad approximately 3 in. inward from the edge and is bolted down. A tan metal building at the east end of the pad provided supply storage and sheltered workspace when the staging area was operating, according to Site personnel. The building is about 16 ft long and 10 ft wide, and has double metal sliding doors on its south side.

Cramer (1987) states that wastes staged at this site were primarily oils, solvents, ethylene glycol, and empty drums for cooling water treatment

chemicals such as Endcor 4690, which is acutely hazardous. Wastes were stored in containers on the pad. Inspections of the site were performed weekly and documented (Cramer 1987).

No HRS migration score has been assigned to this site.

The 4831 LHWSA currently appears as a bermed concrete pad with a metal building atop its east end. In August 1994, the pad held two wooden crates at its northwest corner. Each crate was atop a wooden pallet. Circular concrete weights holding 4-ft-high metal posts had been placed around and just off the edges of the pad. The posts were once connected with a metal chain, which served as a barricade; although many of the posts have now been knocked over, several remain upright and connected by the chain.

4.10.31 4843 AMSF (4843 Alkali Metal Storage Facility)

4843 AMSF is an active, mixed solid waste site that is located in the northwest corner of the 400 Area at Hanford coordinates S530 W9100 and approximate Washington State plane coordinates E587150 N123340. The site is commonly known as the 4843 Alkali Metal Storage Facility, although it has also been known as the 4843 Building and as the 4843 Fast Flux Test Facility Sodium Storage facility (WHC 1991). It is at the southeast corner of a laydown area that is bounded by a chain-link fence. The facility began operation on April 10, 1986, as a storage area for dangerous and mixed alkali metal wastes generated by the Fast Flux Test Facility and various other operations at the Hanford Site (DOE-RL 1993a, Cramer 1987). Site personnel report that the facility is currently in interim status.

The storage facility is a 40-ft by 40-ft, fully insulated, bolted steel building that rests on a concrete slab. It has the capacity to store 22,000 gal or 185,000 lb of alkali metal wastes. Two 12-ft-high, roll-up doors are used for moving supplies into and out of the building. A rope barrier separates the dangerous alkali metal waste storage area from the mixed alkali metal storage area. Refer to Figure 4-45 for a 1990 photograph of the dangerous alkali metal storage area, and Figure 4-46 for a 1990 photograph of the mixed alkali metal storage area.

Additionally, Figure 4-47 is a drawing that shows the AMSF facility's storage area floor plan. Concrete blocks are used to provide shielding, protecting the environment from radioactive alkali metal waste. Waste storage containers used at this facility "may include steel 5-, 30-, and 55-gallon drums, or sealed piping and sealed components that have been welded closed" (DOE-RL 1993a).

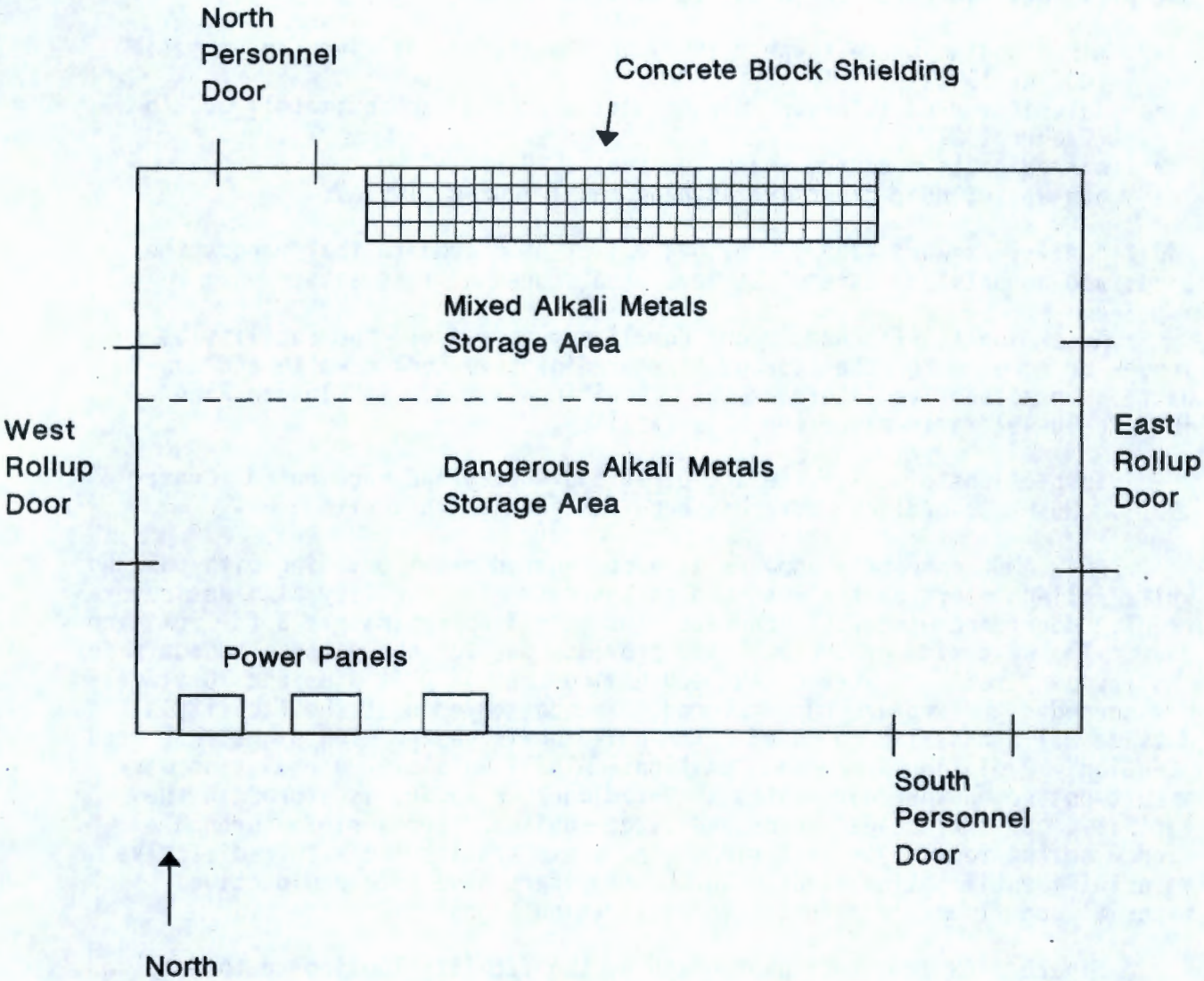
Although Cramer (1987) states, "The storage area is outside the [4843] building," the document may have been referring to a laydown area that is located to the immediate west and northwest of the building.

DOE-RL (1993a) notes that the facility "is a storage unit for alkali metal waste that exhibits the dangerous waste characteristics of ignitability, corrosivity, reactivity, and state-only waste . . . [that is] extremely hazardous waste and dangerous."

Figure 4-45. 4843 Alkali Metal Storage Facility (4843 AMSF): Dangerous Alkali Metal Storage Area.

Figure 4-46. 4843 Alkali Metal Storage Facility (4843 AMSF): Mixed Alkali Metal Storage Area.

Figure 4-47. The 4843 Alkali Metal Storage Facility (4843 AMSF) Floor Plan.



(DOE-RL 1993)

Documents indicate that the following dangerous and mixed alkali metal materials have been stored in the facility:

- mixed sodium waste (Cramer 1987) and "waste radioactive sodium metal" (DOE-RL 1993a)
- materials used to clean up radioactive sodium, approximately 600 lb (Cramer 1987)
- nonradioactive sodium waste (Jacques 1990)
- non-waste, nonradioactive lithium metal (DOE-RL 1993a).

Additionally, Steward (1992) provides a list of documents that report the types and amounts of wastes that have been stored at this site.

According to FFTF Regulatory Compliance personnel, the facility is no longer being used for the storage of nonradioactive sodium waste and non-waste, nonradioactive lithium metal. Additionally, a RCRA Closure Plan (DOE/RL-90-49) is in place for this facility.

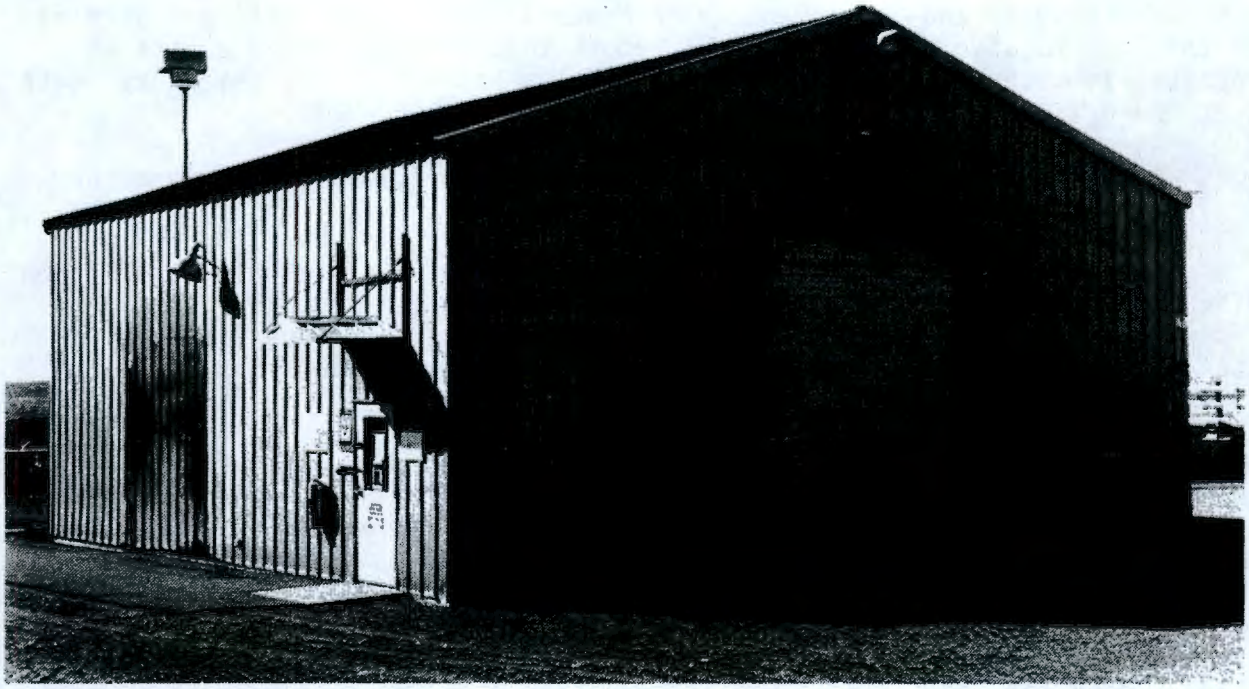
Inspections of this site are performed weekly and documented (Cramer 1987). No HRS migration score has been assigned to this site.

4843 AMSF currently appears as a corrugated metal building with painted white roll-up doors on the west and east sides. The facility also has several regular doors and windows. Concrete pads extend approximately 3 ft from each door. The west side of the building provides part of the eastern boundary for the laydown area. An area on the south side that is 8 ft wide and 10 ft tall has corroded and appears rust-colored. The bottom edge of the facility's outside walls has also corroded. The building is posted with signs that read "Caution: Radiation Area" and "Caution: Alkali Metals." A radiation work permit posted on the door states that radioactive sodium is stored in the facility. Several 55-gal drums and large canisters are visible through a window on the facility's east side. The drums are labeled with radioactive material identification signs, and the canisters have both radioactive material and flammable material identification signs.

Figure 4-48 is a 1987 photograph of the facility looking southwest, and Figure 4-49 is a 1994 photograph looking northwest.

Figure 4-48. 4843 Alkali Metal Storage Facility (4843 AMSF), Looking Southwest, 1987.

Figure 4-49. 4843 Alkali Metal Storage Facility (4843 AMSF), Looking Northwest, 1994.



4.11 UNDOCUMENTED 400 AREA WASTE SITES

4.11.1 Altitude Valve Pit T-58 French Drain

WHC (1993a) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) report that a french drain exists to receive rainwater from 400 Area Altitude Valve Pit T-58. The inventory states that the drain is located at Hanford coordinates S10090 W7790.

A historical review of documents and drawings failed to disclose the drain's construction or dates of operation.

Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score. DOE-RL (1988a) does not list it as a registered class V underground injection well.

4.11.2 Altitude Valve Pit T-87 French Drain

WHC (1993a) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) report that a french drain exists to receive rainwater from 400 Area Altitude Valve Pit T-87. The inventory states that the drain is located at Hanford coordinates S10090 W7890.

A historical review of documents and drawings failed to disclose the drain's construction or dates of operation.

Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score. DOE-RL (1988a) does not list it as a registered class V underground injection well.

4.11.3 Altitude Valve Pit T-330 French Drain

WHC (1993a) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) report that a french drain exists to receive rainwater from 400 Area Altitude Valve Pit T-330. The inventory states that the drain is located at Hanford coordinates S1065 W1830.

A historical review of documents and drawings failed to disclose the drain's construction or dates of operation.

Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score. DOE-RL (1988a) does not list it as a registered class V underground injection well.

4.11.4 Burn Pit

A burn pit is located in the 600 Area, roughly 3/4 mi northeast of the 400 Area, at approximate Washington State plane coordinates E588380 N123582. The pit is southeast of the undocumented waste dumping area described in Section 4.11.12, and is also southeast of the suspected burial ground described in Section 4.11.11. It is accessible by a dirt road that begins at the northeast end of the FFTF Visitor Center parking lot, and is located 700 to 800 ft southeast of that road.

The burn pit is approximately 100 ft long, 50 ft wide, and 15 ft deep. Fire-scarred metal mesh screening, rags, wood scraps, and fire bricks are visible at the site. The pit appears to be inactive, as unburnt tumbleweeds are piled within the pit and some natural vegetation has begun to grow along the pit walls.

The pit has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score. Figure 4-50 is a 1994 photograph of the pit.

Figure 4-50. Burn Pit, 1994.

4.11.5 Concrete Batch Plant

An undocumented site is located at the northeast corner of the 400 Area, just north of the perimeter road and east of several railroad tracks. The site is at approximate Washington State plane coordinates E587671 N123544. A batch plant for concrete mixing was located there during the construction phase of FFTF. It has since been removed, and the site is now inactive.

The batch plant has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score.

The batch plant site appears as a vegetation-free, cobble-covered area that is surrounded by 8-ft-high chain-link fencing with three strands of barbed wire along the top. The fenced area is approximately 170 ft wide and 280 ft long. It has a chained and locked gate at its south side. A concrete building foundation is located at the southwest corner of the fenced area, with rebar and wooden supports protruding several inches from its surface. Several pit areas, which used to contain raw materials for the concrete, are located near the building foundation. Signs with numbers are posted on the inside of the east fence wall, and a sign with the names and phone numbers of responsible personnel is posted on the gate.

4.11.6 Construction Material Dumping Area

Construction debris has been dumped in an area several hundred feet northwest of FMEF, at approximate Washington State plane coordinates E587344 N123494. Figure 4-51 is a 1994 photograph of this site.

Figure 4-51. Construction Material Dumping Area, 1994.

This dumping site is just north of the perimeter road and west of the access road that leads to the 4608 Percolation Ponds. Dumping may or may not continue at the site today.

Material present at the site includes tires, concrete rubble, metal fencing, rebar, metal grating, sheet metal, piping, and metal scraps. There are no boundaries to clearly define the dumping area. The site is approximately 100 ft long and 100 ft wide.

This site has not been assigned an HRS migration score, nor has it been documented as a waste site in the WIDS database.

4.11.7 Diesel Fuel Tank Fitting Leak

Two empty underground tanks, located just south of the 400 Area fire station parking lot, were unearthed and removed on May 10, 1994. One of the tanks had held diesel fuel and the other had held unleaded gasoline. After the tanks were removed, the soil underneath was discovered to have been contaminated with diesel fuel. Site personnel report that the leak appeared to have been from around the fittings on the diesel fuel tank, as the tank itself appeared intact.

According to Occurrence Report RL-WHC-HFD-1994-0001, included in Appendix A, approximately 20 vertical ft of soil were initially removed from the site. Some diesel-contaminated soil remained in place. DOE-RL Environmental Compliance and the Washington State Department of Ecology were notified of the spill, and further remediation actions were being planned.

Since the occurrence report was written, further actions have been taken to clean up the diesel spill. As of May 24, 1994, Arc Contracting Company

Inc. (ACCI) personnel reported that 32 vertical ft of soil has been removed from the site. Tests were being conducted by Bovay Northwest, Inc., to determine whether or not significant amounts of diesel contamination were present in the remaining soil. Diesel-contaminated soil had been piled in four mounds, from 5 ft to 10 ft high, that were covered with plastic. A large bioremediation pit was being dug approximately 100 ft west of the fire station parking lot. The pit was to be lined with plastic and filled with the diesel-contaminated soil. Fertilizer, water, and bacteria would initially be added to the soil, according to the ACCI personnel. More fertilizer and water would be added daily, and the soil would be tilled under for aeration. It was estimated that the bioremediation process would last 45 to 90 days.

The diesel spill site has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score.

In May 1994, the site that originally contained the two tanks appeared as a large pit, approximately 50 ft long, 30 ft wide, and 32 ft deep. The pit was bordered by three covered mounds of diesel-contaminated soil and four uncovered mounds of uncontaminated soil. Site personnel reported that the two tanks were removed from the pit and taken to another location. Concrete chunks and pieces of rebar and metal piping were located on the west side of the pit near four blue 55-gal steel drums, one orange plastic drum, and a gray metal dumpster. The entire site, including the pit and the seven piles of soil, was approximately 50 ft wide and 100 ft long and was surrounded by sawhorse-style barricades and orange plastic fencing. Several of the barricades were posted with signs reading "Danger: Hazardous Chemicals." Figure 4-52 is a May 24, 1994 photograph of the original tank site.

The bioremediation pit appeared in May 1994 as a depression that was approximately 100 ft long and 50 ft wide. Heavy earth-moving equipment was being used to dig the pit, which had not yet been completed. Part of the pit had already been lined with plastic. One plastic-covered mound of diesel-contaminated soil, which was surrounded by steel posts and orange-red tape, was located just south of the pit. Figure 4-53 is a May 24, 1994 photograph of the partially-complete bioremediation pit.

By August 1994, the area that the tanks were excavated from had been backfilled and covered with gravel, but a slight depression remained. All barricades and signs had been removed. The four blue 55-gal steel drums remained at the northwest corner of the site, on the paved parking lot, next to the gray metal dumpster. All signs, barricades, and piles of soil had been removed. The bioremediation pit to the east of the parking lot appeared as a 100-ft-square excavation that was lined with plastic and filled with soil piled 3 to 4 ft above grade.

Figure 4-52. Excavated Soil at the Site of the Diesel Fuel Tank Fitting Leak, May 1994.

Figure 4-53. Bioremediation Trench Being Dug Northeast of the Diesel Fuel Tank Fitting Leak Site, May 1994.

4.11.8 Material Dumping Area and Building Foundation

A site with a building foundation, sidewalks, and construction debris is located just north of the 400 Area and several hundred feet northwest of the MASF. The site is at approximate Washington State plane coordinates E587463 N123528. It is approximately 100 ft north of the perimeter road that runs along the area's northern boundary, and is east of the access road to the 4608 Percolation Ponds. Figure 4-54 is a 1994 photograph of this site.

Figure 4-54. Material Dumping Area and Building Foundation, 1994.

A portion of a building remains standing. Although the building appears to have been of wood frame construction, the portion that remains is a concrete brick vault that was inside the building's wooden frame. The inside walls of the vault have been painted, and the floor slopes to a single drain that is located in the middle of the room. The vault has corrugated metal roofing. Its door is missing. The concrete building foundation, which is approximately 75 ft long and 25 ft wide, remains intact. Several sidewalks leading from the building foundation are also intact. The building's dates of operation and decommissioning are unknown.

Debris present at the site includes glass, metal, brick, and wood from the building; wooden pallets; chunks of concrete; scraps of metal; concrete core samples; and other construction materials. These materials have been scattered randomly around the building foundation described above. Surplus concrete and asphalt were also poured in an area at the north end of the site. Dumping may or may not continue at the site today.

The entire site, including the building foundation and several piles of scrap material, is approximately 300 ft long and 200 ft wide. Some natural vegetation and cobbles are also present at the site.

This site has not been assigned an HRS migration score, nor has it been documented as a waste site in the WIDS database.

4.11.9 Sanitary Waste Tie-Line from the 400 Area to the Washington Public Power Supply System

BNI (1993) states that an underground sanitary waste tie-line between the 400 Area and the Supply System was constructed in 1991. Hanford Site Drawing H-6-1801 indicates that the tie-line begins at Hanford coordinates N455 W8269 and ends at coordinates N8897 W595. The line has never been intentionally used and is considered inactive (BNI 1993).

This 8-in., gravity flow tie-line begins at the inlet to the 4607 Sanitary Sewer septic tank. It connects the 400 Area sanitary sewer main with the Supply System sewage treatment facility, which is approximately 3 mi northeast of the 400 Area. If the line becomes operational, it will replace the 4607 Sanitary Sewer septic tank and the 4607 Sanitary Sewer Lagoon.

Hanford Site Drawings H-6-1801, H-6-1802, and H-6-1803 provide additional details about the underground sanitary waste tie-line. The entire route of the line is shown on Hanford Site Drawing H-6-1801, along with information about elevation changes along the route. Hanford Site Drawing H-6-1802, Sheet 2, also shows elevation changes along the tie-line route. And Hanford Site Drawing H-6-1803 provides drawings of manholes and of the branch between the tie-line and the 400 Area sanitary sewer main.

Bovay Northwest, Inc., conducted an engineering study of the 400 Area sanitary sewer system in 1993 "to investigate alternatives that would eliminate the current practice of disposing primary-treated sewage to an unlined pond north of the 400 Area," the sanitary sewer lagoon. An alternative is required because the current lagoon cannot be permitted under WAC 173-216 regulations for continuing operation. The resulting report, BNI (1993), concluded that the best option would be to use the underground tie-line.

According to the Bovay Northwest report, however, the tie-line "may never be [used] due to regulatory and political constraints between the government and the utility." One reason is that tritium in the 400 Area sanitary waste exceeds the reporting limits for the Supply System sewage treatment facility. Because tritium is present in groundwater pumped in the 400 Area, and removing it from that water would be impracticable, an alternative would be to obtain potable and process water for the area from the Supply System. This alternative cost more than the other alternatives considered and would require further negotiations with the Supply System to arrange for the water supply. However, the report states, "If at all possible, the sanitary waste tie-line installed between the 400 Area and the Supply System should be utilized. Should it be determined that this tie-line between the two areas [is] acceptable to both parties, serious consideration should also be given to a potable water tie-line to eliminate potential future

public health concerns regarding drinking groundwater in the 400 Area" (BNI 1993).

Negotiations are currently underway to determine whether or not the underground tie-line will ever be activated and, if so, under what conditions.

An alternate recommendation presented in the Bovay Northwest report was that an evaporative lagoon be constructed to replace the current sanitary sewer lagoon. This option was recommended because it would accommodate future increases in 400 Area personnel with minimal permitting. The evaporative lagoon would have the capacity to receive 26,000 gal of sanitary wastes per day from the 4607 Sanitary Sewer (BNI 1993). Site personnel report that plans are currently being made for such a lagoon, but construction has not yet begun.

BNI (1993) states that, if the decision is made to proceed with these plans, the evaporative lagoon will become operational and replace the current sanitary sewer lagoon by mid-1996. However, Site employees state that the date the lagoon will become operational remains in question due to funding questions.

Site personnel report that a small amount of sanitary wastes was inadvertently discharged into the underground tie-line and, thus, the Supply System sanitary sewer system, in late 1992. The exact amount discharged is unknown. Radiation detection systems in the Supply System sanitary waste treatment facility indicated the presence of radioactive cobalt, cesium, and tritium beyond set limits. However, only tritium was confirmed to have been present in the sanitary wastes discharged from the 400 Area. The discharge was not considered an unplanned release because no sanitary wastes were released to the environment; instead, they remained within the underground tie-line and the Supply System sanitary sewer.

This site has not been assigned an HRS migration score, nor does it currently appear as a documented waste site in the WIDS database.

A visibly disturbed area, which follows part of the underground line, begins just west of the 4608 Percolation Ponds and east of the 400 Area Sanitary Sewer Lagoon. This path-like area is covered with sand and has little natural vegetation growing on its surface. Signs reading "Caution: Underground Sewer Line" have been placed on posts along the disturbed area. Manholes are also located at several points along the route. There are scraps of PVC piping on the surface. Figure 4-55 is a 1994 photograph of the site.

Figure 4-55. Sanitary Waste Tie-Line from the 400 Area to the Washington Public Power Supply System, 1994.

4.11.10 Septic Tank or Cistern

A concrete pipe emerges from the ground approximately 20 north of the building foundation described in Section 4.11.8. It is located at approximate Washington State plane coordinates E587489 N123559. The pipe has an inside diameter of 2 ft and is loosely covered with a weathered wooden manhole cover. The concrete pipe appears to drop approximately 15 ft into a concrete or concrete-lined circular vault that may have been a septic tank or cistern used during the 400 Area construction boom. The vault appears to extend west of the pipe.

This site has not been assigned an HRS migration score, nor has it been identified as a waste site in the WIDS database. Figure 4-56 is a 1994 photograph of this site.

Figure 4-56. Septic Tank or Cistern, 1994.

4.11.11 Suspected Burial Ground

A suspected burial ground is located in the 600 Area, approximately 3/4 mi northeast of the 400 Area and less than 20 ft north of the waste dumping area described in Section 4.11.12. The burial ground is at approximate Washington State plane coordinates E588282 N123672. It is accessible by a dirt road that begins at the northeast end of the FFTF Visitor Center parking lot.

This suspected burial ground has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score.

The site currently appears as a closed burial ground, measuring 100 ft by 50 ft, that has been covered with soil. The soil has been mounded approximately 10 to 20 ft above the surrounding terrain, with very little natural vegetation growing on it. Some wastes, such as a glove and cut electrical cable, are partially visible on the surface. A berm of soil runs along the north end of the site. Figure 4-57 is a 1994 photograph of the suspected burial ground.

Figure 4-57. Suspected Burial Ground, 1994.

4.11.12 Waste Dumping Site

A waste dumping site is located in the 600 Area, approximately 3/4 mi northeast of the 400 Area, at approximate Washington State plane coordinates E588241 N123643. The site is accessible by a dirt road that begins at the northeast end of the FFTF Visitor Center parking lot, and is on the southeast side of the road. It covers an area of approximately 3 acres.

Tree limbs, bags of leaves, and other waste materials are scattered in areas along the dirt roadway. One of these areas was apparently fenced in the past, since its northeast and southeast corners are framed by wooden posts and chicken-wire fencing. Figure 4-58 is a 1994 photograph of the formerly fenced area.

Additional areas several hundred feet from the roadway contain fire bricks, black rubber gloves, metal buckets, rusted tin cans, broken glass jars, electrical wiring, metal mesh screening, caulking guns, wood scraps, large chunks of building concrete, several semi-circular wooden walls, and other waste materials. Figures 4-59 and 4-60 provide photographs of two of these areas.

Although some of the waste materials appear to have been dumped some time ago, items such as the bags of leaves appear to be recently dumped. It is thus believed that the site may remain active.

This dumping area has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score.

Figure 4-58. Formerly Fenced Area at the Waste Dumping Site, 1994.

Figure 4-59. Miscellaneous Waste at the Waste Dumping Site, 1994.

Figure 4-60. Sagebrush and a Garbage Bag of Leaves at the Waste Dumping Site, 1994.

4.11.13 Well Pump P-14 French Drain

WHC (1993a) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) report that a french drain exists to receive pump packing leakage from the 480-A Pumphouse. The leakage consists of well water from well pump P-14. The inventory states that the french drain is located at Hanford coordinates S0180 W7950.

A historical review of documents and drawings failed to disclose the drain's construction or dates of operation.

Millikin (1988) reports that the french drain has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min.

Effluent received by this french drain is monitored regularly for radioactive or nonradioactive constituents. Monitoring data "indicates tritium levels below radiological effluent guidelines" (Millikin 1988).

This french drain has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score. DOE-RL (1988a) does not list it as a registered class V underground injection well.

4.11.14 Well Pump P-15 French Drain

WHC (1993a) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) report that a french drain exists to receive pump packing leakage from the 480-B Pumphouse. The leakage consists of well water from well pump P-15. The inventory indicates that the drain is located at Hanford coordinates S0180 W7460.

A historical review of documents and drawings failed to disclose the drain's construction or dates of operation.

Millikin (1988) reports that the french drain has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min.

Effluent received by this french drain is monitored regularly for radioactive or nonradioactive constituents. Monitoring data "indicates tritium levels below radiological effluent guidelines" (Millikin 1988).

This french drain has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score. DOE-RL (1988a) does not list it as a registered class V underground injection well.

4.11.15 Well Pump P-16 French Drain

WHC (1993a) and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) report that a french drain exists to receive pump packing leakage from the 480-C Pumphouse. The leakage consists of well water from well pump P-16. The inventory indicates that the drain is located at Hanford coordinates S0722.4 W7884.67.

A historical review of documents and drawings failed to disclose the drain's construction or dates of operation.

Millikin (1988) reports that the french drain has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min.

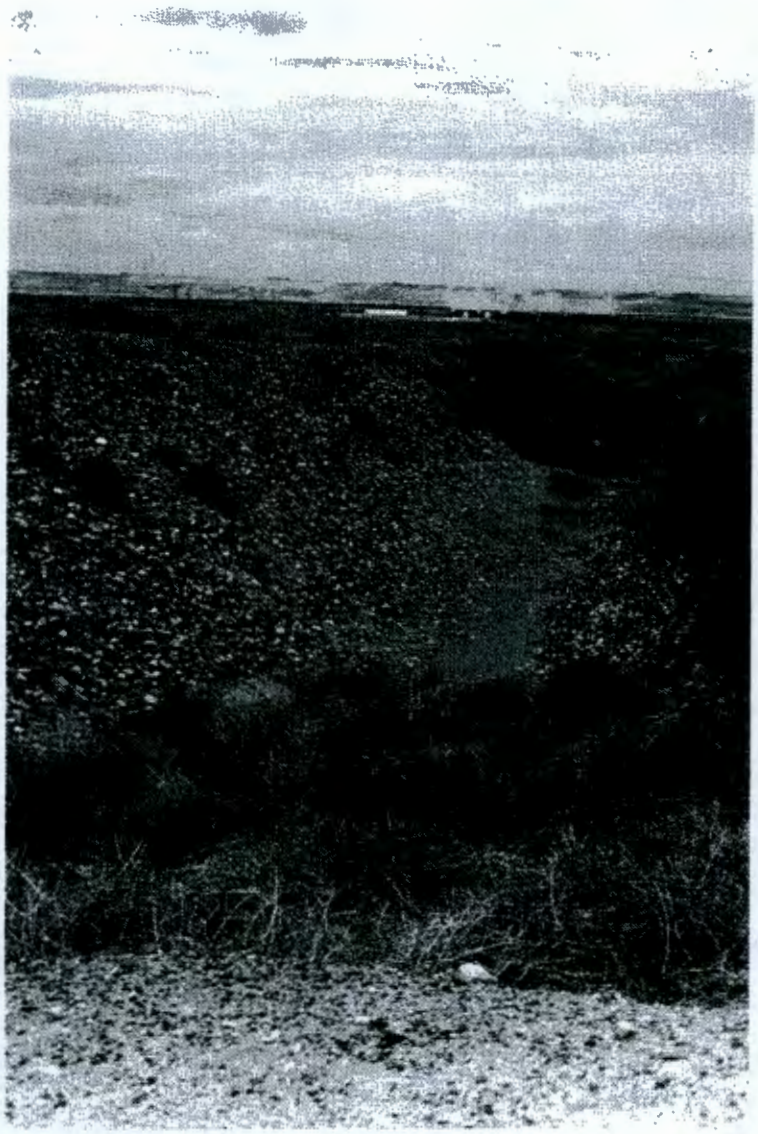
Effluent received by this french drain is monitored regularly for radioactive or nonradioactive constituents. Monitoring data "indicates tritium levels below radiological effluent guidelines" (Millikin 1988).

This french drain has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score. DOE-RL (1988a) does not list it as a registered class V underground injection well.

4.11.16 400 Area Storm Drain Outfall Trench

A trench emerges just north of the perimeter road at the northeast corner of the 400 Area, at approximate Washington State plane coordinates E587820 N123565. This trench is the 400 Area Storm Drain Outfall Trench, which receives storm runoff from various drains throughout the 400 Area.

Figure 4-61. 400 Area Drainage Trench, 1994.



The sides of the trench are covered with cobblestones, and the bottom of the trench is covered with cobblestones and sand. At its starting point, the trench is 30 ft wide at the top and is 20 ft deep. There is no obvious end to the trench, as it narrows down and becomes merely an area of disturbed vegetation that appears to have had water flow over it. The trench runs along the west side of the 400-1 dumping area, toward the Supply System, and is approximately 300 ft long. Although the trench contains piles of dead tumbleweeds and no water is currently visible, Site personnel report that the trench is active.

The trench has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score.

Figure 4-61 is a 1994 photograph of the south end of the trench.

4.11.17 400 Area Retired Portable Sanitary Sewage Treatment Plant

A portable sanitary sewage treatment plant was located at approximate Hanford coordinates S1694 W8483 (Hanford Site Drawing H-4-152051, Sheet 6) and approximate Washington State plane coordinates E587352 N122997. It was several hundred feet away from the 400 Area Retired Sanitary Pond and just east of the 4701-C Guard Station. The plant is believed to have operated between 1972 and 1979, since documents report those operating dates for the

retired sanitary pond to which its effluent was drained. According to Hanford Site Drawing H-4-14602, the plant received wastes from several toilet facilities and drains in the eastern and southern portions of the 400 Area through an underground 8-in. line. After the plant ceased operation, it was removed from the site.

Hanford Site Drawing H-4-152051, Sheet 6, shows this "temporary sewer treatment plant" with underground lines that were "abandoned in place." And Hanford Site Drawings H-4-14600 and H-4-14601 also show a "sewage treatment plant" and associated underground lines in the same approximate location.

Approximately 12,000 gal of aqueous wastes were received by the 400 Area Retired Sanitary Pond from the portable sanitary sewage treatment plant every day during its operation (Cramer 1987). Aqueous effluent from the plant was deposited in the sanitary pond, and nonhazardous sludges were hauled offsite for disposal (Cramer 1987).

The sanitary pond and the portable sanitary sewage treatment plant were the original sanitary sewer system for the 400 Area. During a period of heavy construction in the early 1970's, the system was found to be inadequate to receive sanitary wastes from the increasing number of personnel based in satellite offices and constructing area facilities. WHC (1992) reports that leakage was discovered "at sanitary sewer system manholes and, occasionally, at the outfall," and states that "sampling of the soil to determine type and level of contaminants was not believed to have been done at the time of leakage, or prior to backfill activities, due to the type of spill." The route of the sewer line is shown on Hanford Site Drawing H-4-152051, Sheet 2, but the precise locations of the leaks are unknown. Backfill material was used to cover leak locations, and blacktop or concrete was also poured in certain areas. The number of personnel in the 400 Area decreased in late 1975 and early 1976, stabilizing the sanitary sewer system, but plans were made for a replacement system (WHC 1992).

Site personnel report that a new sanitary sewer system, commonly known as the 4607 Sanitary Sewer, was constructed in 1978 to replace the portable treatment plant and its pond. It is currently the main system for the treatment of sanitary wastes in the 400 Area. Three separate septic tanks were also constructed in 1979 to supplement that sanitary sewer system. These tanks operated until 1983. Refer to Section 4.10.16 for more information about the 400 Area Retired Septic Tanks, and Sections 4.11.20, 4.11.21, and 4.11.22 for more information about the 4607 Sanitary Sewer, its original drain field, and the sanitary sewer lagoon.

After the portable sanitary sewage treatment plant was retired, it was removed from the site (Cramer 1987). No visible evidence of its existence remains. The retired sanitary pond, which was located immediately west of the 4706 Building, was backfilled and abandoned. Refer to Section 4.10.14 for more information about that pond.

Documents reviewed did not indicate that wastes remain at the actual site at which the treatment plant was located. Thus, because the treatment plant was removed from the site, the only wastes remaining would be from sewage leaks along associated underground lines.

This site has not been assigned an HRS migration score, nor has it been documented as a waste site in the WIDS database.

4.11.18 451-A Substation and B/N Plant French Drain

WHC (1993a) reports that a french drain exists to receive rainwater from the 451-A Substation and the 400 Area B/N Plant. A historical review of documents and drawings failed to disclose the drain's location, construction, or dates of operation.

Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score. DOE-RL (1988a) does not list it as a registered class V underground injection well.

4.11.19 400 FD11 (400 Area French Drain 11)

400 FD11 is an active, nonhazardous and nonradioactive liquid waste site that is located in the 400 Area at Hanford coordinates S1544 W7817 (*Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site*, see Appendix C; Hanford Site Drawing H-4-14647) and approximate Washington State plane coordinates E587542 N123053. Hanford Site Drawing H-4-14647 shows the french drain at this site to be approximately 172 ft south of the 408-C West DHX structure, 70 ft west of the 408-B South DHX structure, and 18 ft east and 42 ft south of 400 FD5. The drain is commonly known as 400 Area French Drain 11, although it may also have been known as French Drain 11 and as French Drain Number 11 (WHC 1991). The dates of operation for this french drain are unknown; the drain may or may not still be active.

WHC (1993a), Millikin (1988), and the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) state that the drain has received rainwater from the 453-B Switchgear Pad. Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain has an annual average flow rate of less than 0.01 gal/min.

According to Millikin (1988), there is "no possibility of radioactive contamination" in the effluent discharged to this drain. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain does not appear as a documented waste site in the WIDS database, and DOE-RL (1988a) does not list it as a registered class V

underground injection well. Additionally, the drain has not been assigned an HRS migration score.

400 FD11 currently appears in the middle of a gravel- and cobble-covered field. It consists of a metal pipe, with a diameter of 4 in., that is surrounded by four 4-ft-tall yellow steel posts. The pipe is 15 in. tall and is capped with a metal plug that has a raised square on top. Two 8-in-tall metal bars protrude from the ground approximately 1 ft to the east and west sides of the pipe; they are connected to each other, and to the pipe, by a horizontal metal bar. Refer to Figure 4-19 in Section 4.10.6 for a 1994 photograph of 400 FD5, 400 FD6, and 400 FD11; 400 FD11 is in the foreground.

4.11.20 4607 SS (4607 Sanitary Sewer)

4607 SS is an active, nonhazardous and nonradioactive liquid waste site that is located north of the 400 Area at approximate Hanford coordinates N538 W8280 (Hanford Site Drawing H-4-152051, Sheet 14) and approximate Washington State plane coordinates E587406 N123659. It is across the perimeter road from the 400 Area fence and just west of the access road to the 4608 Percolation Ponds. This site is commonly known as the 4607 Sanitary Sewer, although it has also been known as the 400 Area Sanitary Sewer and as 400 SS. The majority of liquid wastes discharged in the 400 Area are sanitary wastes (BNI 1993).

Site personnel report that this septic system began operating in 1978 and receives all sanitary wastes from 400 Area buildings except the wastes from the few trailers serviced by the 4608 Sanitary Sewer. DOE-RL (1988c), however, reports that the 400 Area Sanitary Sewer began operation in 1979.

Sanitary wastes from buildings in the 400 Area are routed to a 4,445-gal dosing chamber through the 400 Area Sanitary Sewer Main, also known as the 4903 Sanitary Sewer System, which is an underground 12-in. PVC pipe that runs along Hanford coordinate W8269. From the dosing chamber, the wastes then flow into a 45,780-gal, poured-in-place septic tank that is located approximately 300 ft north of the FFTF fence line (WHC 1992). An underground 8-in. line emerges from the northeast corner of the septic tank, travels due east at Hanford coordinate N532 for approximately 100 ft, and then travels northeast to the final disposal site for the sanitary sewer effluent.

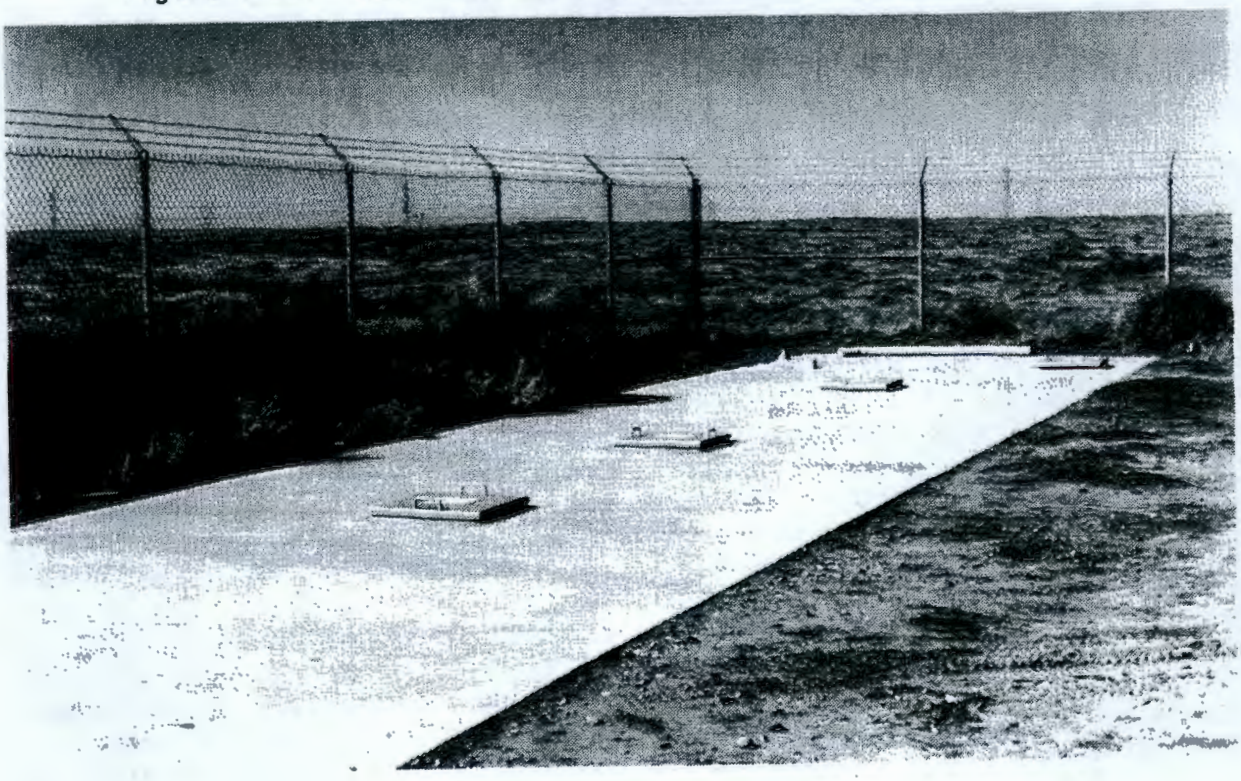
Figures 4-62 and 4-63 provide 1994 photographs of the 4607 Sanitary Sewer septic tank inlet and septic tank, respectively.

Hanford Site Drawing H-4-38165 provides a drawing of the route that the underground sanitary sewer main follows, focusing on its changing elevation. Also, refer to Hanford Site Drawing H-4-38163 for a detailed schematic of the septic tank that shows its construction, measurements, and related structures. Another drawing, H-4-152051, Sheet 14, shows the layout of the septic tank and its associated sewer lines.

WHC (1992) reports that, from 1978 to 1986, the effluent was discharged through the underground 8-in. PVC pipe to the 4607 Sanitary Tile Field. When the sanitary tile field failed in 1986, a valve pit diversion box was installed and sanitary wastes were routed to the 4607 Sanitary Sewer Lagoon.

Figure 4-62. 4607 Sanitary Sewer (4607 SS) Septic Tank Inlet, 1994.

Figure 4-63. 4607 Sanitary Sewer (4607 SS) Septic Tank, 1994.



The valve pit is located approximately 1,400 ft northeast of the septic tank. All effluent from the 4607 Sanitary Sewer now discharges to the unlined, aboveground sanitary sewer lagoon (WHC 1992). Refer to Section 4.11.21 for more information about the tile field and Section 4.11.22 for more information about the lagoon. Additionally, Hanford Site Drawing H-4-159041 provides a detailed sketch that shows the retired 4607 Sanitary Tile Field, the backfilled drainage ditch, the new diversion box, and the 4607 Sanitary Sewer Lagoon.

The septic tank was originally designed to handle a flow rate of 60,000 gal/day (BNI 1993). Reports differ as to the amount of sanitary wastes received by this septic tank in a given period of time. Cramer (1987) states that the 4607 Sanitary Sewer received approximately 6 x 10^6 gal/yr in 1987. McCarthy (1989) states that the septic tank received an average of 15,000 gal of sanitary liquid wastes each day in 1989. WHC (1992) states that the sewer received about 42,000 to 49,200 L of wastes each day in 1992. And BNI (1993) reports that the average flow rate for the tank influent and effluent was 23,100 gal/day in 1993. The differences between these flow rate estimates may be caused by changes in the number of 400 Area personnel from 1987 to 1993.

An underground sanitary waste tie-line was constructed in 1991 to connect the 400 Area sanitary sewer main with the Supply System sewage treatment facility, bypassing the 4607 Sanitary Sewer septic tank and the 4607 Sanitary Sewer Lagoon. The line, which begins at the inlet to the 4607 Sanitary Sewer septic tank, has never intentionally been used and remains inactive. Refer to Section 4.11.9 for more information about the tie-line.

Bovay Northwest, Inc., conducted an engineering study of the 400 Area sanitary sewer system in 1993 "to investigate alternatives that would eliminate the current practice of disposing primary-treated sewage to an unlined pond north of the 400 Area," the sanitary sewer lagoon. An alternative is required because the current lagoon cannot be permitted under WAC 173-216 regulations for continuing operation. The resulting report, BNI (1993), stated that the best alternative would be to use the underground tie-line to bypass the 4607 Sanitary Sewer septic tank and transfer 400 Area sanitary wastes directly to the Supply System sewage treatment plant.

According to the Bovay Northwest report, however, the tie-line "may never be [used] due to regulatory and political constraints between the government and the utility." One reason is that tritium in the 400 Area sanitary waste exceeds the reporting limits for the Supply System sewage treatment facility. Because tritium is present in groundwater pumped in the 400 Area, and removing it from that water would be impracticable, an alternative would be to obtain potable and process water for the area from the Supply System. This alternative would cost more than the other alternatives considered and would require further negotiations with the Supply System to arrange for the water supply. However, the report states, "If at all possible, the sanitary waste tie-line installed between the 400 Area and the Supply System should be utilized. Should it be determined that this tie-line between the two areas [is] acceptable to both parties, serious consideration should also be given to a potable water tie-line to eliminate potential future public health concerns regarding drinking groundwater in the 400 Area" (BNI 1993).

Negotiations are currently underway to determine whether or not the underground tie-line will ever be activated and, if so, under what conditions.

An alternate recommendation presented in the Bovay Northwest report was that an evaporative lagoon be constructed to replace the current sanitary sewer lagoon. The evaporative lagoon would have the capacity to receive 26,000 gal of sanitary wastes per day (BNI 1993). Site personnel report that plans are currently being made for such a lagoon, but construction has not yet begun.

BNI (1993) states that, if the decision is made to proceed with these plans, the evaporative lagoon will become operational and replace the current sanitary sewer lagoon by mid-1996. However, Site employees state that the date the lagoon will become operational remains in question due to funding questions.

The four trailers that are not connected to this septic system discharge sanitary wastes to the 4608 Sanitary Sewer, a smaller system that is located just inside the perimeter fence and near the trailers. Sections 4.10.22 and 4.10.23 provide more information about the smaller sewer system and its tile field.

The 4607 Sanitary Sewer is inspected weekly, and the results of those inspections are documented (Cramer 1987).

This site has not been assigned an HRS migration score, nor does it appear as a documented waste site in the WIDS database.

The 4607 Sanitary Sewer septic tank site is surrounded by an 8-ft-high, chain-link fence that is topped with three strands of barbed wire. The only gate, which is located on the east side of the fenced area, is unlocked and open. A concrete pad measuring 15 ft wide and 150 ft long runs within the fenced area, along its west side. Six metal access doors or hatches, posted with "Danger: Confined Space" signs, are located on the concrete pad. A corrugated metal building, which is part of the 400 Area Process Pond and Sewer System rather than the 4607 Sanitary Sewer, is located at the southeast corner of the fenced area. The floor of the building has a metal hatch similar to those found on the concrete pad. A circular concrete tank is located approximately 10 ft from the south end of the concrete pad, just outside the fence. Hanford Site Drawing H-4-38162 provides a drawing of the septic tank, its associated underground sewer lines, and the process sewer control structure.

4.11.21 4607 STF (4607 Sanitary Tile Field)

4607 STF is a nonhazardous and nonradioactive liquid waste site that is located north of the 400 Area, approximately 100 ft west of the 4608 Percolation Ponds and north of the 4607 Sanitary Sewer Lagoon. It is at approximate Hanford coordinates N1660 W7120 (Hanford Site Drawing H-4-159041) and approximate Washington State plane coordinates E587735 N124026. The site is commonly known as the 4607 Sanitary Tile Field, although it has also been known as the 400 Area Sanitary Tile Field and as 400 STF. Site personnel report that the tile field began operating in 1978 to receive sanitary waste

effluent from the 4607 Process Sewer. It is believed to have ceased operation in 1986 (WHC 1992).

This tile field, also known as a subsurface soil absorption system, consisted of perforated, 4-in. PVC pipe that was designed to discharge sanitary sewage wastes by gravity. The pipe was sloped 3 in. for every 100 ft and was spaced on 8 ft centers. Additionally, the tile field was filled with 1 ft of gravel and crushed rock and was covered with "untreated building paper." Approximately 1,600 ft of 8-in. PVC pipe connected the tile field with the 4608 Sanitary Sewer septic tank (BNI 1993).

Numerous problems were encountered with the tile field. Septic tank effluent repeatedly surfaced in the area of the tile field and overflowed into a natural depression nearby (WHC 1992). WHC (1992) states that the problems with the tile field occurred because it had been installed above a caliche layer that apparently confined the liquids discharged. However, WHC-EP-087 states that a caliche layer did not exist underneath the tile field. Site personnel report that the existence of a caliche layer was not investigated and verified when the field failed.

In 1986, the drain field failed completely, causing effluent to overflow through a manhole and enter the natural depression through a drainage ditch (WHC 1992). WHC (1992) states that the drain field clogged, causing its failure, but Site personnel report that the cause of failure is unknown. A valve pit diversion box was subsequently installed at Hanford coordinates N1471 W7231 (Hanford Site Drawing H-4-159041) to divert the waste stream to the depression, which came to be known as the sanitary sewer lagoon. The lagoon was deepened, a berm was constructed around it, and the existing drainage ditch was backfilled (WHC 1992). Refer to Section 4.11.22 for more information about the 4607 Sanitary Sewer Lagoon.

Since 1986, all sanitary effluent from the 4607 Sanitary Sewer has discharged from the sanitary sewer system to the unlined and aboveground sanitary sewer lagoon, which is located approximately 100 ft west of the 4608 Percolation Ponds (WHC 1992). Site personnel report that the tile field remains in place but is no longer active. The sanitary tile field is thus believed to be inactive, although it remains classified as active in WIDS (WHC 1991).

Hanford Site Drawing H-4-159041 provides a detailed sketch that shows the retired 4607 Sanitary Tile Field, the backfilled drainage ditch, the new diversion box, and the 4607 Sanitary Sewer Lagoon. And Hanford Site Drawing H-4-38162 provides a detailed sketch of the tile field, along with another sketch that shows its location relative to the 4608 Percolation Ponds and the 4607 Sanitary Sewer septic tank.

The total amount of wastes received at this site during its operation is unknown (Cramer 1987). Reports differ as to the amount of sanitary wastes received by the 4607 Sanitary Sewer in a given period of time. Cramer (1987) states that the system received wastes at a rate of approximately 6×10^6 gal/yr in 1987. McCarthy (1989) states that the system received an average of 15,000 gal of sanitary liquid wastes each day in 1989. WHC (1992) states that the system received about 42,000 to 49,200 L of wastes each day in 1992. And BNI (1993) reports that the average flow rate for the septic tank

influent and effluent was 23,100 gal/day in 1993. The differences between these flow rate estimates may be caused by changes in the number of 400 Area personnel from 1987 to 1993.

This site has not been assigned an HRS migration score, nor does it appear as a documented waste site in the WIDS database.

4607 STF currently appears as a vegetation-covered area that blends into the surrounding terrain. The precise location of the sanitary tile field cannot be visually identified. As mentioned above, however, the tile field may be found on several Hanford Site drawings. Pieces of the tile field are evident above ground. Site personnel report that the 4607 Sanitary Tile Field was partially broken up during excavation for the underground tie-line.

4.11.22 4607 SSL (4607 Sanitary Sewer Lagoon)

The 4607 Sanitary Sewer Lagoon is an active, nonhazardous and nonradioactive liquid waste site that is located north of the 4607 Sanitary Sewer septic tank and southwest of the 4608 Percolation Ponds. It is at approximate Hanford coordinates N1560 W7319 (Hanford Site Drawing H-4-159041) and approximate Washington State plane coordinates E587678 N123986. The site is commonly known as the 4607 Sanitary Sewer Lagoon, although it has also been known as the 400 Area Sanitary Sewer Lagoon. The majority of liquid wastes discharged in the 400 Area are from sanitary wastes. This lagoon receives wastes from the 4607 Sanitary Sewer, which receives the sanitary wastes from all 400 Area buildings except those few serviced by the 4608 Sanitary Sewer (BNI 1993).

Shortly after the 4607 Sanitary Sewer and 4607 Sanitary Tile Field began operating in 1978, sanitary effluent began surfacing in the location of the drain field and overflowed into a natural depression nearby. In 1986, the drain field failed completely, causing effluent to overflow through a manhole and enter the natural depression through a drainage ditch (WHC 1992). WHC (1992) states that the drain field clogged, causing its failure, but Site personnel report that the cause of failure is unknown. A valve pit diversion box was subsequently installed at Hanford coordinates N1471 W7231 (Hanford Site Drawing H-4-159041) to divert the waste stream to the depression, which came to be known as the sanitary sewer lagoon. The lagoon was deepened, a berm was constructed around it, and the existing drainage ditch was backfilled (WHC 1992).

Since 1986, all sanitary effluent from the 4607 Sanitary Sewer has discharged from the septic tank to the unlined and aboveground sanitary sewer lagoon. Site personnel report that the tile drain field remains in place but is no longer active. Hanford Site Drawing H-4-159041 provides a detailed sketch that shows the retired 4607 Sanitary Tile Field, the backfilled drainage ditch, the new diversion box, and the 4607 Sanitary Sewer Lagoon. Additionally, refer to Section 4.11.21 for more information about the drain field.

The lagoon, which is not well defined by walls or boundaries, has a diameter of approximately 75 ft (BNI 1993). BNI (1993) reports that the

theoretical combined evapotranspiration and percolation rate of the pond, based upon current flow, is approximately 4.6 gal/ft^2/d.

The amount of wastes received at this site is unknown. Reports differ as to the amount of sanitary wastes received by the 4607 Sanitary Sewer in a given period of time. Cramer (1987) states that the system received wastes at a rate of approximately 6 x 10^6 gal/yr in 1987. McCarthy (1989) states that the system received an average of 15,000 gal of sanitary liquid wastes each day in 1989. WHC (1992) states that the system received about 42,000 to 49,200 L of wastes each day in 1992. And BNI (1993) reports that the average flow rate for the septic tank influent and effluent was 23,100 gal/day in 1993. The differences between these flow rate estimates may be caused by changes in the number of 400 Area personnel from 1987 to 1993.

Sanitary sewer effluent produced in the 400 Area has been monitored routinely since 1980 for ammonia, chloride, phosphate, lead, zinc, cadmium, mercury, and pH levels (WHC 1992).

Bovay Northwest, Inc., conducted an engineering study of the 400 Area sanitary sewer system in 1993 "to investigate alternatives that would eliminate the current practice of disposing primary-treated sewage to an unlined pond north of the 400 Area," the sanitary sewer lagoon. An alternative is required because the current lagoon cannot be permitted under WAC 173-216 regulations for continuing operation. The resulting report, BNI (1993), stated that the best alternative would be to use an underground tie-line that was constructed in 1991 to connect the 400 Area sanitary sewer main with the Supply System sewage treatment facility, bypassing the 4607 Sanitary Sewer septic tank and the 4607 Sanitary Sewer Lagoon.

The 8-in., gravity flow tie-line begins at the inlet to the 4607 Sanitary Sewer septic tank. It has never intentionally been used and remains inactive. If the line were to become operational, it would replace the 4607 Sanitary Sewer septic tank and the 4607 Sanitary Sewer Lagoon (BNI 1993).

According to the Bovay Northwest report, however, the tie-line "may never be [used] due to regulatory and political constraints between the government and the utility." One reason is that tritium in the 400 Area sanitary waste exceeds the reporting limits for the Supply System sewage treatment facility. Because tritium is present in groundwater pumped in the 400 Area, and removing it from that water would be impracticable, an alternative would be to obtain potable and process water for the area from the Supply System. This alternative cost more than the other alternatives considered and would require further negotiations with the Supply System to arrange for the water supply. However, the report states, "If at all possible, the sanitary waste tie-line installed between the 400 Area and the Supply System should be utilized. Should it be determined that this tie-line between the two areas [is] acceptable to both parties, serious consideration should also be given to a potable water tie-line to eliminate potential future public health concerns regarding drinking groundwater in the 400 Area" (BNI 1993).

Negotiations are currently underway to determine whether or not the underground tie-line will ever be activated and, if so, under what conditions. Refer to Section 4.11.9 for more information about the tie-line.

An alternate recommendation presented in the Bovay Northwest report was that an evaporative lagoon be constructed to replace the current sanitary sewer lagoon. The evaporative lagoon would have the capacity to receive 26,000 gal of sanitary wastes per day (BNI 1993). Site personnel report that plans are currently being made for such a lagoon, but construction has not yet begun.

BNI (1993) states that, if the decision is made to proceed with these plans, the evaporative lagoon will become operational and replace the current sanitary sewer lagoon by mid-1996. However, Site employees state that the date the lagoon will become operational remains in question due to funding questions.

The 4607 Sanitary Sewer Lagoon currently appears as an area that is covered with natural vegetation, including cattails and sagebrush. The north and west sides are clearly depressed, but the south and east sides gradually slope upward to the surrounding terrain and do not have clear boundaries. Liquid is visible in places on the surface of the lagoon, and the area smells strongly of sewage. Signs reading "Caution: This Pond Contains Treated Sewage" and "Warning: Treated Sewage" have been placed on metal posts around the perimeter of the lagoon. Figure 4-64 is a 1994 photograph of the site.

Figure 4-64. 4607 Sanitary Sewer Lagoon (4607 SSL), 1994.

This lagoon has not been assigned an HRS migration score, nor does it appear as a documented waste site in the WIDS database.

4.11.23 4713-B Loading Dock French Drain

WHC (1993a) reports that a french drain exists to receive lunchroom sink wastewater and cooling water from welding torches at the 4713-B Loading Dock. The *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain is located at Hanford coordinates S1550 W8026 and has received effluent from the 4713-B Loading Dock, including cooling water for welding equipment. A historical review of documents and drawings failed to disclose the drain's construction or dates of operation.

Millikin (1988) reports that the french drain receives only intermittent discharges and has a normal flow rate of zero. And the *Inventory of Miscellaneous Liquid Effluent Streams at the Hanford Site* (see Appendix C) states that the drain's annual average flow rate is less than 0.01 gal/min.

According to Millikin (1988), there is a "low possibility of radioactive contamination" in the effluent discharged to this french drain. Contamination is deemed unlikely, however, and the drain has no history of receiving contaminated effluent. No routine monitoring is performed for radioactive or nonradioactive constituents (Millikin 1988).

This french drain has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score. DOE-RL (1988a) does not list it as a registered class V underground injection well.

4.11.24 Buried Construction Waste Area Number 1

Hanford Site Drawing SK-4-81543 (see Appendix C) shows a buried construction waste area, located northwest of the 451-B Substation and northwest of FMEF in the 400 Area. It is at Washington State plane coordinates E587065 N123348. The burial ground covers an area that ranges from approximate Hanford coordinates W9126.06 to W9593 and from S200 to S800. Site personnel report that the burial ground was active from about 1977 to about 1979.

According to the drawing, the burial ground was located underneath the 4843 Laydown Area and the "future" site of the 4843 Building.

No other drawings or documents could be found to provide further information about the burial ground.

This site has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score.

The burial ground is currently covered by the 4843 Laydown Area; the 4843 Building; a vegetation-free, gravel-covered field; and paved roadways. No evidence of the burial ground is visible at the site.

4.11.25 Buried Construction Waste Area Number 2

Hanford Site Drawing SK-4-81543 (see Appendix C) shows a buried construction waste area, located northeast of the 451-B Substation and

northeast of FMEF in the 400 Area. It is at Washington State plane coordinates E587321 N123343. The burial ground covers an area that ranges from approximate Hanford coordinates S330 to S790 and from W8392 to W8700. Site personnel report that the burial ground was operational from about 1972 to 1974.

According to the drawing, the burial ground was located underneath the "future" site for the "4224 Flammable Storage Building."

No other drawings or documents could be found to provide further information about the burial ground.

This site has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score.

The burial ground is currently covered by a vegetation-free, gravel-covered field and the 4831 Flammable Storage Facility. No evidence of the burial ground is visible at the site.

4.11.26 440 HWTSF (440 Hazardous Waste Temporary Storage Facility)

The 440 Hazardous Waste Temporary Storage Facility, also known as the Hazardous Waste Temporary Storage 440 Building/Slab, was constructed in the 400 Area at approximate Washington State plane coordinates E587478 N123363. The facility is 55 ft south of the 4713-C Building and within the FFTF protected area fence. Its northeast corner is at Hanford coordinates S440 W8010, and its southeast corner is at S500 W8030 (Hanford Site Drawing H-4-302003, Sheet 4). Site personnel report that the facility began operation in December 1993 as a less-than-90-day storage area for hazardous wastes, replacing the 4831 Laydown Hazardous Waste Staging Area.

Hanford Site Drawing H-4-302003, Sheets 1 through 5, provide details about the construction and the location of the facility. It consists of a "pre-engineered clearspan steel structure" that is approximately 12 ft tall and has a concrete foundation. The structure is 60 ft long and 20 ft wide. A concrete containment berm, approximately 5 in. high and 6 in. wide, runs along the east side of its concrete foundation.

The structure's south, west, and north sides consist of steel siding; its east side consists of 8-ft-high metal chain-link fencing woven with metal strips. A gap of approximately 6 in. exists between the fencing and the metal structure. The structure has a weathertight, zinc-coated steel roof with four skylights and a "full length roof vent" that runs along the very top of the roof. Insulation was "not required in the walls or roof of this building," and electrical service was "not required for this facility" (Hanford Site Drawing H-4-302003, Sheets 1 through 5). Telephone wiring was installed, however, and a telephone is located on the outside of the facility's south wall. The walls and roof have been painted a rusty tan color, inside and out.

A paved, "U"-shaped access road was constructed on the east side of the facility. The road connects with Tyler Street at its south end and the 4713-C access road at its north end. The access road was sloped to provide drainage away from the facility (Hanford Site Drawing H-4-302003, Sheets 1 and 2).

The southeast corner of the structure was originally designated on Hanford Site Drawing H-4-302003, Sheets 3 and 4, as the Spill Cleanup Equipment Area. This area is 10 ft long and 9 ft, 8 in. wide. Its concrete foundation is raised 6 to 8 in. above the structure's foundation. Its north and west sides are bounded by regular 8-ft-high metal chain-link fencing, without woven strips, and its south side is bounded by the south wall of the structure.

The fenced east side of the facility has two double-swing gates. One, a 10-ft-wide gate, is located at the very center of the facility's east side. A paved ramp, 10 ft wide and 11 ft long, leads from that gate to the new paved access road. The ramp extends 5 ft, 6 in. inside the gate and extends 5 ft, 6 in. outward from the gate to the access road. Another 10-ft-wide gate, which is located at the south end of the facility's east side, bounds and allows access to the area originally designated as the Spill Cleanup Equipment Area (Hanford Site Drawing H-4-302003, Sheets 3 and 4). Both gates are locked.

Rain gutter pipes descend from the structure's roof in several locations to facilitate the drainage of rainwater.

Material excavated during the construction of the facility was to be "spread evenly on the ground to the west of the building," according to Hanford Site Drawing H-4-302003, Sheet 1.

Because this facility replaced the 4831 LHWSA as the less-than-90-day storage area for 400 Area hazardous wastes, it receives the same wastes as that site had received. Cramer (1987) states that wastes staged at the 4831 LHWSA were primarily oils, solvents, ethylene glycol, and empty drums for cooling water treatment chemicals such as Endcor 4690, which is acutely hazardous.

This site has not yet been documented as a waste site in the WIDS database, nor has it been assigned an HRS migration score.

In August 1994, the facility contained about five blue 55-gal steel drums, stacked two high on wooden pallets in the area designated by drawings as the Spill Cleanup Equipment Area. A white crate or box, labeled "Spill Kit," is located within the facility at the north end. The spill kit is not located within the area designated on drawings as the Spill Cleanup Equipment Area; the only items currently stored in that area are the blue drums. Six yellow metal cabinets, each of which is 6 to 8 ft high, have been placed inside the facility along the west wall. All of the cabinets are labeled "Flammable, Keep Fire Away," and four are labeled "Hazardous Waste." Two wooden crates are also located inside the facility. Both are labeled "Hazardous Waste" and "Persistent," and one is labeled "Combustible Liquid."

The facility has been posted with signs reading, "Less Than 90 Day Accumulation Area for Hazardous Waste," "Danger: No Smoking, Matches, or Open Flames," and "Danger: Hazardous Waste Storage."

4.11.27 4831 FSF (4831 Flammable Storage Facility)

The 4831 Flammable Storage Facility is located at approximate Washington State plane coordinates E587299 N123308. It borders a portion of Texas Street at the street's end and is approximately 10 ft south of the 4831 Laydown Hazardous Waste Staging Area; the two facilities are separated by the street.

This facility consists of a corrugated metal building, known as the 4831 Building, and a concrete pad that is surrounded by a locked chain-link fence.

The 4831 Building is about 20 ft high, 20 ft wide, and 50 ft long, and is made of corrugated metal that has been painted goldenrod yellow. It is posted with signs reading "Flammable Storage Facility," "400 Area Site Warehousing Services, Authorization Required for Access to Facility or Withdrawal of Material," "No Smoking," and "Danger: No Smoking, Matches, or Open Lights."

The concrete pad, which runs along the south side of the 4831 Building, is 20 ft wide and 50 ft long. Its west, south, and east sides are surrounded by a chain-link fence that is approximately 6 ft high. A single gate, which is on the west side of the fenced area, has been chained and padlocked. A regular door and a roll-up door are located on the south side of the 4831 Building; they allow access from the building to the fenced concrete pad. Signs posted on the fence read, "Danger: No Smoking, Matches, or Open Lights" and "No Hazardous Chemicals in Fenced Area. Stored in This Area: Nonregulated Empty Drums, Nonregulated Waste, and Used Oil."

Approximately 80 drums were being staged on the concrete pad in May 1994. Most were 55-gal steel drums, although two appeared to be 55-gal plastic drums and another was a slightly larger plastic drum. These drums were stacked two high, four deep, and ten wide on wooden pallets at the east end of the concrete pad. Several of the drums had MSDS labels on them, but the labels had either been partially removed or erased. Additionally, the site contained two blue, 55-gal steel drums labeled "Nonregulated Waste." The specific types of waste contained within the two blue drums could not be determined by this author, as no other labeling could be seen from outside the fence. All of the drums appeared to be intact. Other wooden pallets are stacked at the west side of the pad, along with an unmarked metal box. Figure 4-65 is a 1994 photograph of the 4831 Flammable Storage Facility.

Figure 4-65. 4831 Flammable Storage Facility (4831 FSF), 1994.

4.12 LIST OF 400 AREA BUILDINGS, FACILITIES, AND STRUCTURES

The 400 Area contains several major buildings, facilities, and structures, including the Fast Flux Test Facility (FFTF) reactor and its support facilities.

Table 4-12 provides a list of these buildings, facilities, and structures. Some have been decommissioned and/or demolished, while others remain operating. Mobile office trailers and most temporary construction buildings have not been included. These buildings, facilities, and structures may or may not be important from a waste standpoint. Refer to Figures 4-1 and 4-2 for drawings that show the historical and current locations of buildings throughout the 400 Area.

Table 4-12. List of 400 Area Facilities and Structures. (sheet 1 of 3)

Facility	Comments
52	FMEF Substation.
401	Visitor Center.
403	Fuels Storage Facility.
405	FFTF Reactor Containment Building, also known as the FFTF Reactor Building. For information about the status of FFTF, refer to Section 4.2.
408-A	East Dump Heat Exchanger (DHX). Also known as the Main Heat Dump, East. Remains active.
408-B	South Dump Heat Exchanger (DHX). Also known as the Main Heat Dump, South. Remains active.
408-C	West Dump Heat Exchanger (DHX). Also known as the Main Heat Dump, West. Remains active.
409-A	Closed Loop Heat Dump, East #1. Also known as CLS DHX 1.
409-B	Closed Loop Heat Dump, East #2. Also known as CLS DHX 2.
409-C	Closed Loop Heat Dump, West #3.
409-D	Closed Loop Heat Dump, West #4.
427	Fuels and Materials Examination Facility. Also known as the FCP Process Building. FMEF was "designed and constructed to be a high-security, multi-storied structure with the capability to handle low and high exposure radioactive materials. The original intent was to use FMEF to fabricate and reprocess FFTF fuel and experiments. Due to program and funding changes, most of the specialized equipment has never been installed and radioactive material has never been introduced to the facility. The facility is used only for personnel offices" (Seamans 1994).
427A	Argon/Hydrogen Mixing Building.
432A	Gas Bottle Storage.
436	Training Facility.
437	Maintenance and Storage Facility (MASF). Consists of a main building and a two-story service wing, located within the FFTF protected area. Its purpose was "to provide maintenance, repair, and storage facilities for radioactive or specialized maintenance equipment used" in support of FFTF (Seamans 1994). Remains active.
440	90-day Hazardous Waste Storage Pad.
451-A	FFTF Electrical Substation, 115KV.
451-B	400 Area Electrical Substation, 115KV.
453-A	Transformer Station, East, 2.4 KV. Also known as the A-1 Switchgear.
453-B	Transformer Station, South, 2.4 KV. Also known as the A-2 Switchgear.
453-C	Transformer Station, West, 2.4 KV. Also known as the A-3 Switchgear.
480-A	Water Supply Well Number 1.
480-B	Water Supply Well Number 2. Also known as the Water Supply Well House.
480-D	Water Supply Well Number 4.
481	Water Pumphouse Building.
481-A	481-A Water Pumphouse. Also known as the Water Pumphouse Building. The pumphouse is a single-story, concrete block building with 149 m^2 or 1,608 ft^2 of floor space. Construction was completed in 1984. "The pumphouse contains a diesel-powered pump for firefighting, a 1,136-L diesel fuel tank, and two electrical water-sealed pumps that supply all of the potable water to the 400 Area, including sanitary and process sewer water. The potable water pumps draw from three deep wells located within the 400 Area and discharge to three 1,135,500-L storage tanks." The water is then provided to facilities by a suction pump (WHC 1992). Remains active.
482-A	Water Storage Tank.
482-B	Water Storage Tank.
482-C	Water Storage Tank, FMEF.

Table 4-12. List of 400 Area Facilities and Structures. (sheet 2 of 3)

483	FFTF Cooling Towers.
483-A	Cooling Tower, FMEF.
483-B	Water Treatment Building.
484	ICCW Equipment Building.
491-E	HTS Service Building, East.
491-S	HTS Service Building, South.
491-W	HTS Service Building, West.
4166	Transfer Storage Building, FMEF.
4220	Telephone Exchange.
4500	Electrical Distribution.
4608	Percolation Pond.
4608-A	Leaching Field.
4608-B	Control Structure and Process Sewer Sampling Station.
4621-E	Auxiliary Equipment Building, East.
4621-W	Auxiliary Equipment Building, West.
4622	Meteorology Building and Tower.
4701-A	Guard Station, Kentucky Boulevard.
4701-B	Guard Station, Grant Avenue. Remains in place but no longer functions as a manned guard station.
4701-C	Guard Station, Hayes Street. Remains in place but no longer functions as a manned guard station.
4701-TR	Security Office Building (proposed).
4702	Office Building.
4703	FFTF Reactor Control Building. Also known as the FFTF Control Building.
4704	Office Building.
4704-N	Security Maintenance Shop.
4704-S	400 Area Fire Station.
4705	Administration Building for HPFL (proposed).
4706	Office Building. Also known as the Support Services Building.
4707	400 Area Site Support Office.
4709	Fire Station (proposed).
4710	Operation Support Building. Also known as the FFTF Office Building.
4713-A	Riggers' and Drivers' Operations Facility. Also known as the FFTF Refuel Area Laydown Facility.
4713-B	FFTF Maintenance Shop. Also known as the Protected Area Maintenance Building.
4713-C	Warehouse. Also known as the MASF/Refueling Laydown Area.

Table 4-12. List of 400 Area Facilities and Structures. (sheet 3 of 3)

Facility	Comments
4713-D	Interim Maintenance and Storage Facility.
4716	FFTF Tool Crib. Also known as the Maintenance Tool Storage Facility.
4717	Reactor Service Building.
4717-A	Cask Loading Station (part of the 4717 Building).
4718-B	Warehouse, HPFL (proposed).
4718-TC	Office, Temporary.
4719	Medical Aid Station.
4721	FFTF Emergency Generator Building. Also known as the FFTF Emergency Generator Facility.
4722-B	Carpenter Shop. Also known as a Site Services Maintenance Shop.
4722-C	Painters' Shop. Also known as a Site Services Maintenance Shop.
4722-D	--
4726	Janitorial Storage.
4727	Maintenance Flammable Storage.
4732-A	Warehouse.
4732-B	Warehouse.
4732-C	Warehouse.
4734-A	Nitrogen Dewar Pad.
4734-B	Site Services Maintenance Shop.
4734-C	Warehouse, Special Tools.
4734-D	Warehouse.
4760	Construction Contractor Shop.
4790	Patrol Headquarters Building.
4790-A	Microwave Tower Storage. Also known as the Microwave Tower.
4791-TC	Warehouse. Also known as the FMEF Model Building.
4802	Construction Support Building. Also known as FMEF Construction.
4814	Special Tools Warehouse. Also known as FMEF Construction.
4831	Flammable Storage. Also known as the Flammable Storage Warehouse.
4842-A	451-B Substation Switchgear. Also known as the 400 Area Substation Switchgear.
4842-B	Switch Water Pumphouse. Also known as the Water Pumphouse Switchgear.
4843	Alkali Metal Storage. Formerly known as the Laydown Area Warehouse.
4862	FMEF Entry Wing Office. Also known as the Entry Wing and Fuel Assembly Area, FCP.

5.0 300-FF-2 UNPLANNED RELEASES

Chapter 5 includes a description of unplanned releases located in Operable Unit 300-FF-2 and within the 300, 400, and 600 Areas. Unplanned releases, or spills, are defined as the inadvertent and unplanned releases of contaminants, either radiological or chemical, to the environment. Most releases are to soil. Each is described separately in the following sections.

5.1 UPR-300-1 (307 TO 340 WASTELINE LEAK)

UPR-300-1 is an inactive, mixed liquid waste site, located at Hanford coordinates N54445 E15405, between the 307 Retention Basins and the 340 Building (see Figure 5-1, Detail A). The site is commonly known as the 307 to 340 Waste Line Leak, although it has also been known as 316-1, 316-1A, and 300-UN-1 (WHC 1991). An unplanned release of process waste containing transuranic fission products was discovered at this site on December 9, 1969 (Stenner et al. 1988).

The leak was discovered when the transfer pump from the 307 Retention Basins to the 340 Building did not function properly and water began to appear at the surface (Denham 1970). The damaged line was hand excavated during the week of December 15 to 20, 1969. It was discovered that a carbon steel transition pipe, 5 ft below grade between the cast iron retention basin pipe and the stainless steel 340 waste system piping, had been corroded away. Since the bottom half of the pipe was corroded away, it was assumed that the corrosion took place over a long period of time, possibly as long as two years (Denham 1970).

Approximately 900 Ci of relatively short-lived radionuclides, mainly ^{147}Pm and including 10 Ci each of ^{90}Sr and ^{137}Cs, leaked to the soil column. More than 90% of the contamination from this incident is believed to be confined within a cylindrical section of soil approximately 25 ft deep and 12 ft in diameter (Denham 1970). The soil above and in the vicinity of the leak was grossly contaminated; it was removed, placed in barrels, and taken to a 200 Area burial ground for disposal (Denham 1970, Stenner et al. 1988).

A 9-ft-deep hole was dug directly beneath the corroded pipe section using an extended posthole digger. Soil samples were collected at several points and sent for isotopic analysis (Denham 1970). In addition, a groundwater monitoring well (399-3-8) and four more exploratory holes were drilled and sampled to determine the extent of contamination (Denham 1970). The analytical results are presented in Denham (1970).

An HRS migration score of 26.60 has been assigned to this site (Stenner et al. 1988). Unplanned releases UPR-300-2, UPR-300-11, and UPR-300-41 are also associated with the 340 Complex. See Sections 5.2, 5.7, and 5.16, respectively, for details of these releases.

5.2 UPR-300-2

UPR-300-2 is an inactive, mixed liquid waste site that is located at Hanford coordinates N54445 E15405, within 10 to 20 ft north, east, and south

of the 340 Building (see Figure 5-1, Detail A). An alias for this site is UN-300-2 (WHC 1991). An unplanned release occurred at this site in January 1954 (Stenner et al. 1988).

Approximately 10 mCi of ^{137}Cs was found at this site (Stenner et al. 1988). The site has an HRS migration score of 18.27 (Stenner et al. 1988).

5.3 UPR-300-4

UPR-300-4 is an inactive, mixed liquid waste site that is located at Hanford coordinates N54280 E14200, beneath and south of the 321 Building. An alias for this site is UN-300-4 (WHC 1991). From 1945 to 1955, an unplanned release and/or releases occurred at this site (Stenner et al. 1988). Figure 5-2 is a drawing that shows the location of this spill.

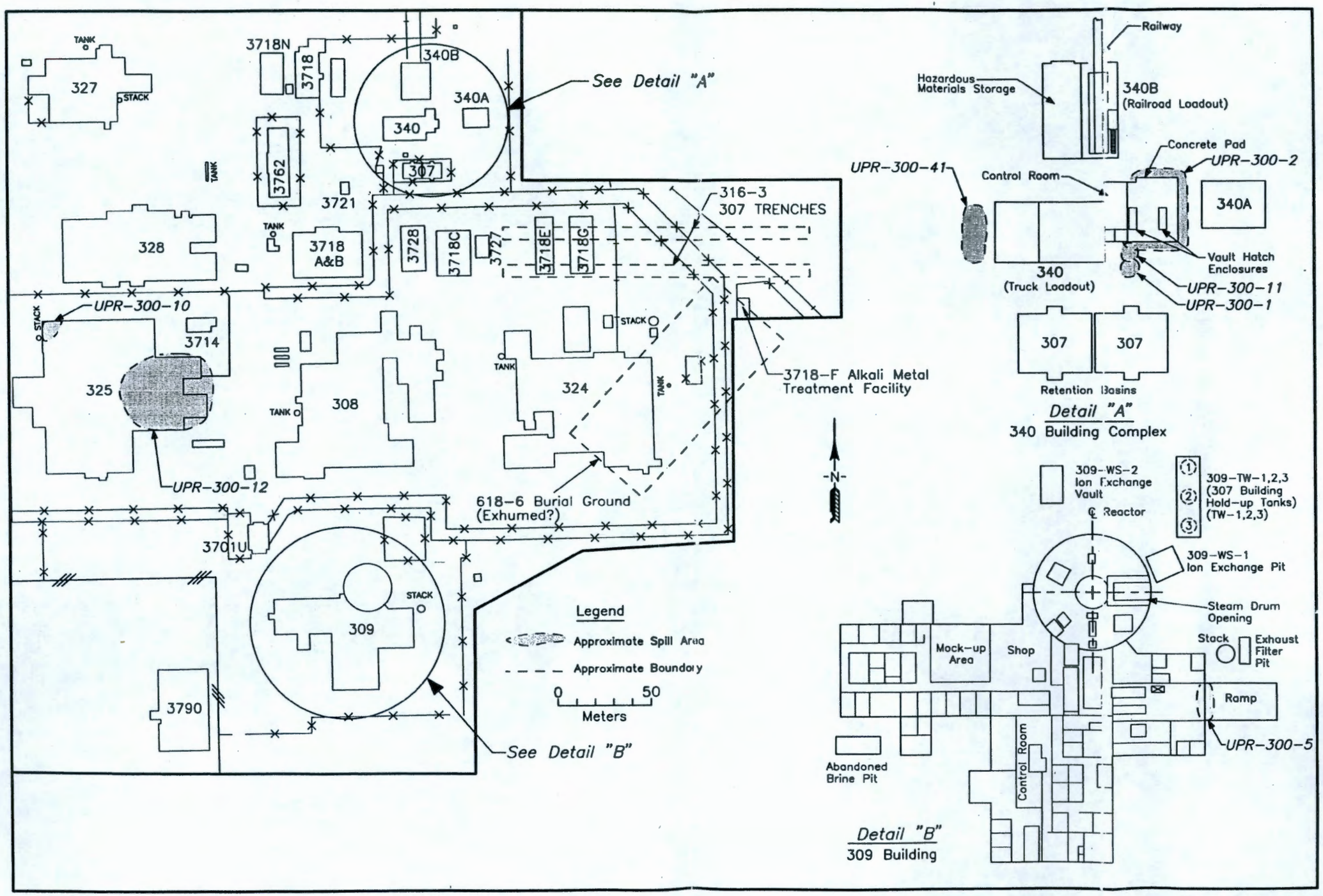
It is assumed the contamination is from leaks in equipment used during the development of REDOX and PUREX processes. It has also been reported that there may have been a reverse well used at the 321 Building from 1945 to 1947 (Gerber 1992). The material released contained uranium (Stenner et al. 1988). During the installation of the Hydraulic Core Mock-Up (HCM) for Fast Flux Test Facility (FFTF) development from 1977 to 1979, excavations inside the canyon area uncovered uranium contamination. The excavation encountered a yellow substance, presumably uranyl nitrate, measuring 20 mRad/h. The yellow substance extended to from 15 to 20 ft below the canyon floor and most likely continued beyond this depth. Cleanup of the contamination was only performed on the area needed for the HCM (Briggs 1982). The true extent of the contamination is unknown, but a 100-ft by 100-ft area south of the 321 Building is suspected to be contaminated (Cramer 1987).

Because removal of the all of the contaminated soil was believed to be a threat to the 321 Building, it was not attempted. An HRS migration score of 22.12 has been assigned to this site (Stenner et al. 1988).

Currently, the 321 Building is unoccupied and is in the process of being isolated. The floor drains have been plugged, and water, electricity, and steam are going to cut off in the building. Once the building is isolated, it will be turned over to D and D.

5.4 UPR-300-5

UPR-300-5 is an inactive, low-level liquid waste site that is located at approximate Hanford coordinates N53852.82 E15360 (Hanford Drawing H-3-57400), approximately 4 ft from the 309 Building and extending the full width of that building's truck ramp (see Figure 5-1, Detail B). An alias for this site is UN-300-5 (WHC 1991).. An unplanned release of low-level, radioactively-contaminated water occurred at this site on August 31, 1973 (Stenner et al. 1988).



WHC:JJA:300AREA:GA-2

Figure 5-1. Unplanned Releases UPR-300-1, UPR-300-2 UPR-300-5, UPR-300-10, UPR-300-11, UPR-300-12, and UPR-300-41.

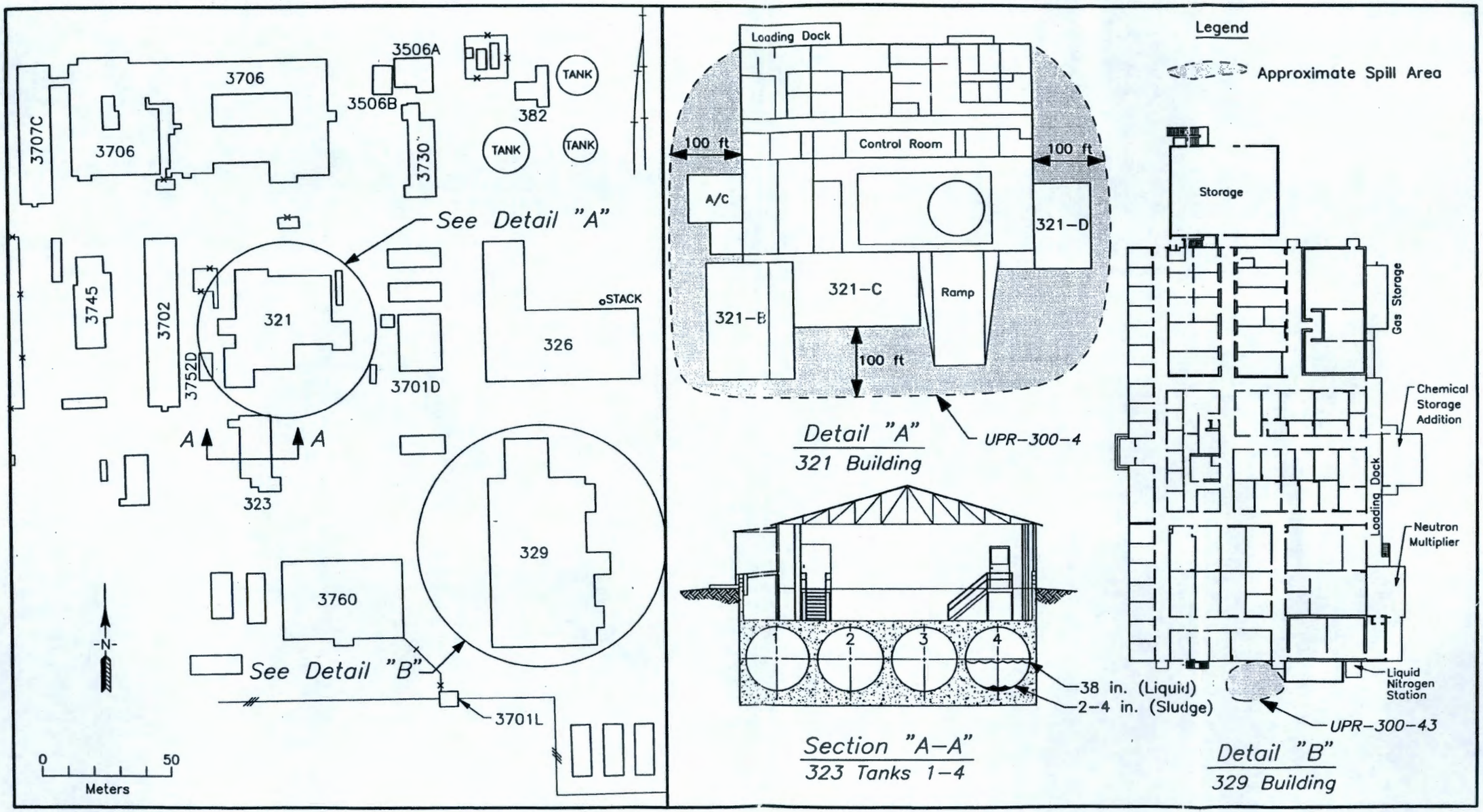


Figure 5-2. Unplanned Releases UPR-300-4 and UPR-300-43.

The 309 Storage Basin fill line was left open, pouring radioactively contaminated water into the basin and causing it to overflow (Stenner et al. 1988). The basin overflow line flowed into TW-3, a liquid storage tank for the 309 Building. Drain pipes from the truck stall, the stack filter vault, and the stack proper are also connected to TW-3 (Radiation Incident 73-BNW-17, Appendix A). When TW-3 filled, the contaminated water flowed through the interconnected drain pipes, flooding the filter vault and flowing into the base of the stack. The below-grade truck stall, which extends outside of the building, was flooded to a height of approximately 18 in. An unknown amount of water was released, but between 7,000 and 10,000 gal of water was pumped from the 309 Building to the process sewer via the ion exchanger and TW-1 for disposal in the process pond during decontamination activities (Radiation Incident 73-BNW-17, Appendix A).

Initial surveys of the truck stall and ramp floor inside and outside the building revealed direct radiation levels to 20 mRad/h and smearable contamination to 30 mRad/h. It was also determined that the sand lying on the top of the blacktop had concentrated the radioactive contamination (Radiation Incident 73-BNW-17, Appendix A). Initial survey results for the basin area, the stack vault, and the stack base were not reported.

Cleanup efforts involved decontaminating the area that was contaminated by the spill. The sand and rocks in the truck stall area were scooped up and placed in barrels for disposal. The contaminated areas of the truck ramp were flushed with water several times. The blacktop of the truck ramp, an area measuring approximately 25 ft by 50 ft, was sealed with a coat of oil and sand, covering the smearable contamination and reducing the direct reading to less than 500 c/m (Radiation Incident 73-BNW-17, Appendix A). The contamination within the truck stall and on the floor in the storage basin area was reduced by flushing with water. Decontamination efforts reduced the contamination levels to 7000 c/m (dry) and 1000 c/m (dry). No decontamination activities were reported for the stack filter vault or the stack (Radiation Incident 73-BNW-17, Appendix A).

Samples of the contaminated water were analyzed by HEDL radiochemistry personnel following the incident. The results are presented in Table 5-1 (Radiation Incident 73-BNW-17, Appendix A).

Table 5-1. Radiochemistry Results of the Contaminated Water.

Total Beta	5.8E-04 μCi/ml
Total Alpha	< 3E-05 μCi/ml
^{137}Cs	5.73E-04 μCi/ml
^{134}Cs	4.7E-05 μCi/ml
^{60}Co	3.6E-05 μCi/ml

(Radiation Incident 73-BNW-17, Appendix A)

An HRS migration score of 14.66 has been assigned to this site (Stenner et al. 1988).

5.5 UPR-300-7

UPR-300-7 is an inactive, hazardous liquid waste site that is located at Hanford coordinates N54780 E14500, around the day tank behind the 384 Building. An alias for this site is UN-300-7 (WHC 1991). An unplanned release of No. 6 fuel oil occurred at this site on August 17, 1972 (Stenner et al. 1988).

Approximately 850 gal of No. 6 fuel oil overflowed a full day tank behind the 384 Building when oil was transferred from the storage bunker. The spilled oil was retained in the soil between and around two adjacent day tanks, as well as in the concrete valve pits around the day tanks. Approximately 30 gal of oil flowed with wastewater in the trench to a sewer system that empties into a sump in the southeast part of the 384 Building basement. The sump released some of the fuel oil to the north process pond. (Stenner et al. 1988). When it was discovered that some of the fuel oil had reached the process pond, the ash sluicing system was activated, since it was connected to the same sump. The ash sluice system emptied and purged the sump, discharging the effluent to the ash pits (HEDL Incident Report 33-72, Appendix A).

A portable pump air tank truck was used to recover approximately 800 gal of the spilled oil. Conduits throughout the 384 Building foundation and in the floor trench were flushed of all oil with hot water (Stenner et al. 1988). Approximately 10 gal of fuel oil was discharged to the north process pond and approximately 20 gal was discharged to the ash pits. The majority of the fuel oil in the north process pond was removed by skimming off the oil and disposing of it in a nearby ash-filled area. The fuel oil in the soils surrounding the day tanks penetrated less than 3 in. The contaminated soils were to be covered when a nearby construction project was completed (HEDL Incident Report 33-72, Appendix A).

5.6 UPR-300-10

UPR-300-10 is an inactive, mixed liquid waste site located beneath the northwest corner of the 325 Building at Hanford coordinates N54025 E14670. An alias for the site is UN-300-10 (WHC 1991). An unplanned release of radioactive liquid was discovered at this site in 1977 (Stenner et al. 1988).

Leak testing of the radioactive liquid waste sewer (RLWS), which served the 352-B Hot Cells, identified a leak in the 325 Building between the west basement wall of Room 32 and the north foundation wall of Room 202. An unknown amount of radioactive liquid waste, which may have included dissolution of highly radioactive samples, such as irradiated reactor fuels, is believed to have been released (Stenner et al. 1988, WHC 1991).

The line involved was capped and rerouted through the basement of the 325 Building (Stenner et al. 1988).

5.7 UPR-300-11

UPR-300-11 is an inactive, mixed liquid waste site that is located at Hanford coordinates N54453 E15404, beside the 340 Building, as shown in

Figure 5-1. An alias for this site is UN-300-11 (WHC 1991). Contaminated soil resulting from an unplanned release of radioactive liquid waste was discovered at this site on October 31, 1977 (Hall 1978).

Soil staining below flanges on a tee in the radioactive liquid waste line was discovered when the area was excavated by hand for installation of a new valve box (Hall 1978). Flow tests conducted after the staining was discovered confirmed the integrity of the line under the current operations (Hall 1978). The leaking flanges on the tee in the exposed radioactive liquid waste line resulted in the contamination of approximately 22 ft^3 of soil in a column approximately 1 ft in diameter and extending to approximately 23 ft below grade (Stenner et al. 1988). At that depth, contamination spread laterally in an area of interface between undisturbed soil and backfill material (Stenner et al. 1988). Diagrams of the area of contamination in relation to the piping and valve box are presented in Hall (1978).

Fission products were found in soil samples, but no alpha-emitting radionuclides were detected (Stenner et al. 1988). Results of the soil sampling from the excavation and the borings are presented in Hall (1978). Radiation survey results from readings collected during the initial excavation and at the leaking tee are presented in Hall (1978). Evidence of contamination from a separate release was also found, somewhat blurring contamination boundaries. Physical conditions prevented characterization of the second contaminated soil column (Stenner et al. 1988, Hall 1978).

Contaminated soil was removed by hand excavation to about 8 ft below grade, then placed in drums and buried in a 200 Area burial ground. Approximately 90% of the contamination was removed, leaving approximately 1 Ci in place (Stenner et al. 1988, Hall 1978).

An HRS migration score of 17.43 has been assigned to this site (Stenner et al. 1988).

5.8 UPR-300-12

UPR-300-12 is an inactive, mixed liquid waste site that is located at Hanford coordinates N54050 E14945, beneath the 325 Building as shown in Figure 5-1. An alias for this site is UN-300-12 (WHC 1991). An unplanned release of radioactive rinse water occurred at this site on January 8, 1979 (Stenner et al. 1988).

When a sewer valve was closed, 15,141.60 L of radioactive rinse water was discharged to the basement floor of the 325 Building, in Room 50-A. Some of the water leaked to the ground through a crack (Stenner et al. 1988).

The rinse water contained nitrate ions, ^{147}Pm, fission products, and transuranic radionuclides. The total activity in the rinse water was estimated to be approximately 70 Ci, of which 95% was ^{147}pm. The contaminated area itself was never characterized because it was beneath the 325 Building. However, the radionuclides were retained in the soil at this site. Nitrate ions, but no radionuclides, were detected in samples taken from a nearby groundwater monitoring well (Stenner et al. 1988). PNL (1981) reports that coring through the cement floor of Room 50-A and sampling of the soils below

was completed on January 26, 1979, but results from the sampling are not included in PNL (1981) and have not been located.

Room 50-A was decontaminated. Removal of the contaminated soil was believed to be a threat to the 325 Building, so it was not attempted (Stenner et al. 1988). A detailed description of the events that led to the spill, the cleanup activities, and the corrective actions taken to prevent another similar incident are described in PNL (1981).

An HRS migration score of 62.88 has been assigned to this site (Stenner et al. 1988).

5.9 UPR-300-13

UPR-300-13 is an inactive, mixed liquid waste site that is located around and under the underground spent acid receiver tank located east of the 333 Building in the present location of the 334-A Building as shown in Figure 5-3. An alias for this site is UN-300-13 (WHC 1991). An unplanned release of spent process acid occurred at this site on July 31, 1973 (Stenner et al. 1988).

Approximately 4,921 L of spent process acid leaked to the ground through a hole in a koroseal-lined, mild steel, 4000-gal receiving tank wall (Stenner et al. 1988, UNC 1973). The acid released included 4,432 lb of NO_3; 447 lb of copper; and 3 lb, or approximately 5.0×10^{-3} Ci, of uranium (UNC 1973). The extent of contamination is not known (Stenner et al. 1988).

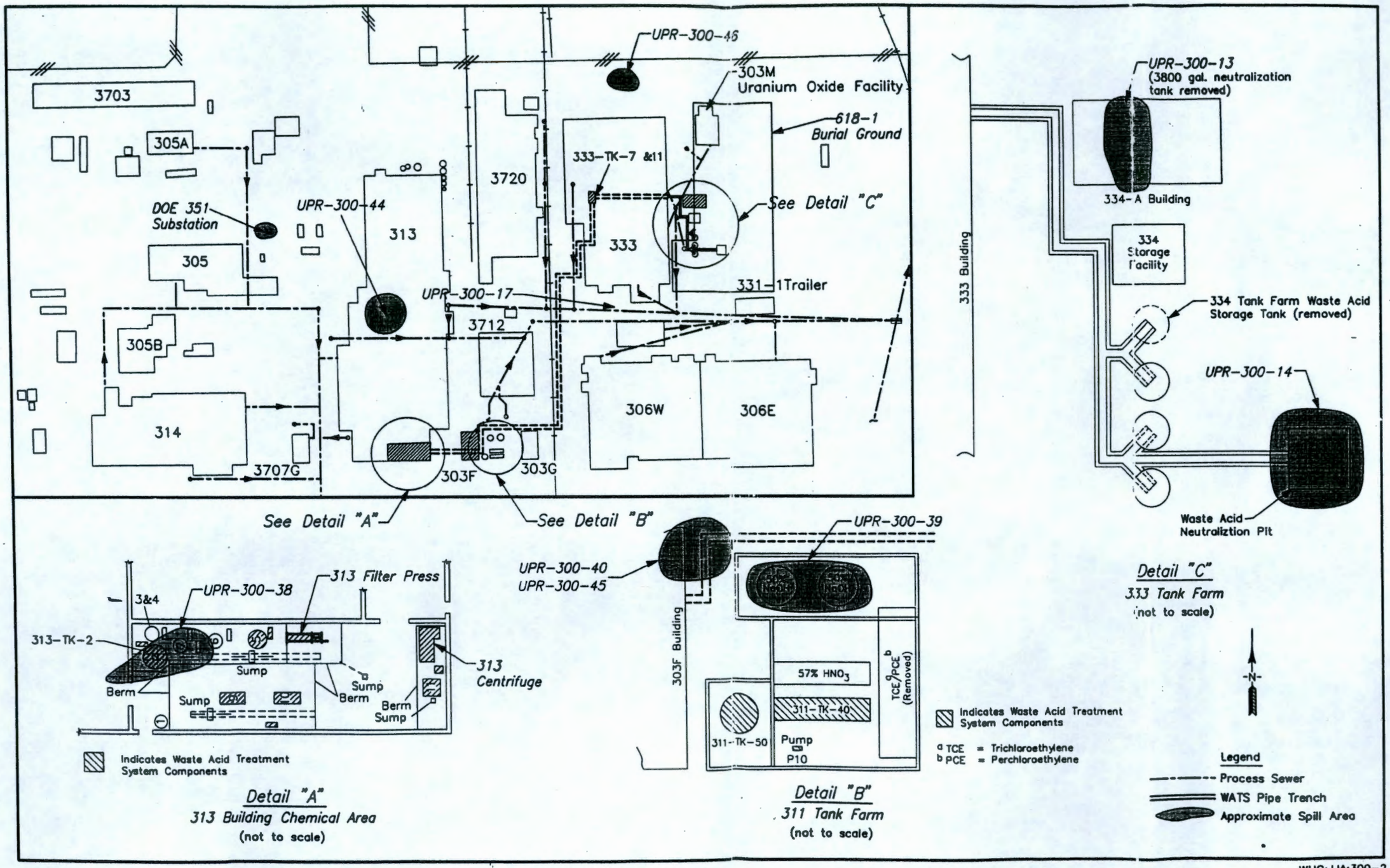
Approximately 1,910 lb of caustic was added to the tank and allowed to leak to the ground to neutralize the leak (UNC 1973). The leak rate was calculated at 154 gal per hour, according to UNC (1973). No other cleanup measures were conducted, and the tank was removed in 1973 (Stenner et al. 1988, UNC 1973).

Specific details of the spill discovery and corrective actions are detailed in UNC (1973). Based on the location of the leaking UST (adjacent to the 618-1 burial ground), it is possible that the acid may have traveled through a portion of the burial ground. Currently, the site of the former UST is covered by the 334-A Building, which is a single-story building with a basement containing two waste acid tanks and one nitric acid raw material tank.

An HRS migration score of 59.74 has been assigned to this site (Stenner et al. 1988).

5.10 UPR-300-14

UPR-300-14 is an inactive, hazardous liquid waste site that is located at the 334 Tank Farm at Hanford coordinates N55060 E15000. An alias for this site is UN-300-14 (WHC 1991). An unplanned release of 93% sulfuric acid solution occurred at this site on July 18, 1975, when a 6,000-gal aboveground



WHC:JJA:300-2

Figure 5-3. Unplanned Releases UPR-300-38, UPR-300-44, UPR-300-45, and the DOE-351 Substation.

tank leaked (Stenner et al. 1988). A line break in the fill line to Tank No. 32 from the #3 High Tank in the 334 Tank Farm caused the loss of 1200 gal (4,542.50 L) of 93% sulfuric acid solution. The solution traveled through a concrete trench to a limestone pit that had been designed to neutralize spilled acid (Stenner et al. 1988)

Figure 5-4. The UPR-300-14 Site, March 1994.

The limestone pit is referred to as a neutralizing box. This box is approximately 16 ft wide, 16 ft long, and 6 ft deep, and has 2-in. plank walls. The box is 30 ft from the tanks and contains 1.5 ft of limestone, minimum 3 in. (approximately 100 ft^2) underlain with 1 ft of 2-in. maximum washed gravel (Hanford Drawings H-3-18525 Sheet 1/1, H-3-18525 Sheet 2/2 and H-3-18520). According to Site personnel, the neutralization box would not have neutralized all the acid. This conclusion was based upon the volume of the spill compared to the neutralizing effects of 100 ft^2 of limestone. The limestone was apparently placed in the box in bags.

The neutralizing box was constructed over the #1 Burial Ground (see Figure 5-4). The acid could have dissolved some of the contents of the burial grounds. This and other leaks were responsible for the undermining of the tank supports and subsequent tilting of the south end of the aboveground tanks in the early 1960's.

The flow of the acid from the elevated storage tank was stopped by closing the bottom valve on the tank and installing a "saddle pipe support." According to Site personnel, in 1977 the trench to the limestone pit was intentionally blocked and a drain was installed to divert any future spills to the process sewer. An HRS migration score of 9.22 has been assigned to this site (Stenner et al. 1988).

5.11 UPR-300-17

UPR-300-17 is an inactive, mixed liquid waste site that is located at the southeast corner of the 333 Building at Hanford coordinates N55300 E14900 (see Figure 5-3). An alias for this site is UN-300-17 (WHC 1991). An unplanned release of radioactive contamination occurred at this site on September 2, 1979 (Stenner et al. 1988). Rain caused uranium shavings in a garbage can to ignite. The can was inside a plastic-lined, wooden burial box, which also caught fire (Stenner et al. 1988).

Radioactive contamination from the event was limited to the ground around the wooden burial box, an area with a radius of approximately 10 ft. Readings up to 15,000 c/m were taken 2 ft from the burial box. The ground and burial box were covered with plastic (Stenner et al. 1988). An HRS migration score of 22.59 was assigned to this site (Stenner et al. 1988).

According to Site personnel, asphalt in the contaminated area was removed and the area was patched with new asphalt. UPR-300-17 currently appears as a painted asphalt driveway; no evidence of the unplanned release is apparent.

5.12 UPR-300-18

UPR-300-18 is an inactive, mixed liquid waste site that is located within the 321 Tank Farm. An alias for this site is UN-300-18 (WHC 1991). An unplanned release of low-level, radioactive solution occurred at this site on August 27, 1962 (Stenner et al. 1988).

In the process of removing a drain plug from a low-level ^{134}Cs waste line, a pipefitter's clothing was contaminated with up to 10,000 c/m when a solution unexpectedly squirted out the drain hole. The pipefitter immediately replaced the plug and prevented further contamination spread. A followup inspection by operations personnel revealed that the main valve had failed to seat (Radiation Occurrence Report #62-0-59, Appendix A).

The employee was decontaminated. However, reports do not mention whether any environmental cleanup was performed (Stenner et al. 1988).

5.13 UPR-300-38

UPR-300-38 is an inactive, liquid mixed waste site that is located in the Chemical Area (Uranium Recovery Area) of the 313 Building. The site is located at Hanford coordinates N55300 E15000 (WHC 1991). An alias for the site is UN-316-38. An unplanned release was discovered in the early 1970's during repair of a floor in the 313 Building. Solution was found running into a hallway from beneath the acid brick floor. This solution contained nitric and sulfuric acids with uranium in solution and a neutralizing solution with 50% sodium hydroxide. The ground beneath the floor in the 313 Building Uranium Recovery Area may contain uranium-bearing acid waste (Stenner 1988).

During the floor repair, an underground lake of seeping material was collected and processed through the uranium recovery operation. Removal of the subfloor was not complete; apparently, some material was removed

(WHC 1991). An HRS migration score of 59.74 has been assigned to this site (WHC 1991).

Conversations with Site personnel indicate that the composition of the uranium in the nitric and sulfuric acids was as follows:

0.95 Enriched	1.25 Enriched
735 PPM ^{236}U	595 PPM ^{236}U
0.97 x 10 -8 Ci/g	0.84 x 10 -6 Ci/g

According to Site personnel, the pipe trench, which runs east to west south of the tanks and filter press, was lined with stainless steel after the spill. The sump in this trench that leads to the process sewer has been grouted up. The site currently appears as it did during normal operations. Depth to groundwater at seasonal high is 35 ft bgs.

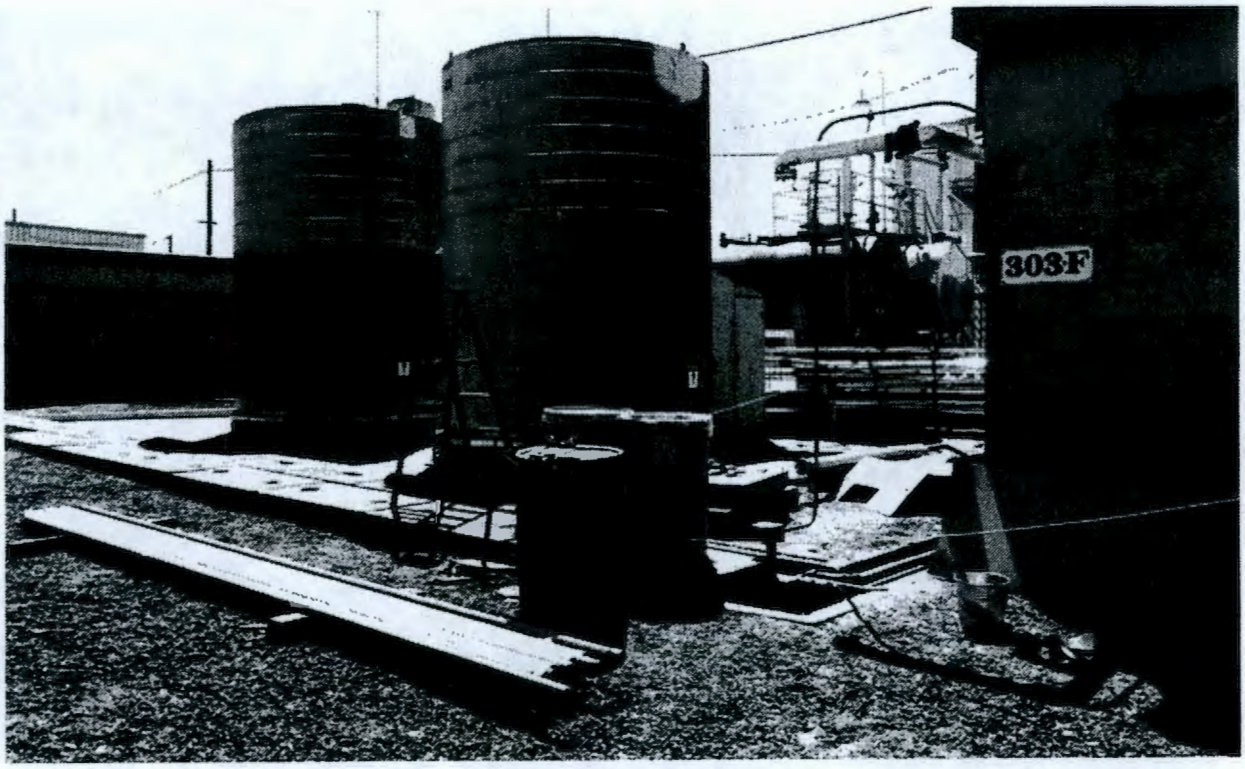
5.14 UPR-300-39

UPR-300-39 is an active liquid hazardous waste site in the 311 Tank Farm that is located at Hanford coordinates N55100 E15375. An alias for the site is UN-300-39 (WHC 1991). This unplanned release has an HRS migration score of 44.02 (WHC 1991). An unplanned release occurred in approximately 1954 in the 311 Tank Farm when one of two 10,000-gal sodium hydroxide storage tanks leaked (see Figure 5-3). A 50% sodium hydroxide solution contaminated soil around the tanks. Soil around the tanks still exhibits high pH, necessitating the use of chemical resistant suits when excavating in the area (Stenner et al. 1988). Figure 5-5 is a photograph of the UPR-300-39 at the 311 Tank Farm.

According to Site personnel, concrete containment curbs with catch basins were installed at the facility in 1985 as part of Project #685 (see Figure 5-5). This project was intended to reduce chemical discharge to the soil in the 311 Tank Farm (Hanford Drawing H-3-55807).

The site currently appears as part of the 311 Tank Farm. The ground at the Tank Farm and the surrounding areas is mostly covered with asphalt or concrete, but some gravel areas remain exposed.

Figure 5-5. The UPR-300-39 at the 311 Tank Farm.



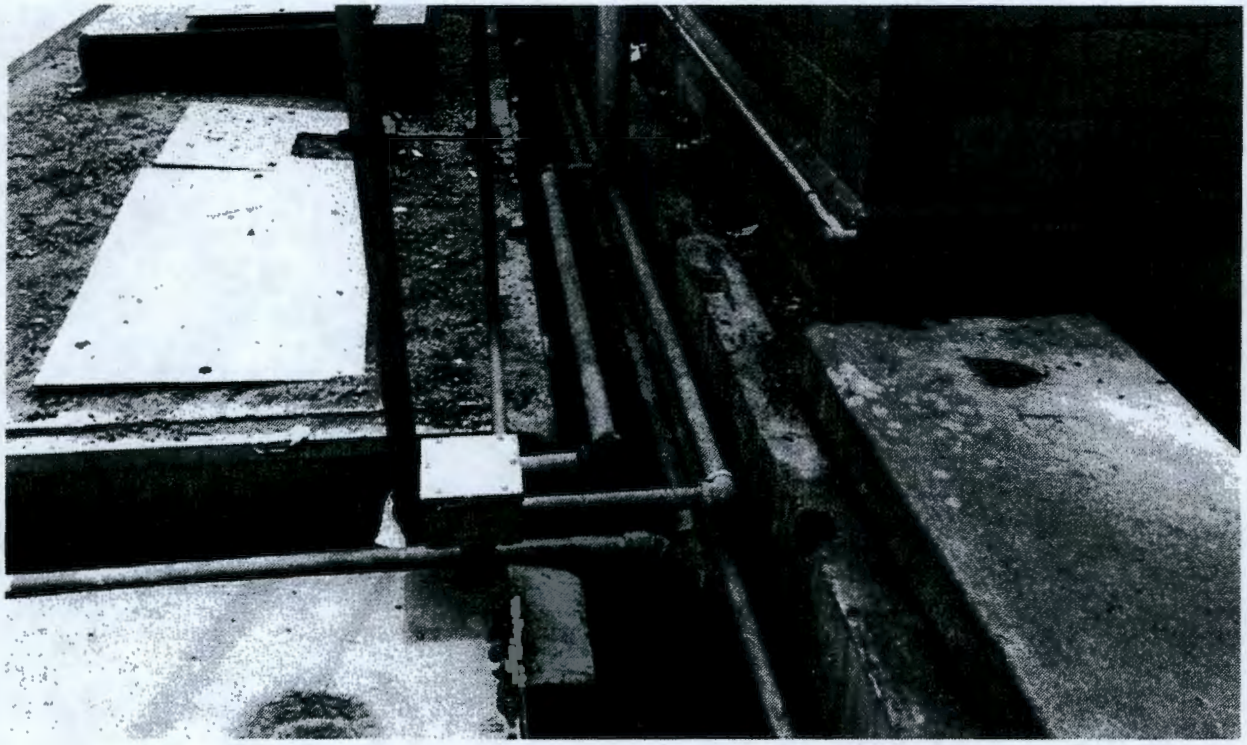
5.15 UPR-300-40

UPR-300-40 is an inactive, mixed liquid waste site that is located in a pipe trench between the 311 Tank Farm and the 303-F Building at Hanford coordinates N55025 E14500 (see Figure 5-3). An alias for the site is UN-300-40. An unplanned release occurred at this site in 1961 (WHC 1991).

In October 1974, it was discovered that drain connections between the pipe trench, the 303-F Building, and the process sewer were broken. The bottom of the trench was severely eroded, indicating that a spill had occurred. The soil beneath trench floor remains contaminated by nitric and sulfuric acids with uranium in solution (Stenner et al. 1988). Removal of contaminated soil was apparently not pursued (WHC 1991). The site has been aligned an HRS migration score of 59.74 (WHC 1991).

According to Site personnel, the severely eroded trench was replaced. Figure 5-6 shows the pipe trench exposed. The site currently appears as a cement pipe trench. Radiation stickers have been placed on the concrete blocks that cover the pipe trench.

Figure 5-6. WATS Pipe Trench at the UPR-300-40 Site Exposed, 1985.



5.16 UPR-300-41 (340 BUILDING PHOSPHORIC ACID SPILL)

UPR-300-41 is an inactive hazardous waste site that is located at Hanford coordinates N54450 E15400, approximately 15 ft west of the 340 Building in the 300 Area (WHC 1991) as shown in Figure 5-1. Aliases for this site include the 300 Area #340 Building Phosphoric Acid Spill and UN-300-41 (WHC 1991). An unplanned release occurred at this site on June 3, 1986. The released liquid consisted of phosphoric acid with the following constituents: 14,000 ppm chromium, 1,900 ppm manganese, 1,700 ppm iron, and 400 ppm nickel (WHC 1991). The liquid released was from a leak in a 55-gal drum situated in an asphalt pad (WHC 1991).

113.60 L of the liquid, which is categorized as extremely hazardous waste, leaked from the drum situated on an asphalt pad; it contaminated part of the asphalt pad and an area of soil next to the pad (WHC 1991). The spilled material was neutralized, absorbed, and packed into 55-gal drums (Cramer 1987). Contaminated soils were excavated and placed into drums for disposal, and the asphalt pad was cleaned with a detergent solution (Cramer 1987). Soil samples were collected and analyzed to determine when cleanup was complete (Cramer 1987). Cleanup was judged to be complete when the concentration of chromium was less than 5 ppm (Cramer 1987).

5.17 UPR-300-42 (300 AREA POWERHOUSE FUEL OIL SPILL)

UPR-300-42 is an inactive hazardous waste site that is located at Hanford coordinates N54750 E14550, at the No. 2 Day Tank adjacent to the powerhouse in

the 300 Area (WHC 1991). Aliases for this site include the 300 Area Powerhouse Fuel Oil Spill and UN-300-42 (WHC 1991). An unplanned release consisting of number 6 fuel oil occurred on October 12, 1983 (WHC 1991). The release resulted when fuel oil flowed onto the ground because of the failure of an automatic shutoff (WHC 1991).

The release consisted of 1,135.60 L of number 6 fuel oil (WHC 1991). Sand was spread over the spill area to confine and absorb the oil (WHC 1991). Oil-soaked sand was removed from the spill area (WHC 1991).

5.18 UPR-300-43 (300 AREA SOLVENT REFINED COAL SPILL)

UPR-300-43 is an inactive hazardous waste site that is located at Hanford coordinates N53850 E14460, outside the 329 Building in the 300 Area (WHC 1991). Aliases for this site include the 300 Area Solvent Refined Coal Spill and UN-300-43 (WHC 1991). An unplanned release consisting of 208.20 L of liquid containing solvent-refined coal (light fraction) occurred in July of 1986 (WHC 1991). The release was caused by container failure due to corrosion (WHC 1991).

Refer to Figure 5-2 for a drawing that shows the location of UPR-300-43.

All discolored soil was removed (WHC 1991), and no sampling or further cleanup activities were conducted.

5.19 UPR-300-44 (URANIUM BEARING WASTE ACID-ETCH SPILL)

UPR-300-44 is an inactive mixed waste site that is located at Hanford coordinates N55320 E14320. An unplanned release occurred at this site in January 1985. The release consisted of wastewater and, possibly, uranium-bearing acids (Cramer 1987).

During the installation of a new extrusion press, a leak was discovered in a section of the process sewer line. This leak resulted in the unplanned release of materials to the ground. The exact date that the leak initially occurred is unknown. Any spills that occurred in the 313 Uranium Recovery Area could have been discharged to this line, potentially for many years; as a result, they could have been discharged to the ground.

Materials generated in the Uranium Recovery Area consist of nitric and sulfuric acids with uranium in solution; and nitric, hydrofluoric, and chromic acids with uranium, copper, and zirconium metals in solution, which are hazardous substances. Other solutions discharged to this line include neutralized acid solutions of the same composition. This release may also be known by the following aliases: 313 Building, Uranium Bearing Waste Acid-Etch Spill (Cramer 1987), and UN-300-44 (WHC 1991).

5.20 UPR-300-45 (303-F BUILDING URANIUM-BEARING ACID SPILL)

UPR-300-45 is an inactive mixed waste site that is located at Hanford coordinates N55050 E14510, which is the ground beneath the transfer piping east of the 303-F Building (Cramer 1987). An unplanned release occurred at

this site in February 1985, due to a gasket failure in the transfer line caused by the freezing of the solution in the line. This release is also known by some Site personnel as the 311 Tank Farm Uranium-Bearing Acid Spill.

The leakage of 37.90 L of waste acid solution containing uranium was identified as nitric and sulfuric acids with uranium in solution. Analysis indicated that the solution contained 3,480 p/m NO_3, 6,960 p/m SO_4, and 920 p/m Uranium (Cramer 1987). The ground beneath the leak indicated radioactive contamination caused by the leak; as a result, soil was exhumed and shipped to the low-level burial grounds for disposal. The effectiveness of this cleanup action is undetermined (Cramer 1987).

5.21 UPR-300-46

UPR-300-46 is an inactive, low-level, unplanned release that occurred north of the 333 Building, inside the fence and east of a telephone pole (WHC 1991) (see Figure 5-3). Radioactive contamination was discovered at this site on June 21, 1989, during the excavation of a pipe trench. It appeared that the contamination was confined to a narrow band of soil about 1 to 2 in. thick. It is unknown when the release occurred to cause the contamination (Appendix A, Event Fact Sheet OSS/3A-89-005).

About one dump truck load of soil was removed (Appendix A, Event Fact Sheet OSS/3A-89-005). The disturbed area was then backfilled and graded to provide about 4 in. of fill over the site. An additional 4 in. of crushed stone was added to the site to bring it up to the existing grade of the surrounding area. Warning signs were placed to indicate potential underground contamination (WHC 1991).

5.22 UPR-400-1 (400 AREA COOLANT SPILL)

UPR-400-1 is an inactive, hazardous liquid waste site that is located in the 400 Area, north of the 427 Building and adjacent to its cooling towers, at Hanford coordinates S1150 W8900. The site is commonly known as the 400 Area Coolant Spill and was previously numbered UN-400-1 (WHC 1991). An unplanned release of coolant solution occurred at this site in February and March, 1984 (Cramer 1987).

Approximately 189.30 L of coolant solution was spilled at this site during construction activities. The solution consisted of 50% water and 50% ethylene glycol, an "aircraft deicer mix" (Cramer 1987).

No HRS migration score has been assigned to this site.

UPR-400-1 cannot be visually identified at its reported location. The unplanned release occurred in an area north of FMEF and east of the FMEF cooling units. The area immediately east of the FMEF cooling units is a vegetation-free, gravel-covered field in the shape of a semicircle. The field is bordered by an asphalt-covered roadway and parking area. No signs are present to mark the site of the unplanned release. Figure 5-7 is a 1994 photograph of the site.

Figure 5-7. The UPR-400-1 Site, April 1994.

5.23 UPR-600-1

UPR-600-1 is an inactive, mixed solid waste site that is located at Hanford coordinates S6200 E2883. It covers the 618-10 burial ground and an area extending to 300 yd beyond the fence. The unplanned release occurred at this site on July 4, 1961, and was caused by a fire within the burial ground. The fire destroyed all flammable material in the affected trench and caused the spread of radioactive particulates to the immediate environment.

It is estimated that the trench contained about 200 boxes of contaminated materials, several "CWS" filters, and an unknown amount of other materials. The fire was extinguished using two pump trucks that began operation on the upwind side of the fire. The maximum dose rate to fire personnel was 80 mR/h, and the average dose rate was 6 mR/h. No personnel or equipment contamination were detected upon exit of the burial ground (Appendix A, Radiation Occurrence Report 61-0-22).

Surveys conducted after the incident revealed particulate readings in excess of 100,000 c/m, with up to 20 particles per 100 ft^2 at 50 to 75 ft beyond the fence extending to about 100 yd. At 300 yd, detectable particulate contamination was found to be 3 particles per 100 ft^2 and ranged from 4,000 to 20,000 c/m (Stenner et al. 1988). The area was covered with clean fill dirt to preclude the loss of this contaminated particulate material.

This site has been assigned an HRS migration score of 13.23 (Stenner et al. 1988).

5.24 UPR-600-2

UPR-600-2 is an inactive, mixed solid waste unplanned release that occurred at Hanford coordinates S6200 E2883, within the 618-10 burial ground. It occurred February 14, 1963 during a routine burial of a "milk bucket," a shipping container so named due to its construction.

The release consisted of spotty contamination limited to three individual sites. The first was a 5-ft radius around the burial barrel (pipe storage unit), and the second, an area in front of the 618-10 burial ground access gate. The third was a spot in front of the 300 Area Powerhouse. Airborne contamination from the milk bucket resulted in readings of up to 80,000 c/m (Stenner et al. 1988/Newton 1963 letter to Keen, Appendix A).

The investigation resulted when the truck driver was found to be contaminated after completing a "milk can" burial at the 618-10 burial ground. The driver's clothes were contaminated with up to 30,000 c/m. All of his clothing was discarded, and the highway was closed so that surveys could be conducted on the truck's known pathway. No contamination was found on the roadways and only the two previously mentioned spots of contamination were found. The spot in front of the 300 Area Powerhouse read 40,000 c/m (Appendix A, Letter to A.R. Keen dated February 18, 1963).

The 618-10 burial ground was stabilized in 1983 to preclude the release of contamination to the environment (WHC 1991).

This site has been assigned a PNL HRS migration score of 17.07 (Stenner et al. 1988).

5.25 UPR-600-3

UPR-600-3 is an inactive, mixed solid waste site located at Hanford coordinates S6200 E2883, within the 618-10 burial ground. An unplanned release occurred at this site on September 4, 1963, when the lid of a waste container came off during routine disposal activities, causing a contamination spread. As a result, about 600 ft^2 of the burial ground surface was contaminated with the dust that read up to 400 mR/h at 2 in. (Stenner et al. 1988).

The waste container was a 1-gal paint bucket that had been shipped from the 327 Building. The can was shipped in a "milk pail cask" instead of a regular "milk pail." When the can was released to drop into the burial barrel, the lid came off. Smears of the truck bed indicated contamination of 1,000 c/m at 1 in. and 25,000 c/m at 1 in. from the truck undercarriage. Site personnel assigned to the job received contamination on their clothing that read up to 20,000 c/m at 1 in. All their clothing, except their socks and shoes, was successfully decontaminated; the socks and shoes were discarded (Appendix A, Radiation Occurrence Report 63-0-27).

The release was attributed to the use of an improper container for waste burial. The site was washed down by the 300 Area Fire Department to preclude the spread of the contamination (Stenner et al. 1988). The 618-10 burial ground was stabilized in 1983 (WHC 1991).

An HRS migration score of 16.17 has been assigned to this site (Stenner et al. 1988).

5.26 UPR-600-4

UPR-600-4 is an inactive, mixed waste unplanned release that occurred at Hanford coordinates N12103 W2561, within the 618-11 burial ground. It occurred on March 6, 1964 and was the result of radioactive material that was blown out of its container as it was dropped into a burial barrel. As a result, 1,000 ft^2 was contaminated with wastes from the High-Level Radiochemistry Facility (327 Building). Readings taken after the release were up to 10,000 c/m (Stenner et al. 1988).

The waste material was contained in three small cans loaded in a 1/2-ton cask and a specially designed can loaded in a recently constructed 8-ton cask. The special can (weighing 15 lb) contained an additional 15 lb of waste material (30 lb total). As the special can was dropped into the burial barrel (pipe storage unit, see Figure 6-19), a radioactive blow back occurred that resulted in the surface contamination and the contamination of two of several Site personnel present.

Just prior to the detection of the contamination spread, preparations were made to drop the additional three small cans from the second cask on the trailer. It was noted that the cans had fallen from the cask and were lodged in the bottom of the drop chute. It was determined that the cask had not been properly secured and apparently vibrated open in transit.

The shipping trailer and two trucks present were found to be contaminated. They were decontaminated at the burial ground by the Fire Department by washing them with water (Appendix A, Radiation Occurrence Report 64-8).

The 618-11 burial ground was stabilized in 1983 (WHC 1991).

5.27 UPR-600-5

UPR-600-5 is an inactive, mixed solid waste site that is located at Hanford coordinates N122103 W2561, inside the 618-11 burial ground. An unplanned release occurred at this site on May 18, 1964, and was the result of a fine white powder escaping a truck chute during routine burial operations. The ground surface and employees were contaminated by airborne contamination that consisted of 500 c/m beta/gamma gross fission products (Stenner et al. 1988).

The incident occurred when canned wastes from the 325 Building were being dumped into receptacles in the 618-11 burial ground. After the dump chute was located above the receiving receptacle, the dump chute lid was opened. When the lid was opened, a fine white powder was observed drifting out of the chute. "After washing down the dump chute and the area around the receiving receptacle, a plastic chute extension and the water spray nozzle were taped in place." The spray nozzles produced a fine mist that sprayed inside the chute extension. The dump was made and the truck moved away from the receptacle. In a survey of the area, personnel contamination was found. Personnel were

successfully decontaminated, except for a pair of shoes, which was discarded (Appendix A, Radiation Occurrence Report 64-15).

Surface contamination was confined to an area of 1,800 ft^2 (Stenner et al. 1988). The area was covered with a clean layer of soil after the release, reducing readings to background levels (Appendix A, Radiation Occurrence Report 64-15). The burial ground was surface stabilized in 1983 (WHC 1991).

5.28 UPR-600-6

UPR-600-6 is an inactive, mixed solid waste site that is located at Hanford coordinates 12103 W22561, inside the 618-11 burial ground. An unplanned release occurred at this site on February 8, 1965, as a result of high winds that blew contaminated materials from a truck during burial operations.

Winds of 32 mi/h with gusts of 44 mi/h blew the wastes from the 327 Building over an employee and onto the ground, causing spotty contamination that consisted of ^{103}Ru and ^{95}Zr-Nb. Readings taken indicated contamination levels of 100 c/m to 200 mR/h. The contaminated area was 1,400 ft^2 (Stenner et al. 1988).

The burial ground was surface stabilized in 1983 (WHC 1991).

5.29 UPR-600-7

UPR-600-7 is an inactive, mixed solid waste site located at Hanford coordinates 12103 W2561, inside the 618-11 burial ground. An unplanned release occurred at this site on March 1, 1965, when an employee dumped a wooden box, which contained a highly contaminated filter from the 327 Building, from the back of a truck. When the box hit the ground, "clouds of dust" were emitted from the box seams and caused spotty contamination in the immediate vicinity (Appendix A, Radiation Occurrence Report 65-08, Stenner et al. 1988). The 618-11 burial ground was surface stabilized in 1983 (WHC 1991).

5.30 UPR-600-8

UPR-600-8 is an inactive, mixed solid waste site that is located at Hanford coordinated N12103 W2561, inside the 618-11 burial ground. An unplanned release occurred on April 7, 1967, as a result of air backup or loose contamination blown from the release gate of a cask during routine burial operations. This release resulted in the contamination of a 30 ft^2 area with contamination readings to 100,000 c/m (Stenner et al. 1988).

At the time of the burial, the operation was being conducted from the upwind side of the cask. At the moment the waste was dropped into the chute, the wind reversed in a strong gust, causing the airborne spread of contaminants. The waste consisted, in part, of aluminum rupture cans that had been inspected in the 327 Building. The fact that the contaminant was a "fairly fresh fission product" indicates that it was picked up by the cans during transfer operations through "A" cell.

The contamination spread was detected immediately, and all personnel evacuated the area. A pump truck was dispatched from the 300 Area Fire Department to wash down the contaminated truck and ground surface (Appendix A, Radiation Occurrence Report BNW-67-21).

The area was covered with 2 to 3 in. of clean gravel (Stenner et al. 1988). The 618-11 burial ground was surface stabilized in 1983 (WHC 1991).

5.31 UPR-600-9

UPR-600-9 is an inactive, mixed solid waste site that is located at Hanford coordinates N21103 W2561, inside the 618-11 burial ground. An unplanned release occurred at this site on April 14, 1967, as a result of waste materials becoming wedged in the truck chute and causing an airborne release during normal burial operations.

The wastes consisted of corroded aluminum rupture cans and pieces of an N Reactor safety rod from the 327 Building. Readings on the waste materials at the chute were up to 450 mR/h at 1 ft. The airborne contamination was limited to a fan-shaped, 750- by 450-ft area that extended northeast from the dump chute.

The material to be buried was transported from the 327 Building in a new 5-ton cask. After the dump, the dose rates remained at 450 mRad/h at 1 ft, indicating that some of the wastes had not cleared the bore of the cask. The end cap was removed and a rod was inserted into the bore. This operation cleared the cask bore, but the dose rate remained high. A water rinse of the cask bore had no effect in reducing the dose rate. A second rinse also had no effect, and workers taped a plastic cover over the head of the cask.

The dose rates at contact with the ground were 450 mRad/h at the chute; 50 mRad/h 10 ft from the chute; 50,000 c/m at 30 yd from the chute; 25,000 c/m at 75 yd from the chute; and 500 c/m at the pole line, 250 yd from the chute. Beyond that point, all readings were at the background level. The Radiation Monitoring and Waste Disposal pickups were found to be contaminated with up to 70,000 c/m.

Contamination within the burial ground fence was covered with 3 to 6 in. of gravel. Contamination outside the fence was turned under to bury contamination and released from radiation zone status (Appendix A, Radiation Occurrence Report BNW-67-22, Stenner et al. 1988).

The 618-11 burial ground was surface stabilized in 1983 (WHC 1991).

5.32 UPR-600-10

UPR-600-10 is an inactive, mixed solid waste site located at Hanford coordinates N12103 W2561. It is at the corner of, and inside of, the 618-11 burial ground. An unplanned release occurred at this site on September 30, 1963, when loose surface contamination on a burial container became airborne, causing ground surface contamination.

During normal burial operations, a container caused airborne contamination, which read to 1.4 rads/h at 3 in. of high-level beta/gamma, to be deposited on the ground and disposal truck. It is assumed that the container had been externally covered by a significant amount of loose, highly radioactive material. The contaminated ground area, 400 ft^2 around Barrel 327-2, was washed down with 6,000 gal of water to control blowing soil. The most highly contaminated soil was shoveled into waste barrels, and the entire area was covered with several inches of clean sand. The truck was sprayed with a fixant and sent to the 200-W decontamination facility (Appendix A, Radiation Occurrence Report 63-0-29, Stenner et al. 1988).

5.33 UPR-600-11

UPR-600-11 is an inactive, mixed solid waste site that is located at the 305-B berm and the J.A. Jones Construction Pit Number 1. An unplanned release occurred at this site on May 29, 1980, as a result of construction activities that uncovered previously unknown contamination.

Workers were excavating a berm and had removed 100 yd^3 of material when contamination with beta/gamma readings of up to 4,000 c/m was found in the soils. Initially, the contaminated soils were placed in the same clean landfill as the clean soils already excavated: J. A. Jones Construction Pit Number 1. The contaminated soils were then re-excavated from this clean burial ground and transported to the 200 Area burial grounds for disposal.

It is believed that the contamination originated in discarded asphalt paving rubble that was placed at the south end of the berm (Stenner et al. 1988).

This site has been assigned an HRS migration score of 20.45 (Stenner et al. 1988).

5.34 UNPLANNED RELEASES: POLYCHLORINATED BIPHENYLS FROM FFTF TRANSFORMERS

Dahl (1991) states that 19 electrical transformers within the FFTF complex contain polychlorinated biphenyls, or PCBs. Past releases from the transformers "involved limited seepage from sample ports due to improperly installed fittings." Additionally, some routine operations result in the release of small amounts of PCBs to the environment (Dahl 1991).

The exact locations of the leakage are unknown, and it is not known whether or not all 19 transformers were involved.

The amount of PCBs contained by each transformer averages 5,000 lb. The largest transformer contains approximately 5,600 lb (Dahl 1991).

Site personnel provided information about the FFTF PCB transformers, which is shown in Table 5-2.

Table 5-2. PCB-Containing Transformers at FFTF.

Transformer Number	Voltage	Type of Oil Contained	Location
X-5	13800/480	Askarel	Room 308, 405 Building, 550 Level
X-6	13800/480	Askarel	Room 367, 405 Building, 550 Level
X-7	13800/480	Askarel	Room 331, 405 Building, 580 Level
X-9	13800/480	Askarel	Roof, 405 Building, 580 Level
X-10	13800/480	Askarel	Roof, 405 Building, 580 Level
X-11	13800/480	Askarel	Room 449, 405 Building, 580 Level
X-12	13800/480	Askarel	Room 452, 405 Building, 580 Level
X-13	13800/480	Askarel	Room 457, 405 Building, 580 Level
X-14	13800/480	Askarel	Roof, 405 Building, 580 Level
X-25	13800/480	Askarel	Roof, 405 Building, 580 Level
X-26	13800/480	Askarel	Roof, 405 Building, 580 Level
X-28	13800/480	Askarel	Room 303, 405 Building, 533 Level
X-29	13800/480	Askarel	Room 365, 405 Building, 550 Level
X-30	13800/480	Askarel	Room 431, 405 Building, 531 Level
X-59	13800/480	Askarel	Room 457, 405 Building, 580 Level
X-98	13800/480	Askarel	Room 457, 405 Building, 580 Level
X-100	13800/480	Askarel	Room 308, 405 Building, 550 Level
X-101	13800/480	Askarel	Room 367, 405 Building, 550 Level
X-117	13800/480	Askarel	Room 452, 405 Building, 580 Level

5.35 UNPLANNED RELEASES: DICHLORODIFLUOROMETHANE

The refrigerant dichlorodifluoromethane, or R-12, has reportedly been released in "fugitive airborne emissions" from eight centrifugal chiller units at FFTF. These chiller units are used to provide cooling for personnel and equipment. Each chiller contains up to 3,000 lb of dichlorodifluoromethane.

Dahl (1991) separates the releases of refrigerant into the following three categories.

- Catastrophic pressure boundary, or copper tubing, failure results in the release of all the refrigerant from a single chiller. Such failures have occurred several times during FFTF's first 10 years of operation.

- Normal equipment maintenance causes releases. Periodic maintenance on the chiller units requires that the refrigerant be removed and the compressor unit be completely disassembled. A residual amount of refrigerant remains in the chiller after most has been transferred to storage tanks. This refrigerant is then released when the unit is disassembled.

- Releases occur as a result of leakage from joints and valves on the chillers.

The failure of the catastrophic pressure boundary has caused the most significant releases of refrigerant. However, normal equipment maintenance, as well as joint and valve leakage, cause approximately 1,000 lb of refrigerant to be released each year (Dahl 1991).

6.0 600 AREA WASTE SITES IN OPERABLE UNIT 300-FF-2

Chapter 6 includes Operable Unit 300-FF-2 waste sites located in the 600 Area. The 600 Area is defined as all locations outside otherwise designated areas, such as the 300 and 400 Areas. All sites characterized in this section are documented in WIDS. Each waste site is described separately below.

6.1 600-1, OR JA JONES #1 (LIQUID DUMP SITE)

The 600-1 and JA Jones #1 Waste Sites have previously been treated as separate waste sites but have been determined to be the same and are combined in this section. Photographs examined for J.A. Jones #1 were determined in the field to be of the same location as 600-1. Unplanned release UPR-600-11 is also associated with this site.

600-1 is an inactive liquid hazardous waste dumping area located 1.5 mi north of the 300 Area and 0.5 mi west of the Columbia River. The gravel road to the site is just south of the second railroad crossing on Stevens Drive. The site is on the left, 200 yd east on the gravel road. It was active in the spring of 1976 or 1977 (WHC 1991). According to Site personnel, approximately 200 gal of paint was dumped at this location.

The site has an HRS migration score of 0.0 (WHC 1991).

The landfill is 100 ft long, 50 ft wide, and 10 ft deep. It contains miscellaneous nonradioactive solid wastes from various construction sites. It contains wood scraps, concrete, and miscellaneous construction wastes. It has been backfilled to grade with clean soil (Stenner et al 1988). Figure 6-1 is a photograph of this site.

Partially buried rebar, plastic, concrete, wood and a yellow sign stating "POSITIVELY NO DUMPING" are located in the depression. The site currently appears as a natural depression with yellow faded signs on either side. The subsidence within this natural depression, supported by a small escarpment, also suggests buried material. The recent disposal of tumbleweeds on the east to southeast edge suggests that the site is still active as of March 1994.

The subsidence from the buried material has created small (6-in.) escarpments throughout the site. There is the potential for a person to break through the soil cover and be injured. KEH and WHC Safety have been informed and have visited the site. Danger tape has been strung out along the north side of the depression.

Figure 6-1. The 600-1 or J. A. Jones #1 Liquid Dump Site in the Depression to the Left of the Sign, March 1994.

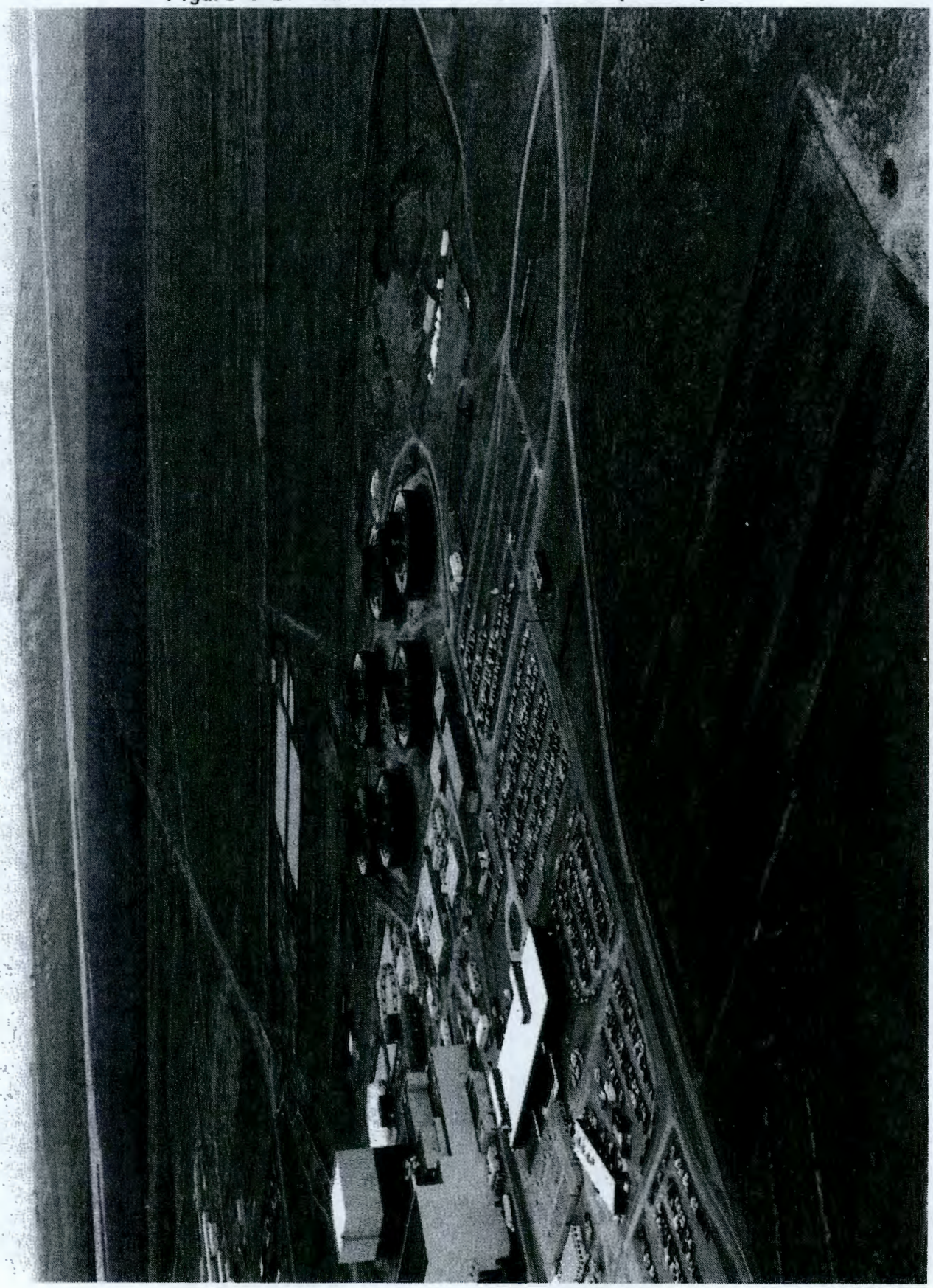
6.2 600-21 (WPPSS "WINDROW" SITE)

600-21 is an area that was contaminated with particulate fallout during a burial in the 618-11 burial grounds (Monthly Report for October 1972 by H. R. Maxfield). The site is located west of WPPSS #2, across the loop road, and approximately 100 ft north of the 618-11 burial ground. It is at Hanford coordinates N121650 W2450 (WHC 1991) (Figure 6-2). An alias for the site is the WPPSS "Windrow" Site.

The contamination was subsequently covered by scraping the affected ground into "windrows." On October 24, 1972, a backhoe was used to cut across each "windrow" at a frequency of every 50 ft to a depth of 6 in. below normal ground level. Direct surveys were made of all soil removed and of the walls of each cut. No beta gamma or alpha radioactivity was detected above the normal background of 100 c/m with a gieger muller (GM) (Monthly Report for October 1972 by H. R. Maxfield, Appendix A).

The site currently appears as a series of small parallel berms that are approximately 24 in. tall, 3 ft wide, and 100 yd long. The berms are arranged to form a triangle approximately 150 yd long and 100 yd wide. Perimeter berms are approximately 4 ft tall. Concrete road dividers have been used as perimeter berms on the south end.

Figure 6-2. The WPPSS "Windrow" Site (600-21).



6.3 600-22 (UFO LANDING SITE)

600-22 is an inactive, hazardous waste dumping area that is located west of the 300 Area at Hanford coordinates S25100 E32700. It is approximately 775 yd from the southwest corner of a soil berm on an azimuth of 218 degrees (Roos and Woodworth 1992). This waste site is commonly known as the UFO Landing Site. Its dates of operation are unknown (WHC 1991).

This site appears on aerial photos as a large, asterisk-shaped area. It is believed to be an old bombing target site that was used by the U.S. military for practice with live bombs (Roos and Woodworth 1992). According to Site personnel, the asterisk-shaped area was used for bombing practice around 1942, before construction began on the Hanford reactors. Figure 6-3 is an aerial photograph that shows the asterisk-shaped area. Also, see Figure 6-4 for a historical photograph that shows the site's location relative to the 300 Area.

Bomb fragments are scattered throughout the site but are concentrated at the site's southeastern corner. No unexploded bombs have been found in the area (Roos and Woodworth 1992).

Areas with minor vegetation disturbance are scattered throughout the site, but little obvious soil disturbance is evident. Vegetation shows signs of stress and appears to have been sprayed with herbicide, as sagebrush at the site are dead but remain standing. It is believed that such spraying created the asterisk-shaped disturbance shown on aerial photos (Roos and Woodworth 1992. Site personnel report that the spraying was likely performed so that bomber pilots could see the target area more easily.

600-22 currently appears as a vegetation-covered area that is not marked or clearly distinguished from the surrounding terrain. The main characteristic that separates the site from its surroundings is a difference in the type of vegetation growing on its surface. The surrounding terrain has a more diverse mix of natural vegetation than does the 600-22 site. Although Roos and Woodworth (1992) state that several round, cone-shaped bomb craters were present at the site in 1992, none can be visually identified. An area at the southeast corner of the site has been bounded by green steel spikes, but no warning signs or barricade chains are present; the bounded area has an inactive telephone pole at its west end. A standing, pre-Hanford fence bisects part of the site (Roos and Woodworth 1992).

Because 600-22 is located at the edge of the Hanford Patrol firing range, Hanford Patrol must be notified and permission provided before this site may be visited.

Figure 6-3. The UFO Landing Site (600-22).

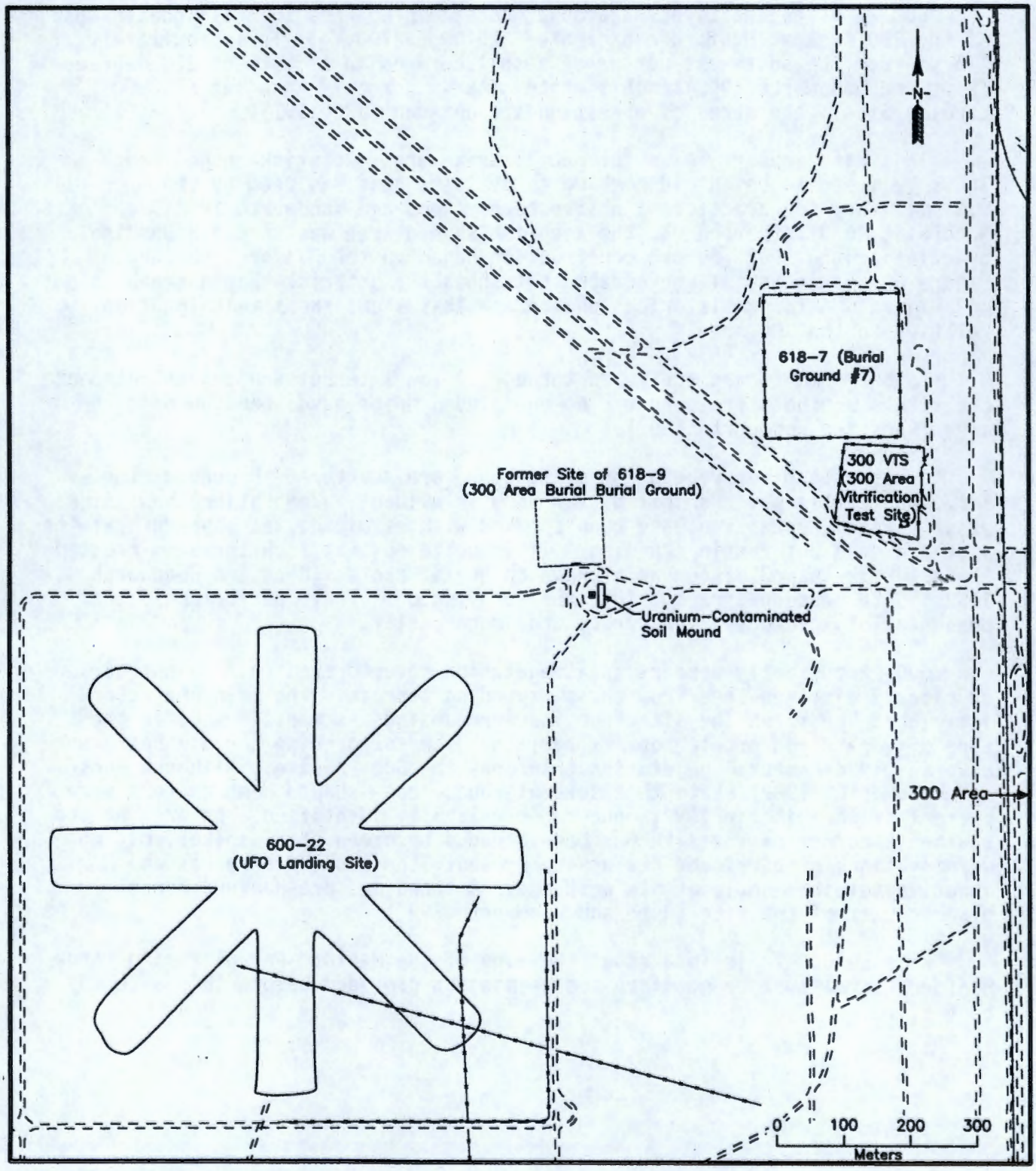


Figure 6-4. Aerial Photograph of the UFO Landing Site (600-22).

6.4 600-23 (GRAVEL PIT 2 SOUTH)

Site 600-23 is a inactive, suspect mixed waste dumping ground. This site is located north of the Wye Barricade on Route 2 South, at Hanford coordinates N17140 W14290. The site consists of a large gravel pit encompassing approximately 30 acres and approximately 60 ft deep. At the west end of the site is a middle terrace. Most of the waste is located in the northern 1/2 to 3/4 of the terrace (WHC 1991).

The middle terrace at the west end of the unit contains construction debris. Barrels, most of which are empty, are present at the face of the terrace. Asbestos is also present. Radiological contamination may be associated with some of the waste materials (WHC 1991). The site is currently an active gravel pit. The middle terrace at the west end of the site does not currently show any exposed barrels or asbestos (Figure 6-5).

6.5 618-1 (SOLID WASTE BURIAL GROUND NO. 1)

The 618-1 burial ground is an inactive, mixed solid waste burial ground that is located at Hanford coordinates N55310 E14987, adjacent to the 333 Building, in the northeast corner of the 300 Area, and near the exclusion fence. This site has also been commonly known as 318-1 and as Burial Ground No. 1. It operated from 1944 to 1957 (Young and Fruchter 1991, Paas 1955).

The burial ground is 320 ft long, 150 ft wide, and 20 ft deep. There are at least two 200-ft-long, 16-ft-wide, and 8-ft-deep trenches running from north to south, and a series of 15-ft-long, 15-ft-wide, and 20-ft-deep pits that run east to west (Stenner et al. 1988). Reportedly, there are three trenches in an east/west orientation measuring 45 m long, 5 m wide, and 5 m deep. The estimated area of the site is 1.5×10^4 m^2, and 1.2 m of clean fill material covers the site (Phillips et al. 1979). Permanent trench markers placed at the site tend to confirm the existence of three burial trenches (Paas 1955).

A large quantity of uranium, estimated to be about 16 tons, was buried at this site. Small quantities of plutonium and other fission products from the 300 Area fuel fabrication laboratories, with incidental amounts of waste from a very small laboratory operation, were also buried at this site (Stenner et al. 1988, WHC 1991).

The estimated volume of contaminated soil at this site is 465 m^3, with an overburden soil estimate of 621 m^3 (WHC 1991).

It is estimated that wastes at this site contain 6.00×10^{-2} Ci of ^{239}Pu and 1.70×10^{-2} Ci of ^{240}Pu in curies decayed through April 1, 1986. During a routine survey of the area in 1991, surface contamination was found outside the burial ground markers (Appendix A, Survey 12645). This contamination was subsequently removed (Appendix A, Survey 32791).

There are several facilities associated with fuels fabrication and waste treatment located within the site boundaries. Some of them are the 300 Area Solvent Evaporator, described in Section 5.5; the 303-M Building and Storage area; part of the acid supply and storage systems and a lime pit, described in Section 5.10, that was used for the neutralization of spilled acids. Additionally there are several smaller storage facilities also located over

Figure 6-5. Aerial Photograph Showing the Location of the UFO Landing Site (600-22) in Relation to the 300 Area.

the burial ground that may have contributed chemical and or radiological contamination to the site.

An HRS migration score of 0.00 has been assigned to this site (Stenner et al. 1988).

618-1 currently appears as a cobble-covered field surrounded by permanent concrete burial ground markers and a light-duty post-and-chain fence. There are several buildings and concrete storage pad areas located on the north and west sides of the site.

6.6 618-2 (SOLID WASTE BURIAL GROUND NO. 2)

The 618-2 burial ground is an inactive, mixed solid waste burial ground that is located at Hanford coordinates N55703 E15060, approximately 100 ft north of the 331 Building, on the north side of the 300 Area exclusion area fence. The site is also known as 318-2 (WHC 1991). It was used to receive wastes between 1951 and 1954 (Stenner et al. 1988).

The site is 350 ft long, 215 ft wide, and 15 ft deep. It contains four 150-ft-long, 51-ft-wide, and 15-ft-deep trenches running from east to west. The bottom width of each trench is 6 ft (Stenner et al. 1988, Paas 1955). Phillips et al. (1979) reports that the trenches were oriented in a north/south direction. Phillips et al. (1979) further reports that, during the construction of the fence surrounding the site, contaminated wastes were found outside the concrete burial ground markers. The fence was moved about 5 m to the north to enclose the site against inadvertent intrusion.

The burial ground was used for the disposal of uranium-contaminated equipment and materials, plutonium, and fission products. The uranium waste was typically solid metallic uranium oxides in the form of metal cuttings from Reactor Fuel Fabrication facilities in the 300 Area (Stenner et al. 1988). The burial ground also received large amounts (tons) of tin from the triple-dip fuels process and lead from the lead-dip fuel process. It was replaced by the 618-3 burial ground (Young and Fruchter 1991).

Stenner et al. (1988) estimated that this site contained 2.00×10^3 Ci of gross beta activity and 61 ci of ^{239}Pu decayed to September 1, 1980. Materials with radiation levels of up to 35 rads/h are known to have been buried at the site (Paas 1955).

The burial ground was "interim stabilized" in 1989 (WHC 1991). During this interim stabilization effort, two dump truck loads of automotive-type batteries were uncovered. It was decided to leave the batteries in place, and the stabilization effort resumed (Appendix A--DSI McKinney to Landon 2-22, 1989). The burial ground is currently in compliance with the Environmental Compliance Manual requirements.

A ground penetrating radar (GPR) survey was conducted in 1987 to determine that the trenches in the burial ground were within the established borders of the burial ground. The survey results indicated that they were and also that the trenches are all located in the south half of the burial ground in an east/west orientation.

This site has an HRS migration score of 0.0 (Stenner et al. 1988).

618-2 currently appears within a fenced area that includes the 618-3 burial ground, described in Section 6.7. Natural vegetation grows on the surface, and the site is posted with "Caution: Underground Radioactive Material" warning signs.

6.7 618-3 (SOLID WASTE BURIAL GROUND NO. 3)

618-3 is an inactive, mixed solid waste site that is located in the 600 Area at Hanford coordinates N56100 E14677 and approximate Washington State plane coordinates E593967 N116379. It is immediately west of and adjacent to the 618-2 burial ground, and is an expansion of that site (WHC 1991). This site is commonly known as Solid Waste Burial Ground No. 3, although it has also been known as Burial Ground No. 3, 318-3, and Dry Waste Burial Site No. 3 (WHC 1991). The burial ground at this site received uranium waste from 1954 to 1955 (Cramer 1987, Stenner et al. 1988).

The original 618-3 burial ground was 347 to 350 ft long, 165 to 168 ft wide, and 15 ft deep, and had a total surface area of 5,365 m^2 (Cramer 1987, WHC 1991). Additionally, a "burial ground extension" appears in drawings at the north end of the 618-3 site. The extension lengthened the site by 47 to 50 ft (WHC 1991).

Hanford Site Drawing H-6-939, an as-built drawing, and Figure 6-6 provide aerial views of this burial ground and its extension. Additionally, Hanford Site Drawings H-3-32585 and M-3600, Sheet 1, show this burial ground in relation to other sites in the northern part of the 300 Area.

Documents provide different information about the layout of this site. Stenner et al. (1988) and WHC (1991) state that the 618-3 site consisted of one large trench that ran from north to south. However, Hanford Site Drawing H-3-4306 shows several pits at 618-2 burial ground, and the WIDS hard files state that patterns established for the 618-2 burial ground were continued at 618-3 (WHC 1991). The drawing indicates that the 618-2 pits were 150 ft long, 51 ft wide, and 15 ft deep, with an east-west axis. Site personnel report that no pits existed at the 618-2 burial ground, however.

Uranium-contaminated waste, primarily building materials from the remodeling of the 313 Building, was the main type of waste deposited at this site (Stenner et al. 1988).

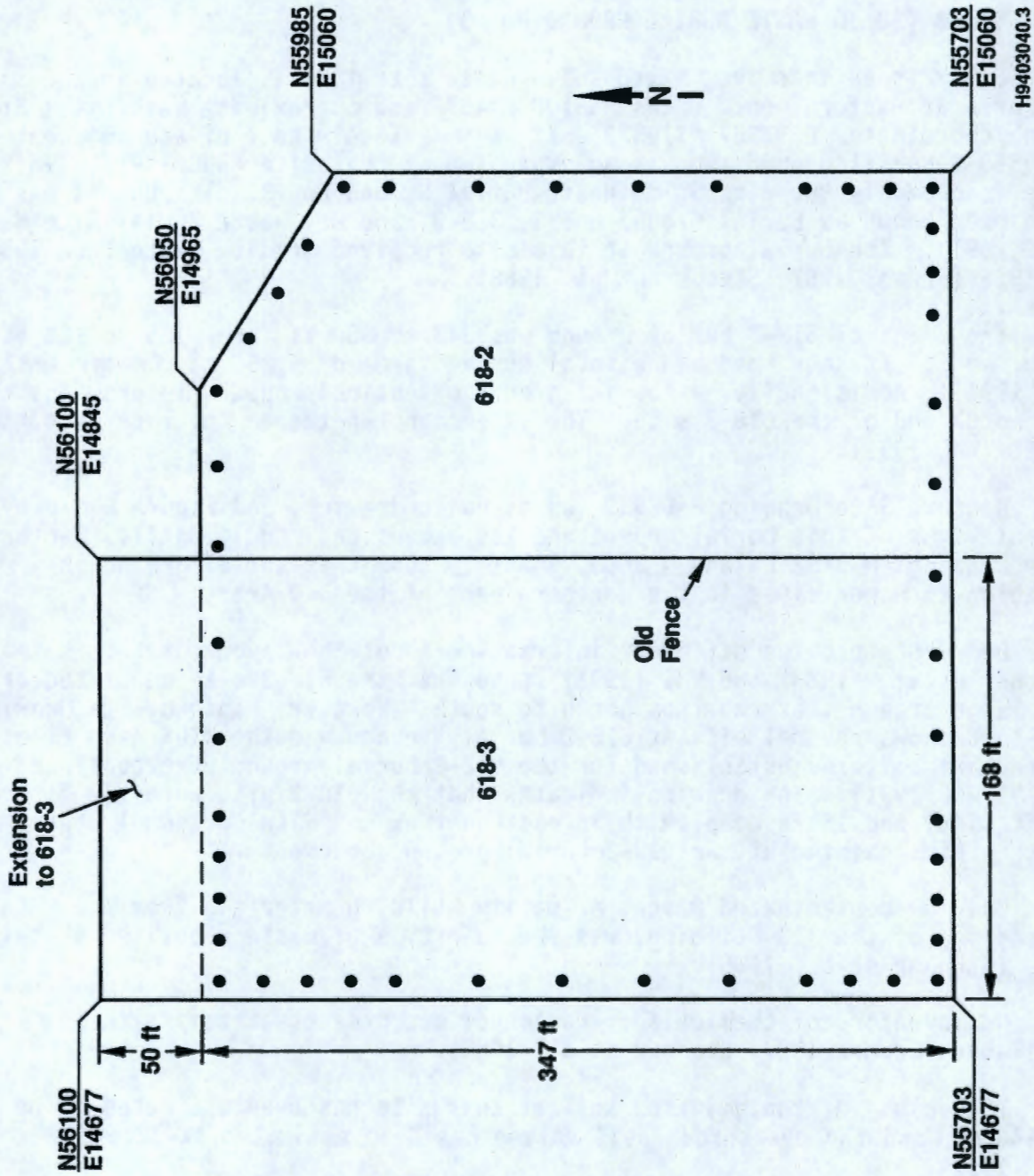
No inventory of chemicals or radionuclides present at this site is available (Cramer 1987, Stenner et al. 1988).

The volume of contaminated soil at this site has been estimated to be 12,549 m^3, and the overburden soil volume has been estimated at 12,643 m^3 (WHC 1991).

The burial ground site was interim stabilized in 1989. In November 1983, spotty surface contamination was found in the northwest corner of the site during an annual survey. There were reportedly "no changes from previous surveys," however, and no corrective action was taken (WHC 1991).

An HRS migration score of 0.00 has been assigned to this site (Stenner et al. 1988).

Figure 6-6. The 618-3 Burial Ground, Its Extension, and the 618-2 Burial Ground.



618-3 currently appears as a vegetation-covered area surrounded by a wire fence and 8-ft wooden posts. Its south side is bounded by the 300 Area perimeter fence. Refer to Figure 6-7 for a historical photograph of the burial ground. The burial ground is posted with "Caution: Underground Radioactive Material" signs, although "Surface Contamination" signs may also be present. This site is not readily accessible, since the areas immediately surrounding it are posted as surface contamination or underground radioactive material zones.

Figure 6-7. Historical Photograph of Solid Waste Burial Ground No. 3 (618-6).

6.8 618-6 (SOLID WASTE BURIAL GROUND NO. 6)

The 618-6 burial ground is an inactive, solid mixed waste burial ground. The burial ground no longer exists in the 300 Area. An alias for the site is Solid Waste Burial Ground #6 (WHC 1991).

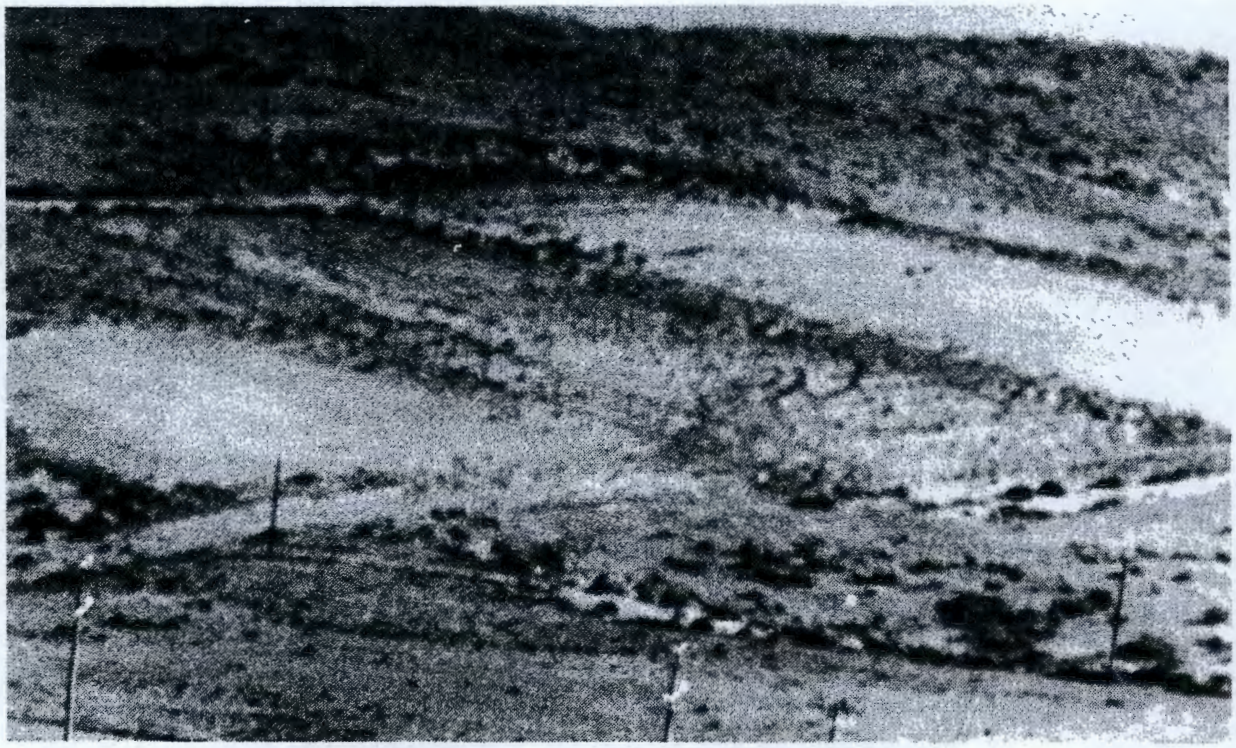
The low-level dry waste in this burial ground was originally located in the southeast corner of the 300 Area (Paas 1955). Prior to the construction of new facilities in late 1951, the material was moved to a location south of the old pond (south pond). The total activity buried here is not known. The material was covered with approximately 6 ft of clean soil, and the area was surrounded by wood fence posts with radiation signs (Paas 1955).

This description by Paas (1955) is contradicted in part by a memo from A. R. Keene in 1961 (Appendix A). This memo states that the burial ground was moved in 1952 from the current 325 Building location to the current 308 Building location, then again in 1957 to the 324 Building location. The existence of the burial ground from 1952 to 1957 in the current location of

the 308 Building is not supported by aerial photographs or Hanford drawings. A photograph of the Solid Waste Burial Ground Number 6 is shown in Figure 6-8.

According to Stenner et al. (1988), the burial ground was first located at the site of the 325 Building from 1944 to 1946 and contained solid uranium waste. An enlargement of this area in 1944 does not dispute or confirm that location for 618-6 burial ground. Examination of aerial photographs confirms that the 325 Building is currently in the old southeast corner of the 300 Area.

Figure 6-8. Aerial Photograph Showing the Location of Solid Waste Burial Ground No. 6 (618-6), October 1951.



Examination of aerial photographs and Hanford drawings (H-4-50310 and H-4-50304) supports the Paas (1955) statement that the burial ground was located in and to the north of the current location of the 324 Building (see Figure 6-8) prior to the construction of the 325 Building in 1951. Therefore it is unlikely that the 618-6 burial ground was ever in the location of the current 308 Building. In 1962, the contents of the burial ground were removed due to the construction of the 324 Building; they were disposed of in the 618-10 burial ground (Stenner et al. 1988). According to Site employees, no inventories of wastes disposed of in this burial ground have been uncovered.

6.9 618-7 (BURIAL GROUND NO. 7)

618-7 is an inactive, mixed solid waste site that is located approximately 1,500 ft northwest of the 300 Area. The site is at Hanford coordinates N56300 E12655 and approximate Washington State plane coordinates E593223 N116657. Its gravel access road is west of Route 4 South from the 300 Area. This site is commonly known as Burial Ground No. 7, although it has also been known as Solid Waste Burial Ground No. 7 and as 318-7 (WHC 1991).

Historical reports provide differing dates of operation for this burial ground. Stenner et al. (1988), Backman et al. (1963), and WHC (1991) state that the site began operation in 1960, while Phillips et al. (1988) states that operation began in 1955. Closure dates for this site are reported to be either 1973 (Stenner et al. 1988, WHC 1991) or 1956 (Phillips et al. 1988).

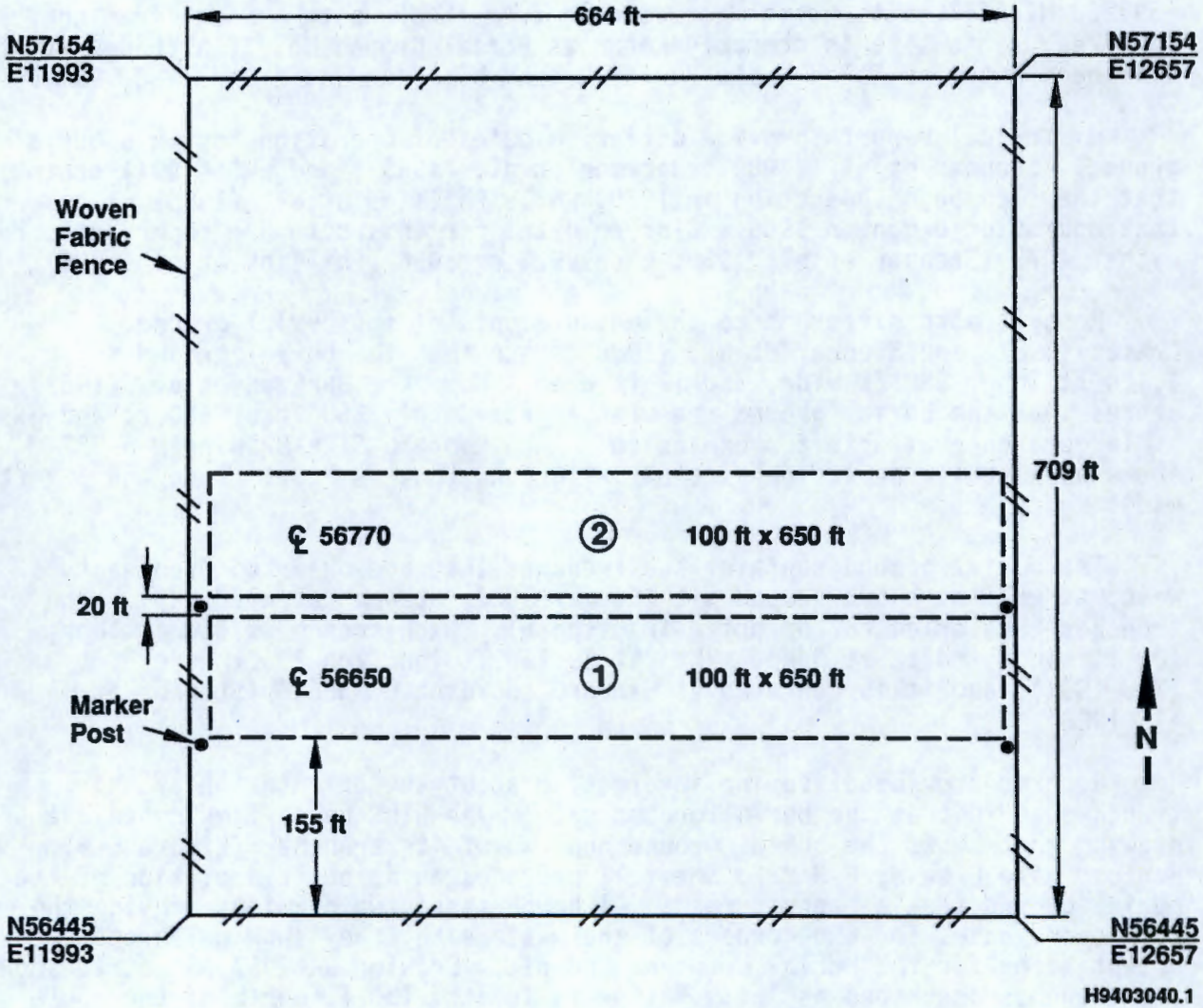
Reports also differ as to the measurements of the burial ground. Cramer (1987) and Stenner et al. (1988) state that the burial ground is 1,120 ft long, 650 ft wide, and 12 ft deep. However, Backman et al. (1963) states that the burial ground measures approximately 350 ft by 650 ft and has a "large area available for expansion." And Hanford Site Drawing H-6-937 shows an as-built depiction of a burial ground that is 709 ft long and 664 ft wide.

The burial ground contains two trenches that are oriented from east to west, as well as a "v"-shaped pit (Cramer 1987, Stenner et al. 1988). The trenches were oriented for drive-in disposal. Each trench is 650 ft long, 100 ft wide, and 12 ft deep. The pit is 140 ft long and 20 ft wide (WHC 1991), and it is centered at Hanford coordinate N56550 (Stenner et al. 1988).

Reports provide differing information about the orientation of the trenches and pit at the burial ground site. The WIDS hard files contain a drawing that shows the burial ground and two of its trenches (Figure 6-9). Hanford Site Drawing H-6-937, Sheet 1, provides an as-built depiction of the burial ground and its access road. Although these two drawings provide the same coordinates for the corners of the waste site, they show different orientations for the burial trenches and pit. Drawing H-6-937, Sheet 1, shows two trenches described as "pits." One is located 150 ft north of the south end of the fenced enclosure, and another is located at the north end of the enclosure. The WIDS drawing shows the trenches to be 20 ft apart and slightly further north; one of the trenches has its center line at Hanford coordinate N56650 and the other trench is centered at N56700. Neither of the drawings shows the thoria pit, which Stenner et al. (1988) state is centered at Hanford coordinate N56550.

A drawing produced from a 1988 ground-penetrating radar survey of the burial ground (see Appendix A) shows three distinct trenches or pits and another, much smaller, area. One of the trenches, smaller than the others, ranges from Hanford coordinates E12200 to E12600 and N56400 to N56460. The other two trenches are nearly equal in size. The first ranges from Hanford coordinates E12050 to E12580 and N56600 to N56700; it is centered at N56670. The second ranges from Hanford coordinates E12050 to E12600 and N56710 to N56810; it is centered at N56750. The smaller area, which is just west of the second large trench and may be part of it, ranges from Hanford coordinates E12000 to E12500 and N56710 to N56820. Unlike the drawings mentioned in the

Figure 6-9. Burial Ground No. 7 (618-7)



previous paragraph, this drawing shows one trench to be at the center of the burial ground site and the other to be in the north half.

Yet another drawing (see Appendix A), included in the WIDS hard file, shows an orientation for the two trenches and the thoria pit that is similar to that indicated by the ground-penetrating radar survey. Pit #1, which corresponds to the first large burial trench described above, is shown to be in the middle of the burial ground site. The drawing describes that pit as being 12 ft deep, opened in 1960, and filled by 1966. Pit #2, which corresponds to the second large burial trench described above, is shown to be in the north half of the site. It is described as having been opened in 1966 and "now filled." The thoria pit, which is smaller than the two other pits, is shown to be in the south half of the site. It is described as 20 ft deep, opened in 1966, and filled "about 1970."

The conflict presented by these drawings remains unresolved.

Additionally, Hanford Site Drawing H-3-23799, Sheets 1 and 2, provides an aerial view and a profile view, and H-3-32585 shows this burial ground in relation to other sites in the 300 Area.

Materials buried at this site were primarily from the 321 Building and the 300 Area fuel manufacturing process (Cramer 1987, Phillips et al. 1979, Stenner et al. 1988). Drummed containers holding solvent with moderate amounts of uranium were buried in the trenches (Phillips et al. 1979). Other low-level material, slightly contaminated with uranium and thorium, was also buried in the trenches, and hundreds of drums of zircaloy chips, slightly contaminated with beryllium, were deposited in this burial ground (Cramer 1987, Stenner et al. 1988) from 1962 until June 1973 (PNL 1986). The zircaloy chips buried at this site were generally less than 1/4 in. wide and 5 mm thick and were buried in 30-gal steel drums (see Appendix A [Sutter 1986]).

The drums containing zircaloy chips were originally filled with water. Because the drums may have corroded and leaked, they may now be void of liquid. PNL (1986) notes that the probable lack of water in some of the drums creates the potential for spontaneous combustion due to the pyrophoric nature of zircaloy chips.

Further investigation reported by Sutter (see Appendix A) indicates that "the hazard from buried drums of zircaloy chips in the 618-7 burial ground is real. The potential for an explosive reaction exists and can be kept to a very low risk level by leaving the burial ground undisturbed until further studies and plans are made." Everett Weakly, then a UNC Nuclear Industries employee, was interviewed by C.S. Sutter and stated that zircaloy is pyrophoric and has been known to explode. He further stated that the drums containing zircaloy should be left undisturbed "to maintain a minimum oxidation rate since it must be assumed the water has leaked out of the barrels" (see Appendix A [Sutter 1986]).

The solvents were segregated and buried in the trenches because of their pyrolytic and explosive qualities (Phillips et al. 1979).

Cramer (1987) reports that the pit at the center of this waste site was used for the disposal of thoria. However, Site personnel report that the southernmost trench--not the pit--was used for the disposal of thoria.

The volume of contaminated soil present at this site has been estimated to be 24,228 m^3, and the volume of overburden soil has been estimated to be 14,200 m^3 (WHC 1991).

After their use was discontinued, both trenches were closed, backfilled, and covered with clean soil (Stenner et al. 1988). The "v"-shaped pit in the center of the site was also backfilled and covered with clean soil (WHC 1991).

618-7 currently appears as a vegetation-covered area that is surrounded by wooden poles and an 8-ft-tall wire fence. Patches within the fenced area are covered with cobbles. The fence is posted with signs that read "Caution: Underground Radioactive Material." A locked gate is located on the east side of the fenced area. Figure 6-10 is a 1994 photograph of the burial ground.

Figure 6-10. 1994 Photograph of Burial Ground No. 7 (618-7).

6.10 618-8 (SOLID WASTE BURIAL GROUND NO. 8)

618-8 (alias 318-8 and Early Solid Waste Burial Ground) is an inactive, mixed solid waste burial ground located at Hanford coordinates N55736, E14320 (southeast corner). It is north of and adjacent to the 300 Area north perimeter fence. The burial ground is reported to be 600 ft long, 100 ft wide, and 15 ft deep, containing several individual trenches. It reportedly contains uranium and uranium contaminated solid waste derived from reactor fuel manufacturing from 1943 to 1944 receiving (Stenner 1988).

Recent historical investigations related to this burial ground reveal no documents or photographic evidence of this site until the early 1950's during an expansion of the 313 Building (Figures 6-11 and 6-12). At a later date, when a parking lot was constructed over a majority of the site, the radiation monuments were cut down to grade.

On September 5, 1980, in association with a Bonneville Power Administration (BPA) power pole placement, radiological contamination was detected outside the boundaries of the burial ground. Surface contamination levels up to 12,000 dpm beta/gamma and 1200 dpm alpha were identified in an area 60 ft northwest of 618-8, approximately 500 ft^2 in size. An area of subsurface contamination with levels up to 1 mR/h was found adjacent to the northeast boundary extending approximately 40 ft (see Appendix A [D.L. Uhl 1980]).

The presence of this contamination indicated the potential for buried radioactive material outside an established burial ground. The subsequent investigation included several "test holes" to estimate the lateral extent of the contamination (Hayward 1987). Of the seven test holes surveyed, one identified radioactive contamination from 200 to 1,500 c/m beta/gamma located 4- to 6-ft below grade. Two other holes revealed construction debris. As a result of this investigation, the northern boundary was extended and delineated by concrete markers.

An HRS migration score of 0.00 has been assigned to this site. The site is currently in compliance with the *Environmental Compliance Manual* requirements.

6.11 618-9 (300 WEST BURIAL GROUND)

618-9 is an inactive, mixed solid waste site that is located approximately 3/4 mi northwest of the 300 Area and 1,500 ft southwest of the 618-7 site. The site is at Hanford coordinates N55738 E11016 and approximate Washington State plane coordinates E592825 N116329. Its gravel access road is west of Route 4 South from the 300 Area (WHC 1991). Hanford Site Drawing H-3-32585 shows the location of this burial ground in relation to other 300 Area sites. This burial ground is commonly known as the 300 West Burial Ground, although it has also been known as 318-9 and as Dry Waste Burial Site No. 9 (WHC 1991). It operated from 1950 to 1956 (Cramer 1987, Stenner et al. 1988).

The burial ground consisted of an open excavation, or trench. Excavated soil was used to line the trench on the north and south sides (WHC 1991). Documents provide differing measurements for the site and its trench. WHC (1991) reports that the site is 180 ft long, 40 ft wide, and 15 ft deep.DOE-RL (1991) states that the burial ground trench was 185 ft long, 18 ft wide at the bottom, 40 ft wide at the top, and 10 to 15 ft deep. Cramer (1987) and Stenner et al. (1988) state that the burial ground site is 200 ft long, 18 ft wide, and 8 ft deep, and report that the trench was 140 ft long, 18 to 20 ft wide, and 8 ft deep. The WIDS hard files similarly state that the site was 200 ft long and 18 ft wide and the trench was 140 ft long, 18 to 20 ft wide, and 8 ft deep. And Hanford Site Drawing H-3-20998, an as-built drawing, shows the burial ground to be 200 ft long and 18 ft wide. It is believed that the burial ground is, in fact, 200 ft long and 18 ft wide.

Figure 6-11. Aerial Photograph Showing Solid Waste Burial Ground No. 8 (618-8), October 1952.

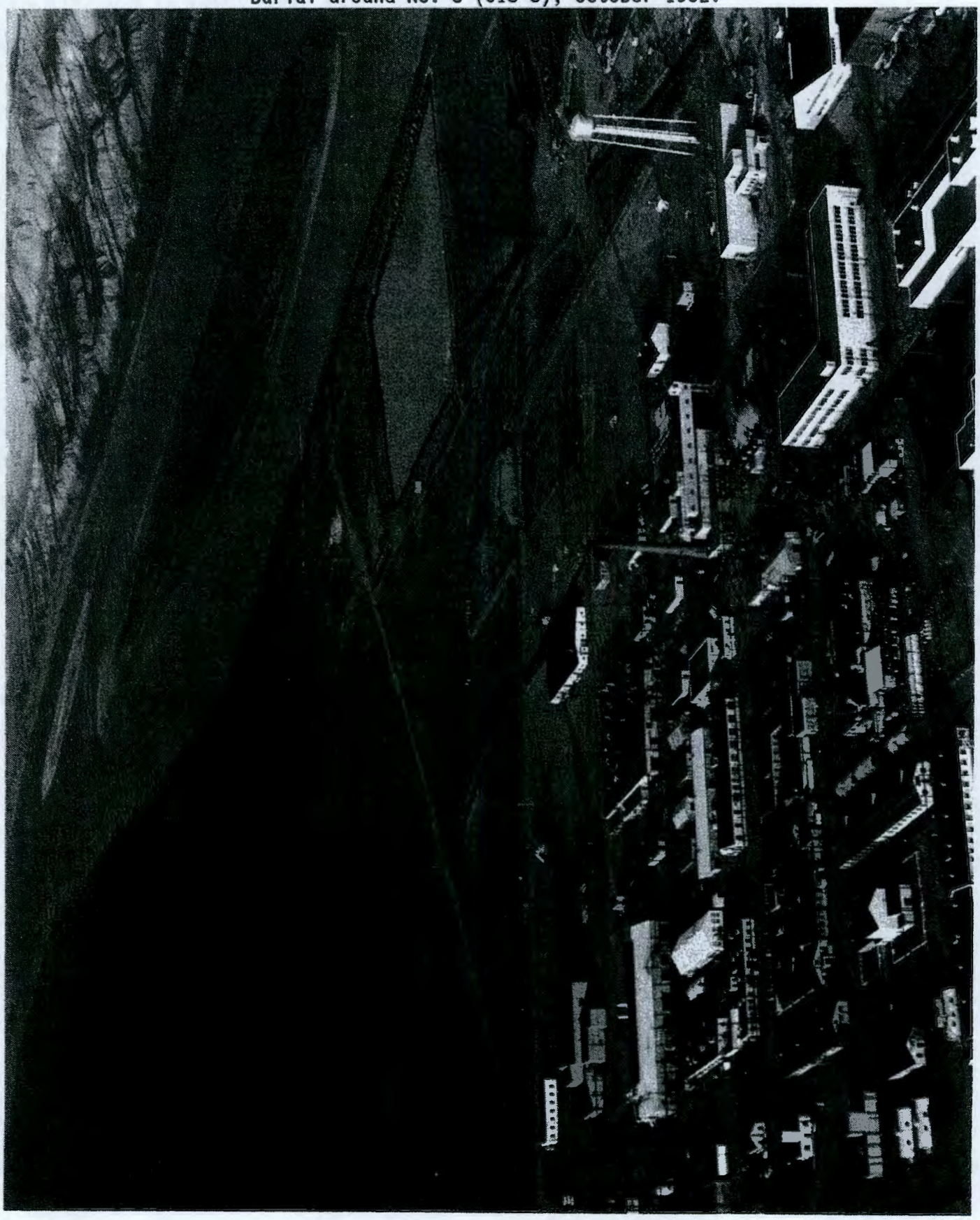


Figure 6-12. Aerial Photograph Showing Solid Waste Burial Ground No. 8 (618-8), March 1954.

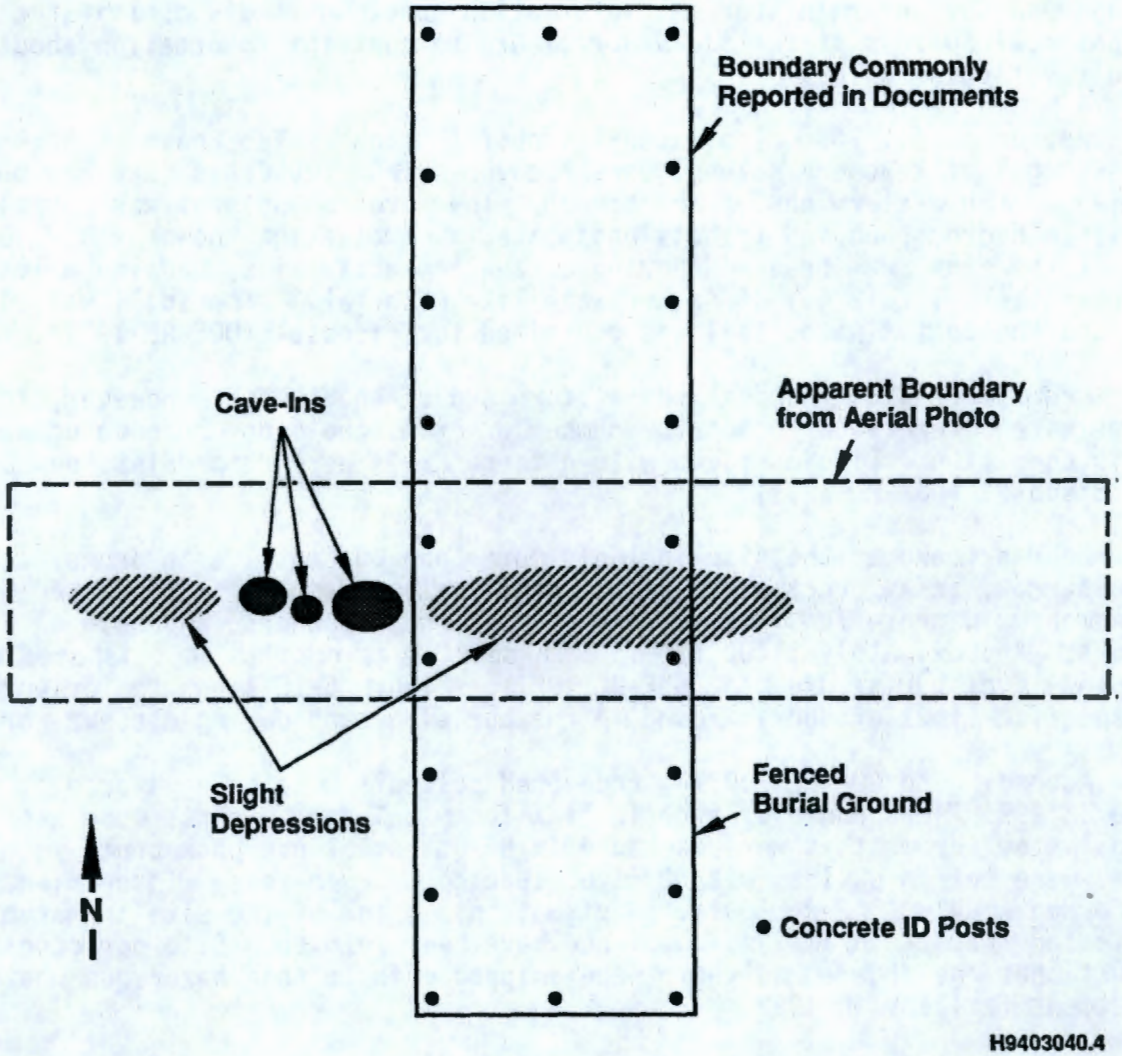
Wastes deposited in this burial ground reportedly included 5,000 gal of uranium-contaminated organic solvents that were packaged in 55-gal drums. These wastes were produced by activities in the 321 Building (Cramer 1987). Cramer (1987) and Stenner et al. (1988) report that 6,000 kg of tributyl phosphate and 10,000 kg of paraffin hydrocarbon were disposed of at this site.

After the burial ground trench was removed from service, it was backfilled, stabilized, and identified with markers. The site was considered to be particularly hazardous because of the uranium-contaminated organic solvents that were buried there (Stenner et al. 1988). It was estimated that the site contained approximately 260 m^3 of contaminated soil and 328 m^3 of overburden soil (WHC 1991).

Prior to cleanup, a fence surrounded a rectangular area at this site that ran from north to south. Figure 6-13 is a historical photograph of the fenced area. The fence was presumably meant to define the burial ground boundaries. Hanford Site Drawing H-3-20998, an as-built drawing, similarly shows the burial ground to be oriented from north to south. However, aerial photographs indicate that the actual burial ground covered a rectangular area of similar size that ran from west to east. Investigation by PNL and Rockwell indicated that the burial ground probably exceeded the fenced boundary by up to 50 ft per side. Areas of subsidence were found outside of, but near, the fenced area (WHC 1991). In addition to Figure 6-13, Figure 6-14 provides a WIDS hard file drawing that shows possible orientations of the burial ground.

Figure 6-13. Historical Photograph of the 300 West Burial Ground (618-9) Prior to Cleanup.

Figure 6-14. The 300 West Burial Ground (618-9).



From February 1991 through May 1991, the site was exhumed and all waste was removed under an Expedited Response Action. Prior to that work, a geophysical survey was performed to determine the boundaries of this burial ground and to confirm historical information about waste disposal at the site. *Geophysical Surveys at the 618-9 Burial Ground* contains information about the results of this survey.

Approximately 700 gal of methyl isobutyl ketone, also known as hexone, and 900 gal of kerosene solvent were recovered from 120 drums that had been buried at the western end of the trench. The kerosene solvent was normal paraffin hydrocarbon and tributylphosphate, a combination known as NPH/TBP. One of the drums was breached during excavation activities, causing a leak of approximately 1 to 2 gal of "a kerosene-like material." The spill was cleaned up, and the contaminated soil was contained for disposal (DOE-RL 1991).

Drums were also found at the eastern end of the trench. However, these drums were severely corroded; the number of drums could not be counted due to their condition. Liquids found within these drums were pumped into new drums for disposal (DOE-RL 1991).

Debris found at the site included more than 80 empty waste drums, a wheelbarrow, scrap process equipment, construction debris, two breached bags of ammonium nitrate fertilizer, unidentified white powders, and several lead bricks. Approximately 1,400 ft^3 of such debris was removed and disposed of in the low-level burial grounds (DOE-RL 1991). Figure 6-15 shows the orientation of specific types of debris found in the burial ground during cleanup work.

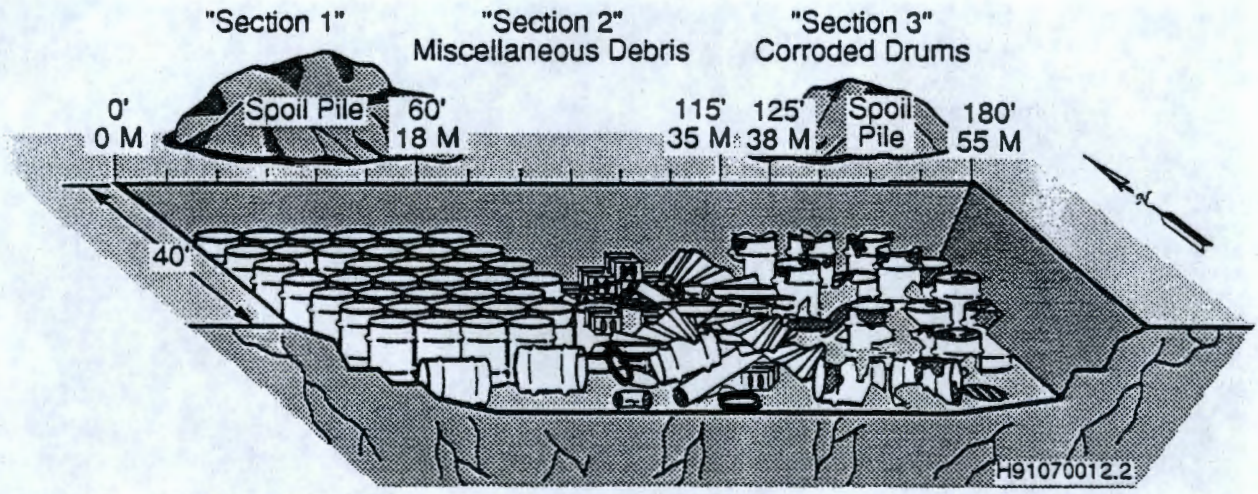
According to DOE-RL (1991), recovered solvents were being stored at the site in 1991, surrounded by a chain-link fence. Those solvents were stored in 55-gal steel drums that were packaged in 85-gal steel overpack drums. The drums were set on pallets with 2 ft of spacing between rows. Inspections were performed weekly (DOE-RL 1991). A visual inspection of the site in March 1994 indicated that the drums and the fence have been removed. Site personnel report that the drummed solvents were shipped offsite to a hazardous waste treatment facility in 1992.

DOE-RL (1991) reports that "extensive follow-up sampling has shown that relatively insignificant amounts of kerosene remain [in soils at the burial ground site] . . . and hexone was not detected. The results of an environmental risk assessment for chemicals above detection further determined that risks posed by other detected constituents to human health and the environment are negligible."

This site has an HRS migration score of 0.0 (Stenner et al. 1988).

618-9 currently appears as an area that has been recently graded and revegetated. Grasses are just beginning to grow on its surface. The site is level with the surrounding terrain and is unmarked. Site personnel report that the former burial ground location was surveyed and released from radiological control.

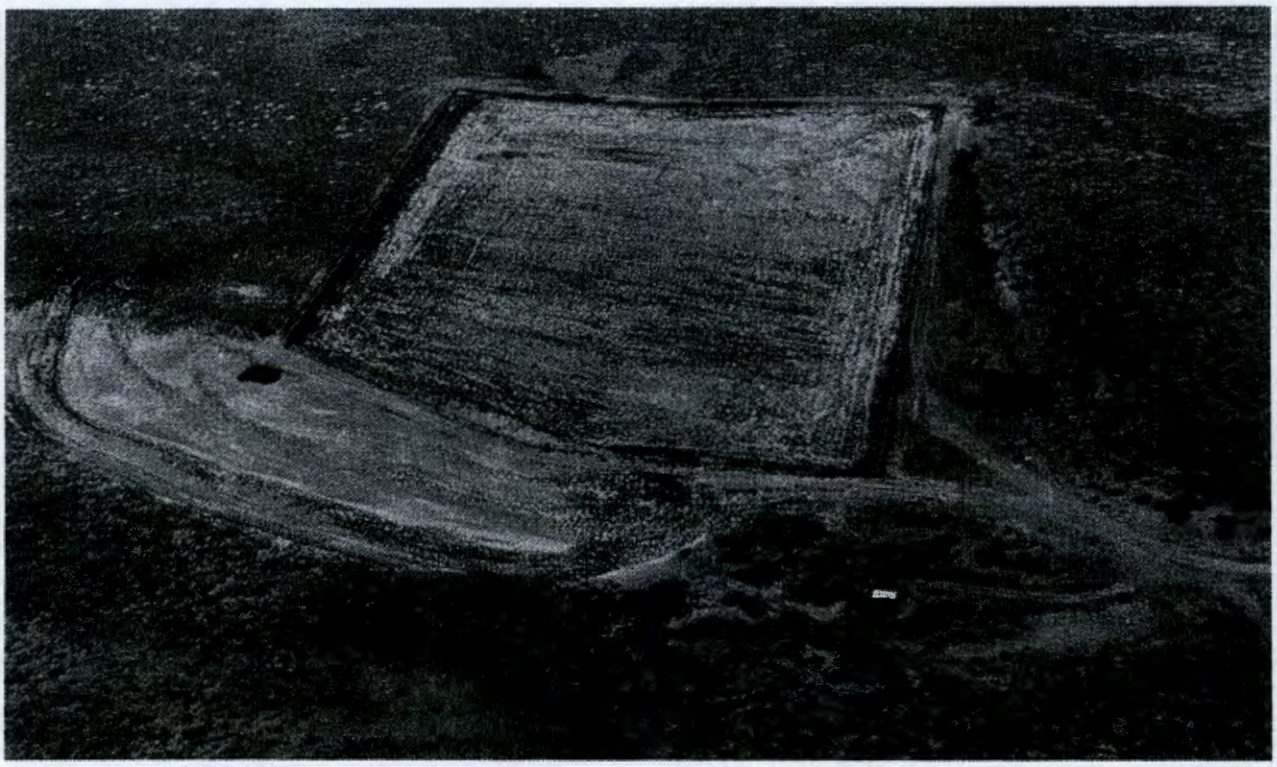
Figure 6-15. Waste Disposal Sections of the 618-9 Burial Ground Prior to Cleanup.



6.12 618-10 (300 North Solid Waste Burial Ground)

618-10 is an inactive, solid mixed waste burial ground. The site is located approximately 4 mi northwest of Hanford's 300 Area and has Hanford coordinates S6200 E2883, S5818 E2592, S5530 E2982, S5982 E3329 (WHC 1991) (Figure 6-16).

Figure 6-16. 300 North Solid Waste Burial Ground (618-10).



The 618-10 burial ground was previously known as the 300 North Burial Ground and as 318-10. It was activated in March 1954 and closed in September 1963. The burial facilities include 12 trenches ranging in size from 40 ft wide and 50 ft long to 75 ft wide and 300 ft long. It also contains 15-ft-long pipe units, 94 in all, which are bottomless 55-gal drums that were welded together and buried vertically (DOE-RL 1993b). Hanford Drawing H-6-934 shows the location of the various trenches and pipe units. The entire burial ground was surface stabilized with clean top soil in 1982. Individual disposal units are no longer visible (DOE-RL 1993b).

The site received a broad spectrum of low- to high-activity, dry, radioactive waste. The waste was primarily fission products and some plutonium-contaminated waste from the 300 Area. The trenches received low-level waste in cardboard boxes; cement barrels containing higher activity waste, including some liquids; and large miscellaneous items (i.e., laboratory hoods, vent filters, and glove box trays). Nonradioactive beryllium was also disposed in the trenches (DOE-RL 1993b).

From the mid-1950's until about 1960, solid radioactive wastes were collected from operations buildings in cardboard containers and then stored in lead pans known as "gunk catchers." They were then transported to 300 North Solid Waste Burial Ground in shielded "load luggers." The cardboard waste

containers were then dropped from the gunk catchers down the pipe units, and the hole was filled with sand and dirt until radiation levels declined to a safe or "tolerance" reading (Gerber 1992).

In 1959 the 327 Metallurgy Laboratory began using a cask truck to transport hot cell waste in aluminum "milk pails," which were remotely dropped into the unit. These "milk pails" were sealed with gelatin and had no lids. Another cask, known as the "gatling gun," deposited 1-liter "juice" cans of high-activity waste from a rotating chamber into the pipe units (DOE-RL 1993b).

Few records documenting solid waste burial activities were kept until 1960. Handwritten monthly logs, providing a tally of waste containers and their volume, were found (Webb 1993a). Monthly logs were identified for September through December of 1960. These records, plus a semiannual format for January through July, identify waste sent to 618-10 (Webb 1993b). The totals are summarized in the Table 6-1.

During surface stabilization in 1983, a black, oily substance was uncovered and photographed, but no samples were taken (Figure 6-17). In 1971, a radiation survey of the burial ground (Radiation Survey #710023, Appendix A) reports several areas of radiologically contaminated oil. Some of this material was reading 80,000 c/m. Three unplanned releases are associated with this site: UPR-600-1, UPR-600-2, and UPR-600-3 (Stenner et al. 1988). Additional information on these unplanned releases can be found in Sections 5.23, 5.24, and 5.25, respectively. An HRS migration score of 0.0 has been reported for this burial ground (WHC 1991).

Figure 6-17. Oily Substance Uncovered During Surface Stabilization at the 300 North Solid Waste Burial Ground (618-10).

Table 6-1. Shipments to 618-10 (300 North) Burial Ground (September 1960 through June 1962).

Radiological Levels	Total Containers	Volume (ft^2)
<10 Ci/ft^2 (in trenches)	Cardboard cartons - 5,008	22,563
10 to 1,000 Ci/ft^3	Milk pails - 529 (in pipe units) Concrete drums - 95 (in trenches)	129.9 1,167.5
>1,000 Ci/ft^3 (in pipe units)	Juice cans - 135 Milk pails - 95	7.2 23.7
Miscellaneous to trenches	Wooden box - 1 Plutonium glovebox - 1 Steel tray - 1 CWS filter - 1	220.0 60 11 4.2

Figure 6-18. The 300 Wye Burial Ground (618-11) Prior to Surface Stabilization.

For more information, refer to the *618-11 Burial Ground Expedited Response Action Proposal* (DOE-RL 1993b), and *Miscellaneous Information Regarding Operation and Inventory of 618-10 Burial Ground* (Webb 1993a).

6.13 618-11 (300 WYE BURIAL GROUND)

The 618-11 burial ground is an inactive, solid radioactive waste burial ground and is located approximately 7.5 miles northwest of the 300 Area, directly west of Washington Public Power Supply System (WPPSS) Plant #2 (WHC 1991) and 1.5 miles northeast of Highway Route 4 South (DOE-RL 1993b). Figure 6-18 is a photograph of this site. It is also known as the Y Burial Ground, 318-11, and the 300 Wye Burial Ground (WHC 1991). The burial ground is located at Hanford coordinates N121103 W2561, N12103 W3561, N12478 W2561, N12478 W3561 (Hanford Drawing H-3-9951 Sheet 2/3). The 618-11 burial ground was operational from March 1962 through December 1967 (DOE-RL 1993b).

The site is 375 ft wide by 1,000 ft long. It appears as a long rectangular area that is oriented east to west. A perimeter chain-link fence and numbered concrete marker posts delineate the site, enclosing an area of 8.6 acres. The burial ground is made up of three burial trenches, fifty pipe storage units, and an undetermined number of 8-ft-diameter caissons (see Figure 6-18). Since the site was surface stabilized in 1983, individual disposal units cannot be distinguished (DOE-RL 1993b).

The trenches were 900 ft long, 50 ft wide, and 25 ft deep. Trenches were V-shaped with sides sloped at approximately 1 ft horizontal to 1 ft vertical. Waste burial in trenches began in 1962. Trenches were installed and filled beginning with the most northerly trench and numbered sequentially in order of installation (DOE-RL 1993b).

The pipe units were made by welding together five bottomless 55-gal drums (Figure 6-19). The 15-ft-long cylinders were then buried vertically and spaced 10 ft apart in three distinct rows. The first row of units was installed in 1963 (DOE-RL 1993b). Large-diameter caissons were added to the west end of the middle row of pipe units in September 1964 (DOE-RL 1993b).

The large-diameter caissons were constructed of 8-ft-diameter, corrugated, 10-ft long metal pipe that was buried 15 ft below grade. The caisson was then connected to the surface by an offset 36-in.-diameter pipe with a dome type cap (WHC 1991) (Figure 6-20). Written records conflict as to the total number of large-diameter caissons actually installed. "Available evidence indicates a total of four large diameter caissons exist at the 618-11 burial ground" (DOE-RL 1993b).

Based on process knowledge, the site contains a vast spectrum of low- to high-level wastes. Contaminants expected to be present include technetium, promethium, zirconium, uranium, americium, cesium, curium, ^{90}Sr, ^{14}C, ^{60}Co, plutonium metals, and plutonium nitrates. Other contaminants are thorium, beryllium, aluminum-lithium, carbon tetrachloride, and sodium-potassium eutectic. The waste would also have included laboratory items. It is known that some waste containing plutonium was deposited at the 618-11 burial ground. Radiological survey records have been identified that describe plutonium-contaminated items and barrels being placed in trenches (Webb 1993b).

Records of the number of waste containers and their volumes (totaled semi-annually) are available from March 1962 to December 1967. The burial ground was deactivated in October 1962 for an undocumented reason and reopened in September 1963. During these months, the waste was diverted to the 618-10 burial ground. Table 6-2 summarizes shipments made from March 1962 through December 1967 (DOE-RL 1993b).

Seven unplanned releases are associated with this burial ground: UPR-600-4, UPR-600-5, UPR-600-6, UPR-600-7, UPR-600-8, UPR-600-9, and UPR-600-10. Specific information on these unplanned releases can be found in Sections 5.26 through 5.33 of this report.

For more information, refer to *618-11 Burial Ground Expedited Response Action Proposal* (DOE-RL 1993b), and *Miscellaneous Information Regarding Operation and Inventory of 618-11 Burial Ground* (Webb 1993a).

This Site has an HRS migration score of 0.0 (Stenner et al. 1988).

Figure 6-19. The Construction of Pipe Units at the 300 Wye Burial Ground (618-11).

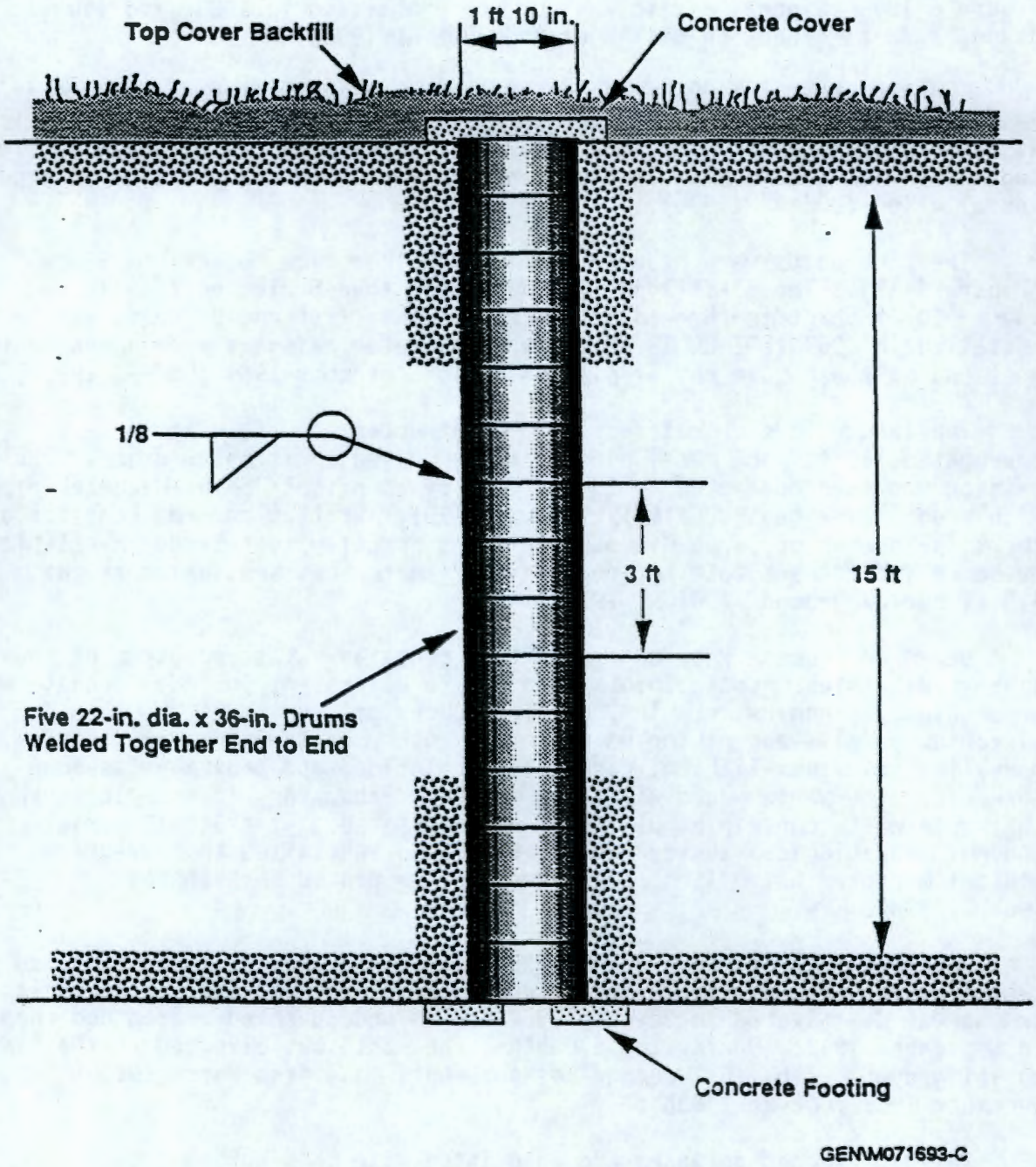


Figure 6-20. The Construction of Large-Diameter Caissons at the 300 Wye Burial Ground (618-11).

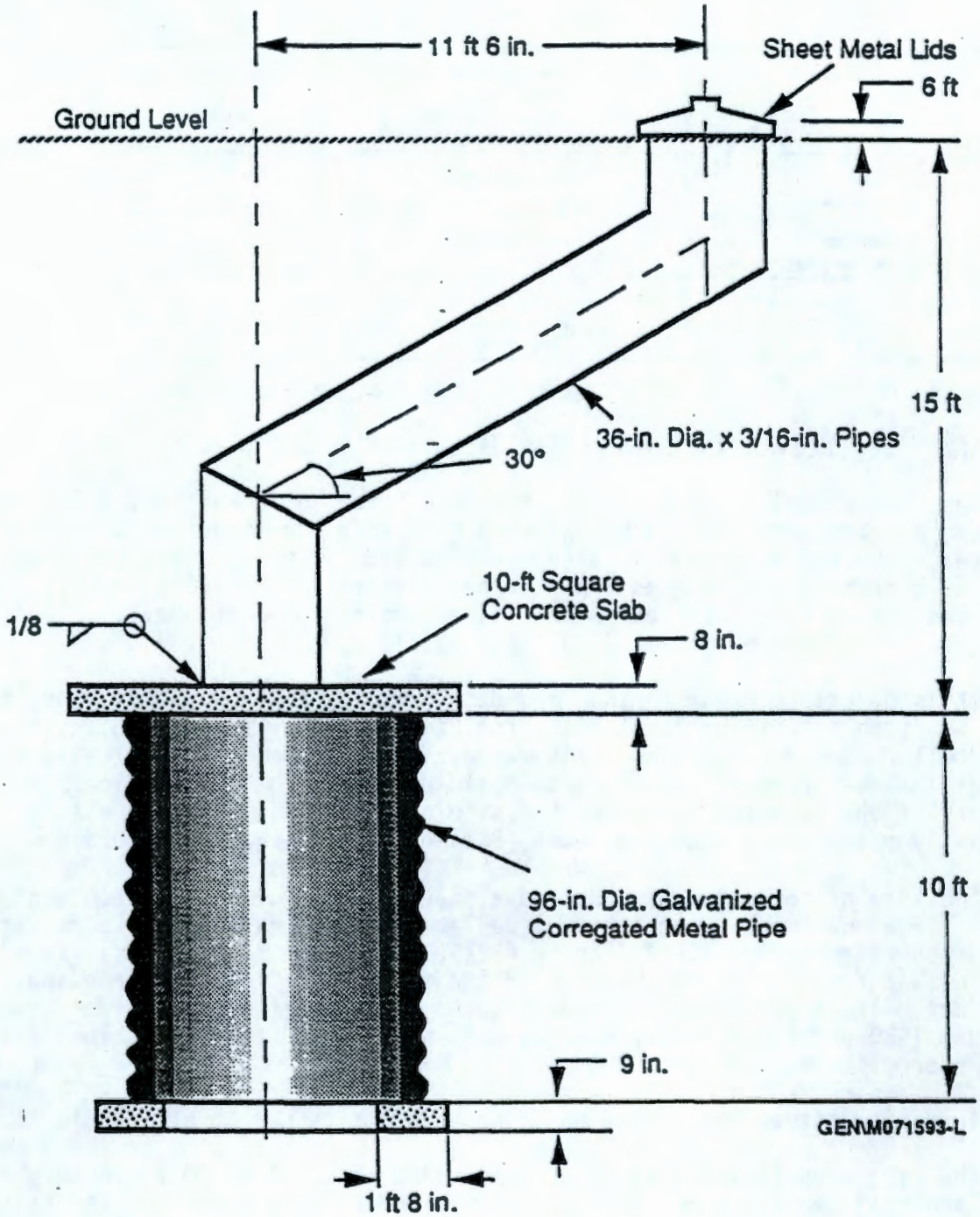


Table 6-2. Shipments to 618-11 Burial Ground, March 1962 through December 1967.

Radiological Level	Total Containers	Volume (ft^2)[a]
>10 Ci/ft^2 (in trenches)	Cardboard cartons- 33,423 55-gal drums- 400	150,895 3,000
10 to 1,000 Ci/ft^2	Milk pails- 3,100 (in pipes/caissons) Concrete drums- 169 (in trenches)	465 1,260
10 to 1,000 Ci/ft^2 (in pipes/caissons)	5-gal pails- 87 1, 2, 3 ft^2 cans- 174	58a 138
>1,000 Ci/ft^2 (in pipes/caissons)	Juice cans - 690	29.5
Miscellaneous in trenches	Steel cave - 1 Wood crates - 19 CWS filters - 6	72 876 48

[a] Appears to indicate volume of waste in can, not volume of containers.

6.14 618-13 (303 BUILDING AREA CONTAMINATED SOIL BURIAL SITE)

The 618-13 burial ground is an inactive, mixed solid waste site located at Hanford coordinates N63343 W25821, 0.5 to 0.75 mi northwest of the 300 Area. The burial ground is also known as 318-13 (WHC 1991). The exact dates of operation are in question. It began operation in 1950, and may have been used only during that year or may have remained open to operation until 1974 (WHC 1991, Stenner et al. 1988, Paas 1955).

It is described as an earthen mound that is 125 ft long, 50 ft wide, and about 50 ft tall, with at least 2 ft of clean soil cover (Paas 1955). It was never taller than 25 ft maximum. It was used to dispose of contaminated topsoil that was removed from the 303 Building area. The radiological activity of the disposed wastes at the site are unknown. The site was originally posted as a radiation zone (Stenner et al. 1988, Paas 1955).

The site of the mound was used as a storage area for depleted solvent wastes, in 55-gal drums, and other miscellaneous waste hardware. In an aerial photograph taken in June 1962 (Figure 6-21), the mound can be clearly seen along with a fenced area to the west of the mound that includes three small buildings. It is presumed by former Site employees that the mound was placedin 1950 and subsequently used as a "blast shield" for the solvent filled drums stored there.

This Site has an HRS migration score of 0.0 (Stenner et al. 1988).

The site appears today as an earthen mound about 15 to 20 ft in height. There are railroad tie berms at each of the four corners and along the east side. These wooden berm walls are in very poor condition, especially on the east side (Figure 6-22). The site is posted with a "Do Not Disturb, Environmental Test Site" warning sign. No other postings could be found. Carbon steel angle irons protrude from the mound on the north side and appear to have once been used as sign posts. On the northwest corner, a small, red-handled valve protrudes from the mound just inside the wooden berm. Adjacent to the west side of the mound is a concrete pad and loading dock. The pad and

Figure 6-21. Aerial Photograph Showing the 618-13 Soil Disposal Site, June 1962.

Figure 6-22. Aerial Photograph Showing the Earthen Mound and Building Foundation Remaining at the 618-13 Soil Disposal Site.

dock were reportedly used for the storage of depleted solvents that were subsequently buried in the nearby 618-9 burial ground, described in Section 6.11 of this report.

6.15 JA JONES #1 BURIAL GROUND

See Section 6.1.

7.0 DIRECTORY OF 300 AREA BUILDINGS, FACILITIES, AND STRUCTURES

Table 7-1, below, provides descriptions of 300 Area buildings, facilities, and structures. Some of these facilities may be important from a waste standpoint. All facilities known to be connected to the 300 Area Process Sewer are included. Not all mobile office trailers have been included, and other temporary construction buildings have been omitted. References for the following table include Hanford Site Drawing H-3-57210, Gerber (1992), WHC (1993b), AEC-GE (1964), and PNL (1984).

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
301	STORAGE FACILITY AND FABRICATION BUILDING The facility was used to store materials, mostly metals, and for the fabrication of unique tools and equipment to be used in Operations. The building was also known as the Garage and Equipment Storage Building. It provided storage for labor service tools, snow removal and salt-sand spreading equipment, and an auxiliary fire tanker truck. It also housed venetian blind washing equipment and drying racks. (Reference drawing H-3-71699).
301-A	PAINT SHOP The facility was used to store paints and painting materials and to provide an area for the painting of surfaces to be placed elsewhere. This building was a temporary construction facility that was converted to a permanent building to be used for the same purpose.
303-A	URANIUM STORAGE Eight Fresh Metal Storage Buildings were constructed to store materials for the fuels processing facilities. All are identical in construction. They are identified as 303-A, B, C, D, E, G, F, and K. The buildings are 48 X 27 X 13.5 ft tall and consisted of a concrete slab and concrete block construction. Access is provided metal covered doors , two in front and one at the rear of each facility.
303-B	URANIUM STORAGE
303-C	URANIUM STORAGE The Building was used for the storage of fissile materials until early 1984. Currently it is listed as the Materials Evaluation Laboratory operated by PNL. The facility is surrounded by a 10 ft high chain-link fence. Reference drawing H-3-3255, photo #8306228-71.
303-E	URANIUM STORAGE Also known as the Magazine Storage Building, it housed engineering materials, equipment, and supplies used in the 306 Building pilot plant. See HW-69534 for a reference drawing.
303-F	CHEMICAL PUMP HOUSE The facility is connected to the 300 Area Process Sewer system. In a radiation report dated October 30, 1946 the building was found to be contaminated with up to 8,000 d/m measured with a Zeuto meter.
303-G	URANIUM STORAGE
303-J	STORAGE This facility was also used for the storage of fresh metal to be used in the fuels fabrication process. Although this building it was of a different size, shape and construction as the other 303 Buildings. It is constructed of a concrete slab floor with foundation walls and wooden frame construction. There are two wooden sliding doors on the front and two small wooden doors on the rear. The overall dimensions are 64 X 41.5 X 27 ft tall. It is connected to the 300 Area Process Sewer system. The building was also used as an office building and provided space for N-Reactor Fuels engineering personnel. As such it housed a prototype mockup room and a layout planning and drafting room. Currently it is used by 300 Area radiation monitors and as storage for 306-W Building operations. Reference drawings H-3-10475, H-3-23521, photo #8306228-35.
303-K	STORAGE Mixed waste material storage.
303-L	Removed in 1970's.
303-M	URANIUM OXIDE FACILITY Built on site of 303-L. Used for the treatment of pyrophoric metal fines and chips generated in the fuels manufacturing process. This facility is more completely described in section 3.5.10 of this report. It is connected to the 300 Area Process Sewer.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
304	URANIUM CONCRETION FACILITY Used to store and treat fuels fabrication radioactive mixed wastes by mixing with cement grout. This facility is more completely described in section 3.5.11 of this report. It is connected to the 300 Area Process Sewer.
305	HOT CELL VERIFICATION FACILITY (HCVF) Also known as the Hanford Test Reactor. The 305 facility was the first operating air cooled nuclear reactor at the Hanford Site. This reactor operated at less than 50 watts and was used to test materials used in reactor and fuels construction. It began operation in March of 1944. It is constructed of steel framing with concrete block walls. It is about 163 ft long, 87 ft wide and 51 ft tall. The facility is connected to the 300 Area Process Sewer system. Reference drawing H-3-6601.
305-A	CONSTRUCTION OFFICE Also known as a Storage Building, it provided storage for out-of-service equipment and materials. It has provision for connection to sewers, steam and water supplies. Reference drawing H-3-883.
305-B	ENGINEERING DEVELOPMENT LAB ANNEX Originally known as the Experimental Test Reactor, it contained two test reactors. The first, the zero power Physical Constants Testing Reactor was characterized by a flexible core that could be loaded to duplicate reactor arrangements. The second, a smaller more sensitive Thermal Test Reactor had a low flux thermal column. The building also housed a critical approach tank. The facility is connected to the 300 Area Process Sewer system. The building and it's addition is currently used as a Mechanical Metallurgical Laboratory. A high bay was added in 1981 to the west side. The basement that housed the original test reactors has been decommissioned and cleaned of all original equipment. Reference drawings H-3-8314, H-3-26600, and H-3-9005, photo #8306228-23.
306-W	FABRICATION AND TESTING LABORATORY Originally completed in 1956 as the Fuel Element Pilot Plant. It was constructed to support the 313 Buildings operations. It was expanded in 1960 to contain the co-extrusion fabrication processes for N-Reactor fuels fabrication. In 1972 the east half was designated as 306E and that portion of the building became the Hanford Engineering Development Laboratory operated by Westinghouse Electric. The west portion (306W) was allocated to Battelle Northwest Laboratories. Used in fuels fabrication there were several machining and chemical processes within the facility. Several metal fires occurred as did several chemical spills. All drains and lines leading from the facility are suspect for both radiological and chemical contamination as are the soils beneath and around the facility. It is connected to the 300 Area Process Sewer system. Reference drawing H-3-32503, photo #8306228-65.
306-E	METAL FABRICATION DEVELOPMENT BUILDING Constructed in 1960 to contain the co-extrusion press and operations. The 306E became the Hanford Engineering Development Laboratory in 1972. It underwent extensive remodeling for this activity and houses a chemical cleaning facility, Non-destructive test facility, and other assorted laboratory operations. All drains and lines leading from the facility are suspect for radioactive and chemical contamination. The facility includes a lime pit for acid neutralization on it's north side. Acid and caustic lines from storage facilities located near the 333 Building were partially removed in 1975. It is connected to the 300 Area Process Sewer system. Reference drawings H-3-8221, H-3-10856, H-3-12752, and H-3-12757.
306W-T2 (M0024)	OFFICE TRAILER Provides additional office space for 306W Building personnel. Reference drawing H-3-41677, photo #8400580-26.
306-T6 (M0057)	OFFICE/TRAINING TRAILER Provides office and training space for Radiation Protection Training and Laboratory Safety Department personnel. Reference drawing H-3-54645, photo #8400580-9.
307	RETENTION BASIN
308	FUELS DEVELOPMENT LABORATORY Also known as the Plutonium Fabrication Pilot Plant, it provides laboratories for research and development of reactor fuels containing plutonium. The laboratories are characterized by large gloved enclosures containing metallurgical equipment. Services include hot, cold and deionized water, steam, compressed air, propane, nitrogen, argon, oxygen, hydrogen, and laboratory contaminated drains. It is also connected to the 300 Area Process Sewer system Reference drawings H-3-32504, H-3-12005, H-3-12006, and H-3-14378, photo #8302384-8.
309	CONTROL AND DATA SYSTEMS Originally constructed as the Plutonium Recycle Test Reactor, it provided a facility for the development and testing of technologies for the utilization of plutonium as a fuel in thermal power reactors. It was a vertical pressure tube type reactor, heavy water moderated and cooled, with a thermal power rating of 70 megawatts. It was placed in lay away condition in 1969. The containment dome , above ground level was decontaminated as was the fuel storage basin area. Most of the original equipment has been removed as the facility was being prepared for a new mission that never was fully realized. It is connected to the 300 Area Process Sewer system. Reference drawings H-3-32529, H-3-11059, and H-3-11060, photo #7813383-3.
311	TANK FARM Connected to the 300 Area Process Sewer. Building removed in 1989.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
313	FUELS MANUFACTURING LABORATORY Original use was reactor fuels manufacture. This facility was expanded from it's original size of 33,020 ft^2 in 1954 to 76,633 ft^2. The facility contained presses, furnaces, chemical operations, and shops. Last used for fuels fabrication in 1971. The south end of the facility continued in use as a receiving and inspection area for N-Reactor fuels and casting and machining operations. In 1983-1984 a large extrusion press was installed in the north section of the facility along with other equipment to be used in the fabrication of reactor process tubes. During this installation the concrete floor was removed as well as several feet of contaminated soil. The facility is connected to the 300 Area Process Sewer. Reference drawings H-3-10015 and H-3-10155.
314	ENGINEERING DEVELOPMENT LABORATORY Originally known as the Metal Extrusion Building it contained a 1,000 lb extrusion press, electric furnaces, rod-straightening machine, an autoclave area, control room, shop and repair area, and offices. Uranium billets were heated and extruded in the facility in preparation for fuels manufacture in the 313 Building. In 1948 the extrusion press was excessed but the facility continued it's other processes. Beginning in 1946 a "chip recovery" operation was started in which waste uranium was pressed in to "briquettes" for shipment offsite. This practice was short lived due to several uranium fires in the process. Also in 1946, another waste recovery process was started and included an "oxide burner", an open hearth furnace, located on the north side of the building. It was recognized early in operations that this treatment method was the cause of surface contamination, out of tolerance, and operation of the furnace was short lived. During August, 1954, 18 in of soil was removed from a 400 ft^2 area to obtain a contamination level of less than 1,000 c/m. The soils removed were reported to be contaminated to 30,000 c/m and a radiation level of 100 mrads/hr. of uranium oxide (Radiation Monitoring Report 7-54 to 8-54). The building was modified in the 1970's for research projects and craft services. Residual uranium contamination remains both inside and outside the facility. It is connected to the 300 Area Process Sewer system. An addition to the building houses a lunch room, change room and office space. Reference drawings H-3-26604, HW-71191, and SK-3-10780, photo #8306228-34.
314-B	STRESS RUPTURE TEST FACILITY Is a reinforced concrete addition to the northwest corner of the 314 Building. It is constructed of 8 in heavy aggregate concrete. The interior walls are arranged to provide eight small cells, each cell has a blast door and a blow-out roof panel. Reference drawing H-3-26604, photo #8306228-57.
315	FILTERED WATER PLANT Constructed to filter raw Columbia River water to supply the 309 Building reservoir and rupture loop. It is a concrete structure 285 yd east of the 309 Building. The facility consisted of control equipment, pumps, three sedimentation basins and filters, and a 70,000 gal storage clearwell. The process sewer system for the facility drains directly back to the Columbia River. The sanitary sewer system feeds a 500 gal septic tank (steel construction) and 50 ft drainfield. Reference drawing H-3-14192.
318	RADIOLOGICAL CALIBRATIONS AND DEVELOPMENT LABORATORY, FORMERLY THE HTLT REACTOR AND MONITORING SERVICES Originally the facility housed the High Temperature Lattice Test Reactor. The reactor was a graphite cube that provided reactor physics data at test temperatures up to 1,000°C. The test reactor and all of it's ancillary equipment has been removed and disposed of. A one story addition was added in 1982. An elevator was added in 1983. The building is connected to the 300 Area Process Sewer. Reference drawings H-3-266605 sheets 1 and 2, photo #836228-18.
318-A	DETECTOR BUILDING Is a small building that was originally part of the HTLTR facility. Currently it is used for storage and as a laboratory. Reference drawing H-3-27942, photo #836228-19.
318-T1	OFFICE TRAILER Provides office space to 308 Building personnel. Reference drawing H-3-41663, photo #8400580-28.
318-T2	OFFICE TRAILER Provides office space to 318 Building personnel. Reference drawing H-3-41745, photo #8400580-16.
318-T3	OFFICE TRAILER Provides office space to PNL Occupational and Environmental Protection Department. Reference drawing H-30-41924, photo #8306228-183.
318-T4	OFFICE TRAILER Provides storage space and an instrument repair facility for the Occupational and Environmental Protection Department. Photo #8400580-15.
320	LOW LEVEL RADIOCHEMISTRY BUILDING The first floor contains wet chemistry laboratories. It provides a covered bottled gas dock for cylinder storage and manifold connections. The building is connected to the 300 Area Process Sewer. Reference drawing H-3-26606, photo #836228-74.
320-T1	OFFICE TRAILER Provides office space to 320 Building personnel. Reference drawing H-3-41375, photo #8400580-18.
320-T2	OFFICE TRAILER Provides office space to 320 Building personnel. Reference drawing H-3-47581, photo #8400580-17.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
321 and 321-A	HYDROMECHANICAL FACILITY Also known as the Cold Chemical Semi-Works and Annex. It was originally constructed to "troubleshoot" problems in the chemical separations facilities in the 200 Areas. The facility houses several concrete cells that were to be used in "cold" separations using unirradiated materials. The facility was used to makeup tracer materials from irradiated materials and was connected to four underground tanks located south of the facility. It is also connected to the 300 Area Process Sewer system. Reference drawings HW-74127 and HW-74126.
323	METALS CREEP LABORATORY Connected to the 300 Area Process Sewer.
324-A AND 324-C	CHEMICAL ENGINEERING LABORATORY Provides engineering cells and services areas for conducting chemical, mechanical, process and complex radioactive experiments. Shipping casks of up to 30 tons can be received by either truck or rail. It housed two shielded storage vaults for High, medium or level radioactive materials. The vaults contain 8 tanks ranging from 1,700 to 18,925 L capacities. The building is connected to both the RLWS system and the 300 Area Process Sewer. Reference drawing H-3-266-8 sheets 1 and 2, photo #8402281-1.
324-T5	OFFICE TRAILER Provides office space to PNL Security Surveillance Team. Photo #8402281-2.
324-T11	OFFICE TRAILER Provides office space to 324 Building personnel. Reference drawing H-3-41378, photo #8306228-189.
324-T12	OFFICE TRAILER Provides office space to 324 Building personnel. Reference drawing H-3-41379, photo #8306228-192.
324-T13	OFFICE TRAILER Provides office space to 324 Building personnel. Reference drawing H-3-41380, photo #8400580-23.
324-T14	OFFICE TRAILER Provides office space to 324 Building personnel. Reference drawing H-3-41380, photo #8400580-31.
324-T15	OFFICE TRAILER Provides office space to 324 Building personnel. Reference drawing H-3-41382, photo #8400580-22.
324-T16	OFFICE TRAILER Provides office space to 324 Building personnel. Reference drawing H-3-41383, photo #8400580-24.
325	RADIOCHEMISTRY LABORATORY Provides specially shielded ventilated and equipped laboratories for radiochemical, radioceramic and high temperature studies. It is the largest of Hanford Laboratories and contains over 50 laboratories. The specially shielded laboratories can perform experiments with radiation levels of up to 1 million R/hr. The facility houses a cask handling area, waste storage tanks, and glove boxes (for alpha-active materials). It is connected to the 300 Area Process Sewer system and the radiation contaminated drain system. Reference drawings H-3-32508 sheets 1, 2 and 3, H-4-50016, H-4-50017, H-3-19178, H-4-50018, and H-3-9306, photo #7813383-7.
325-T1	OFFICE TRAILER Provides office space to 325 Building personnel. Reference drawing H-3-41384, photo #8400580-21.
325-T2	OFFICE TRAILER Provides office space to the Project Management and Engineering Services Department. Reference drawing H-3-54092, photo #8400580-25.
325-T3	OFFICE TRAILER Provides office space to the Project Management and Engineering Services Department. Reference drawing H-3-54092, photo #8400580-8.
325-T4	OFFICE TRAILER Provides office space to the Project Management and Engineering Services Department. Reference drawing H-3-54092, photo #8400580-7.
325-T5	OFFICE TRAILER Provides office space to the Project Management and Engineering Services Department. Reference drawing H-3-54092, photo #8400580-6.
326	MATERIALS TECHNOLOGY LABORATORY Provides laboratories and facilities for the study of metallurgical, chemical, and physical behavior of reactor components and fuels. It is connected to the 300 Area Process Sewer system. Reference drawings H-3-4501 and H-3-4502.
327	POST IRRADIATION TESTING LABORATORY Also known as the Radiometallurgy Building, it provides specially shielded, ventilated, and equipped laboratories for physical and metallurgical examination of irradiated nuclear materials. It houses several cells of meehanite cast iron, or lead, a burst test facility, decontamination chamber, and two large water basins for storage of radioactive materials. It is connected to the 300 Area Process Sewer system. Reference drawings H-4-50195, H-4-50196, and H-3-19423.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
328 and 328-A	ENGINEERING SERVICES AND SAFETY Also known as the Engineering Management and Technical Shops Building, the facility provides shops and facilities for the fabrication of apparatus, and equipment required by research and development. These are machine, electrical, electronic, glass, paint, carpentry, plastic, welding, and sheet metal. The shop areas have recently been converted to maintenance shops for the 300 Area. Reference drawings H-4-50423, H-4-50424, H-4-20843, H-3-9404, and H-3-9699.
329	PHYSICAL SCIENCE LABORATORY Provides physics laboratories for developing instruments, mostly radiation detection instruments. It includes chemistry laboratories for radioanalytical and low-level studies of isotopes. It is connected to the 300 Area Process Sewer system. Reference drawings H-3-26612, H-11-4520 sheets 1 and 2, photo #8306228-68.
329-T1	OFFICE TRAILER Provides office space to 329 Building personnel. Reference drawing H-3-41385, photo #8400580-2.
329-T2	OFFICE TRAILER Provides office space to 329 Building personnel. Reference drawing H-3-41385, photo #8400580-2.
329-T3	OFFICE TRAILER Provides office space to Word Processing Team personnel. Reference drawing H-3-41387, photo #8400580-1.
329-T4	OFFICE TRAILER Provides office space to 300 Area PNL personnel. Located adjacent to and south of the 329 Building.
329-T5	OFFICE TRAILER Provides office space to 300 Area PNL personnel. Located adjacent to and south of the 329 Building.
329-T6	OFFICE TRAILER Provides office space to 300 Area PNL personnel. Located adjacent to and south of the 329 Building.
330	STRESS RUPTURE TEST FACILITY Provides shielded facilities for stress rupture tests of tubular material at conditions of up to 700°F and 30,000 psi. It is constructed to form 8 test cells. Reference drawing H-3-9524.
331	LIFE SCIENCE LABORATORY The performance of a wide variety of biological and ecological research studies. The laboratory provides facilities to conduct research related to chemical exposures and carcinogen and radiation biology related to the use of atomic energy. It houses quarters for housing and caring for colonies of large and small animals. Special services to the facility include conditioned and unconditioned river water to aquatic laboratories and aquatic ponds. The building also houses administrative offices and a library. It is connected to the 300 Area Process Sewer. Reference drawings H-3-29664 sheets 1 and 2, photo #8306228-14.
331-T1	OFFICE TRAILER Originally this trailer was located at 100-F Area and was used as office space. Currently it is being used as a holding area for animal feces and urine samples for analysis. It was manufactured in the 1960's. Reference drawing H-3-41388, photo #840580-20.
331-T5	OFFICE TRAILER Provides office space to 331 Building personnel. Reference drawing H-3-47582, photo #8400580-19.
331-A	VIROLOGY LABORATORY Provides laboratory space for the study of viruses. It contains an office area, mechanical room, 3 laboratories, and 15 pen areas for laboratory animals. The building is connected to the 300 Area Process Sewer system. Reference drawing H-3-27951, photo #8306228-12.
331-B	DOG KENNEL Is a one story concrete block structure containing 110 living quarters and runs for dogs. The north end of the facility contains support facilities for surgery, clinic, hospital, change room and food preparation. Each run is enclosed by a concrete block wall, concrete floor and radiant heat. Outdoor runs are separated by expanded metal fencing. Reference drawing H-3-32591, photo #8306228-11.
331-C	ANIMAL CARE FACILITY STORAGE BUILDING Provides temporary storage space for equipment, it serves the entire 331 complex. Reference drawing H-3-32888, photo #8306228-15.
331-D	BIOMAGNETIC EFFECTS LABORATORY Provides experimentation space for electromagnetic field studies on small animals. It originally housed sewage treatment facilities for the disposal of animal wastes. This equipment was all decommissioned and removed. The building is connected to the 300 Area Process Sewer. Reference drawing H-3-32899, photo #8306228-16.
331-E	GREENHOUSE Provides space to grow plants used in plant studies. The facility is connected to the 300 Area Process Sewer. Reference drawing H-3-32975, photo #8306228-4.
331-F	ANIMAL RESOURCES STORAGE BUILDING Provides space for materials and equipment used to maintain animal pastures of the 331 complex. Reference drawing H-3-41156, photo #8306228-8.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
331-G	INTERIM TISSUE REPOSITORY Provides storage space for tissue samples generated by experiments conducted within the 331 complex. The building was known as the Farrowing Facility, the building was used to house laboratory animals, specifically swine during birthing until. It's use as a farrowing facility was discontinued in 1982. Reference drawing H-3-41153, photo #8306228-7.
331-H	PLANT EXPOSURE FACILITY Provides space for advanced research. Plants are exposed to various aerosols and actinide elements. The facility includes a wind tunnel. Reference drawing H-3-54644, photo #8306228-5.
331-J	INCINERATOR The facility was constructed to be used as an incinerator, but was never used. It is connected to the 300 Area Process Sewer. Also identified as 331-J was a Hay Storage Barn that was located nearby. The hay barn included auger type feed bins. All that remains of the feed storage facilities is a fenced concrete pad. Photo # 8306228-13 is of the former Hay Barn facility.
331-HB1 to 331-HB12	HOGHOUSES Six double building arrangements that provided shelter for laboratory animals (hogs). Hot water was circulated through the concrete pads to help provide heat in winter months. Photo #8306228-10.
332	HAZARDOUS WASTE INTERIM HOLDING FACILITY Provides interim storage for nonradioactive hazardous wastes. The floor is sloped to an exterior wall sump for spill containment. It includes a fenced outdoor storage area as well. Reference drawing H-3-54573, photo #8306228-62.
333	N-REACTOR FUELS MANUFACTURING Also known as the Coextrusion Shop or Fuel Cladding Facility, it housed the manufacturing and related facilities for the preparation of N-Reactor fuels. This process included machining, chemical, inspection, mechanical and laboratory processes. The facility is connected to the 300 Area Process Sewer system. Reference drawings H-3-18479, H-3-18482, H-3-18481, and H-3-18480.
333-1	OFFICE TRAILER MO-052.
334	SAMPLING SHED Also known as the Coextrusion Chemical Supply Building, it houses the control instruments for the acid system. It also provides minor storage of maintenance supplies. It is connected to the 300 Area Process Sewer system. Reference drawings H-3-17667 and H-3-18521.
334-A	SPENT ACID STORAGE
335	AEROSOL TEST FACILITY Connected to the 300 Area Process Sewer.
335-A	FAST REACTOR THERMAL ENGINEERING FACILITY
336	SODIUM TESTING FACILITY Connected to the 300 Area Process Sewer.
337	HIGH TEMPERATURE SODIUM FACILITY AND OFFICES Connected to the 300 Area Process Sewer.
337-B	337 HIGH-BAY AND SERVICE WING Connected to the 300 Area Process Sewer.
338	SAF COLD TEST FACILITY Connected to the 300 Area Process Sewer.
340	WASTE NEUTRALIZATION FACILITY Provides facilities for the temporary storage, neutralization, and load-out of radioactive waste solutions from Area laboratories. It is connected to the 300 Area Process Sewer system. Reference drawings H-4-50282 and H-3-9388.
340-A	RETENTION AND NEUTRALIZATION FACILITY Provides facilities for the temporary storage of radioactive waste solutions from Area laboratories. The building contains six 8,000 gal stainless steel waste storage tanks. Reference drawing H-3-9389.
340-B AND 340-C	RR WASTE LOADOUT FACILITY
350	PLANT OPERATIONS AND MAINTENANCE FACILITY Provides a central crafts shop and administration offices. Shop areas are provided for plastics, carpentry, electrical, instrument, machine, welding, grinding, pipefitter, and millwright work. Reference drawing H-3-54046, photo #8306228-54.
350-A	PAINT SHOP Provides PNL with a facility to conduct spray painting, sandblasting, and steam cleaning. Sandblasting and steam cleaning is conducted on an outside pad nearby. The building contains a spray booth and storage facilities for paint and solvent storage. Reference drawing H-3-54046, photo #8306228-32.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
350-B	WAREHOUSE Provides storage space for maintenance equipment and materials. Reference drawing H-3-54046, photo #8306228-55.
350-C	STORAGE Provides sheltered storage for lumber products. Photo #8402281-5.
350-D	WASTE OIL STORAGE FACILITY This small metal building was constructed sometime in 1988 or 1989 and is used for the storage of waste oils and PCB contaminated oils. There is a waste oil storage tank in a shallow containment pit, located outside the facility at the northeast corner. There is also storage space provided on a pad outside the facility for containers.
351	SUBSTATION 115kV
351-A	METER AND TESTING BUILDING
351-B	METER TESTING AND SWITCHGEAR FACILITY
3506-A	INFRA RED LABORATORY
352-E	GENERATOR SUBSTATION
352-F	ELECTRICAL SUBSTATION
377	STEAM GENERATOR EXAMINATION FACILITY The facility was designed and constructed to perform nondestructive testing, inspection and examination of a retired nuclear steam generator. Additionally destructive testing, chemical cleaning, decontamination, and vibration experiments are performed. Radioactive liquid wastes are collected in a 2,000 gal reinforced fiberglass collection tank in the basement. The tank contents are then trucked to the 300 Area 340 Waste Complex for disposal. Emergency power is provided by a 62.5 kVA diesel generator. Reference drawing H-3-41295 sheets 1 and 2, photo #8306228-47.
377-T1 (M0006)	OFFICE TRAILER Provides computer and office space for 377 Building personnel. Reference drawing H-3-54091 sheet 1, photo #8400580-13.
377-T2 (M0709)	STORAGE TRAILER Provides temporary storage space for materials used in the 377 Building. Reference drawing H-3-54091 sheet 1, photo #8400580-11.
377-T3	OFFICE TRAILER Provides office space to 377 Building personnel. It was formerly a change room facility for J.A. Jones Construction personnel. Reference drawing H-3-54091 sheet 2, photo #8400580-12.
377-T4	STORAGE TRAILER Provides temporary storage of supplies used in support of 377 Building activities. Reference drawing H-3-41389, photo #8400580-14.
382	PUMP HOUSE Constructed to meet the water requirements of the 300 Area Powerhouse, process, sanitary, and fire protection water needs. The facility was expanded during original construction to meet the additional needs due to expansion of other process buildings. It is the smallest of the original Hanford Pumping Stations and consists of pumps, engines, a generator, chlorinator and 200,000 gal reservoir. The facility contains an Allis-Chalmers gasoline engine and a 75 KW Diesel-driven generator. The gasoline engine was removed from service on 8/6/92 as a result of a failed tightness test of the underground gasoline storage tank. Both the Building and the reservoir are connected to the 300 Area Process Sewer system.
382-A	NORTH GROUND WATER TANK 200,000 GAL Connected to the 300 Area Process Sewer system.
382-B	382-B FIRE PUMP STATION This steel frame metal building was constructed in 1994 to house fire protection equipment. It is located adjacent to and south of the 384 Powerhouse.
382-B	SOUTH GROUND WATER TANK 225,000 GAL Connected to the 300 Area Process Sewer system.
382-C	WEST GROUND WATER TANK 900,000 GAL Connected to the 300 Area Process Sewer system.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
384	POWERHOUSE The 384 Building was used to supply steam heat, via coal-fired boilers, to the facilities located in the 300-Area. It originally contained two boilers and stokers, seven pumps, various tanks, and a monorail hoist. An addition on the west end housed water softening equipment and an elevated wooden tank nearby stored the softened water. A 150 ft tall clay brick exhaust stack also once stood at the west end of the facility. There are six boilers, some have been modified to use Bunker "C" oil as well as coal. The facility includes coal handling equipment and coal storage yard adjacent on the east side of the building. It also includes large underground oil storage tanks adjacent to the northeast corner of the facility. These tanks were cleaned out in 1992, and the carbon steel liners were removed during the clean out. Currently a small portable boiler has been used to help supply the steam needs and stands on the northwest side of the facility. The facility drains are connected to the 300 Area Process Sewer system. Reference drawing H-3-6916 sheet 1.
3220	US WEST TELECOMMUNICATIONS BUILDING This building was constructed in 1993 to house telecommunications operations by US West Company. It is located on the west perimeter of the 300 Area south parking lot just outside the Area perimeter fence.
3506-A	MATERIALS PROPERTIES LABORATORY Modified to contain the Telephone Exchange it provided 800 telephone dial system for 300 Area trunk line connections to all other areas and the Richland City system. One room in the facility houses batteries for emergency operation. Reference drawing H-3-4366.
3506-B	SERVICE SHOP
3507	MICROWAVE TOWER AND BUILDING
3607	SEPTIC TANKS
3607-A	PUMPHOUSE
3614-A	RIVER MONITORING STATION Provides equipment space for air and Columbia River water sampling studies. It is located on the west bank of the river just northwest of the 312 transformer station. Reference drawings H-3-27969, H-4-39303, photo #8306228-28.
3621-B & 3621-C	EMERGENCY GENERATOR AND CONTROL
3621-D	EMERGENCY GENERATOR STATION #3
3701-A	APPLE STREET GUARD STATION
3701-D	PATROL HEADQUARTERS
3701-L	WISCONSIN STREET GUARD STATION Originally a two story wooden structure that provided a security checking station for 300 Area personnel. The facility was replaced with a smaller concrete block structure that provides the same service. Reference drawing H-4-50404
3701-N	NORTH GUARD STATION
3701-R	CYPRESS STREET GUARD STATION
3701-S	GEORGE WASHINGTON WAY GUARD STATION
3701-U	PROTECTED AREA GUARD STATION
3702	OFFICES ACCOUNTING AND ADMINISTRATION Provides space for about 30 offices, a lunchroom, conference room and rest rooms. Reference drawing H-3-694.
3703	OFFICES PRODUCTION FUELS ADMINISTRATION BUILDING Offices, reference drawing H-3-811.
3704	STORAGE (JAJ) The 3704 Building was once the Supervisor's Office Building and prior to that the temporary construction (TC) Division Engineer's Office. Reference drawing H-3-16748.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
3705	PHOTOGRAPHY The 3705 Building houses the Hanford Site photography laboratory. All reproductions, slides, and prints are processed in this facility. The building housed darkrooms and several photo processing machines. Chemicals for these process are stored and used within the facility. The drains associated with the facility are contaminated with these photo chemicals. The building once housed Personnel Meters and Records, which processed film badge dosimeters and provided storage of exposure records of personnel. Reference drawings H-11-4366 sheet 1 and H-3-26615, photo #8306228-58.
M0026 (3705-T1)	OFFICE TRAILER Provides office space for photography personnel and space for photo mounting and graphics personnel. Reference drawing H-3-41392, photo #8402281-3.
3706	INFORMATION SERVICES Originally this building was used as a radiochemistry laboratory. It was used for both high and low activity processing experiments. The facility was also used for nondestructive and destructive metallurgical testing of irradiated materials. Design changes began in September 1943 and continued until completion in 1945. These design changes increased the size of the original design by about 100%. In the center of the facility is a hot lab that was constructed of 2 ft thick concrete walls and roof. The remainder of the facility was wood frame or concrete block construction. It is connected to the 300 Area Process Sewer system. The building was also used to house the General Services Organization. During that time period it housed chemical, spectrochemical, and metallographic analytical laboratories, offices for chemists, engineers, and administrative personnel. It also housed drafting rooms, mail and duplicating services rooms, photographic services, first aid, and Security Patrol area headquarters. Reference drawings H-3-8364 and H-3-8365.
3706-A	AIR CONDITIONING EQUIPMENT BUILDING Located just south and parallel to the 3706 Building, it was built as a required design change to the laboratories in the 3706 Building. It was used to house ventilation and air conditioning equipment. Reference drawing W-73558.
3707-A	FUELS TRAINING Originally the Change House and Patrol Headquarters it housed facilities for site personnel required to wear protective clothing to change and for the areas patrol headquarters. The change room portion of the building consisted of a large locker room, shower room, rest room, wash room, and lunch room. The Patrol side housed an office, storage room, and patrol locker room. The Building was also used to house the Maintenance Offices and provided 12 offices for maintenance and engineering personnel. Reference drawing H-3-10060.
3707-B	CUSTODIAL SERVICES Originally a Change House the 3707-B contained a large locker room, lunch room, wash room, shower room, rest room and a water heater room. It's purpose was to provide a place for workers to change from "street" clothing to protective clothing for required work in the 300 Area. As the Custodial Services facility it provides office space for the foreman and storage for supplies and equipment. Reference drawing W-72089.
3707-C	AUTOMATED TECHNOLOGY Also known as the Computer Laboratory, it provides laboratory space for computers and electronic instrumentation development. It also housed a rest room, change room, and lunchroom for the 3706 Building. It is connected to the 300 Area Process Sewer system. Reference drawing H-3-801.
3707-D	INFORMATION SERVICES Once housed the 303 Area Badge and Change House, as such it provided a lunch room, locker room, shower room, and rest room for reactor fuels and maintenance personnel. It also provided a security badge checking station for the 303 exclusion area. Reference drawing H-3-8025.
3707-E	STORAGE (JAJ) Once housed the J.A. Jones, Subcontractors Offices, it provided office and lunchroom facilities. Reference drawing H-3-16747.
3707-F	PERSONNEL SURVEY
3707-G	CHANGE HOUSE
3707-H	CHANGE HOUSE
3708	RADIATION MEASUREMENTS This remodeled space is used for research and analysis of activation and/or mixed fission products. It contains three class C radiochemical laboratories. The building was originally constructed in 1948 as a vehicle maintenance shop. In 1968 it was converted to laboratory and storage space. About one third of the building was used prior to 1984 for transuranic element studies. Liquid effluents are disposed of to the 300 Area Process Sewer system, sanitary sewer, and in the case of radioactive effluents collected in a stainless steel drum for disposal at the 340 complex. Also known as the Electrical and Optical Shops, it housed shop and parts storage for electrical and optical equipment It is connected to the 300 Area Process Sewer system. Reference drawings H-3-762 and H-3-32676, photo #8306228-46.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
3709	PAINT SHOP Originally constructed as the Fire Headquarters. It housed fire protection equipment and personnel. It contained space for three fire trucks, a hose room and tower, fire extinguisher refilling room, dormitory, office, kitchen and rest room facilities. The facility was converted for use as a paint shop in 1964 when new fire facilities were constructed. It is connected to the 300 Area Process Sewer system. Reference drawings H-3-7536 and W-72922.
3709-A	FIRE STATION
3710-A	OIL STORAGE
3711	MAINTENANCE STORAGE Originally provided field shop space for J.A. Jones Construction Shop.
3712	FUELS WAREHOUSE Provided storage space for Uranium and component parts used in fuels canning. Reference drawing H-3-9687.
3713	PAINT AND CARPENTER SHOP Originally constructed as a Receiving Storeroom, it functioned to receive and store spare machinery and miscellaneous items for the 300 Area. It also was used to hold materials awaiting salvage. Currently it provides space for painting, carpentry, and pipe fabrication. A transite paneled concrete pad adjacent to the building is used for sand blasting large pieces. Reference drawing W-69305.
3714	ORGANIC CHEMISTRY LABORATORY Also used for solvent and flammable materials storage. Windows were equipped with pressure release latches. The lights and motors within the building are explosion proof. Reference drawings H-3-8279 and H-3-27938, photo #8306228-38.
3715	MANUFACTURING OPERATIONS WAREHOUSE Provided storage space for reactor fuels components, parts, AISI billets and related materials. Reference drawing SK-3-8224.
3716	STORAGE Originally constructed as the Automotive Repair Shop. It was used to house repair and maintenance activities for 300 Area vehicles. The facility included two fuel pumps used during temporary construction activities, one diesel and one regular gasoline pump each. The building was also used to house the Process Development Laboratory. As such it's mission was to develop alternate reactor fuels processes. The facility is connected to the 300 Area Process Sewer system. Reference drawing H-3-7943.
3717	SHEET METAL AND ENGINEERING OFFICES Originally constructed as the Instrument Shop. It's function was to house the fabrication and testing equipment needed in the specialized instruments used in the 300 Area. It later became the Sheet Metal Shop. It provided shop space for maintenance and fabrication of sheet metal and polyvinylchloride items. It also housed offices used by equipment development engineers. Adjacent to the building is a fenced, paved storage area. It is connected to the 300 Area Process Sewer system. Reference drawings HW-69303 and H-3-7606.
3717-B	STANDARDS LABORATORY Provided shops for instrument maintenance, calibration, and standards as well as office space. It is connected to the 300 Area Process Sewer system. Reference drawing H-3-4346 sheet 27.
3717-C	ARCHIVE STORAGE
3718	OPERATION SUPPORT SERVICES MECHANICAL
3718-A & 3718-B	LABORATORY EQUIPMENT CENTRAL POOL Provides storage space and loan services of laboratory equipment, includes office space and an instrument repair shop. Reference drawing H-3-32535, photo #8306228-24.
3718-C	STORAGE (308)
3718-E	STORAGE (324)
3718-F	SODIUM STORAGE Connected to the 300 Area Process Sewer.
3718-G	STORAGE BUILDING Provide equipment and materials storage for the Chemical Technology Department. Floor drains in the facility discharge to the sanitary sewer. Reference drawing H-3-41670, photo #8306228-185.
3718-M	SODIUM STORAGE FACILITY
3718-N	OPERATIONS SUPPORT SERVICES INSULATORS The facility was formerly used to house electrical shops and as a storage area. Currently it provides shop and storage space for ICF Kaiser insulators. It is an insulated metal building with two sinks that drain to the Sanitary Sewer system.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
3718-0	STORAGE
3719	COMPUTER FACILITY Originally constructed to house First Aid, it provided emergency treatment facilities to the 300-Area personnel. It later became the Fire Protection Headquarters and provided office space and storage of fire extinguishers, fire equipment and tools. The building contains one rest room. Reference drawing H-3-1511.
3720	CENTRAL SERVICE AND CHEMISTRY AND METAL SCIENCES LABORATORY Provides office space and low-level radiochemistry laboratory space. It is connected to the 300 Area Process Sewer. The building was constructed at the former site of the 3722-A Building. Reference drawing H-3-32556, photo #8306228-59.
3721	CLASSIFIED INCINERATOR FACILITY
3722-A	CONSTRUCTION SHOP Originally this building was a Temporary Construction Receiving Warehouse. It was converted to house fabrication and repair facilities for Area equipment. The building was demolished. A concrete pad adjacent to the building site houses material storage racks and a 12 X 15 ft open side shed for a metal cut-off saw and a forge. It is located at the northeast corner of the area along the railroad spur. Reference drawing HW-69302.
3722-B	CONSTRUCTION SHOP This building was increased from its design size by one-third during it's construction to meet the increased needs of the 300 Area. It housed a rigging and portable equipment area, general storage space, tool room, shop, woodworking shop, office and restroom facilities. In the 1960's, it was used to fabricate lithium and thoria targets. It is located about 100 ft south of the 314 Building. It is connected to the 300 Area Process Sewer system.
3726	PROPANE STORAGE BUILDING Located about 50 ft northeast of the 3717 Building, this open sided, wooden frame building housed a 2,600 gal metal propane storage tank.
3727	ARCHIVE FISSILE SPECIMEN VAULT
3728	TEST ARTICLE STORAGE
3730	GAMMA NEUTRON IRRADIATION FACILITY Also known as the Graphite Laboratory and Shop, it provided shielded facilities for the study of irradiated graphite. It also provided facilities for the fabrication of specialized graphite shapes. It is connected to the 300 Area Process Sewer system. Reference drawing H-3-8401.
3731	LABORATORY EQUIPMENT CENTRAL POOL Originally the building was used for graphite storage and other special materials. It was later converted to the laboratory equipment Central Pool. Reference drawings AEC-3A-1325 and H-3-27939, photo #836228-37.
3731-A	GRAPHITE MACHINE SHOP The shop has the capability to turn, bore, drill, plane, and mill graphite to close tolerances, graphite is also stored in the facility. Reference drawing H-3-27939, photo #8400580-32.
3732	OLD THORIA LABORATORY Also known as the Process Equipment Development Laboratory, it housed toxic reactor fuel process and equipment development. The building was equipped with a controlled hood system including absolute filtration used in the thorium canning process. It is connected to the 300 Area Process Sewer system. Reference drawing H-3-4108.
3734	STORAGE Provides storage space for the Carpentry shop. There is fixed radioactive surface contamination outside both access doors to the facility. The contamination was fixed by the application of grey paint. Originally constructed to house gas cylinders both used and unused.
3734-A	PAINT STORAGE Originally constructed to house gas cylinders both used and unused. This building was larger than the 3734 Building. It is located directly west of the 3713 Building and included a loading dock. It is also known as the Paint and Solvent Storage Building, as such it contains storage space for paint and solvents. All fixtures and motors are explosion proof. Reference drawing AEC-3A-1267.
3741	BOX STORAGE BUILDING It's purpose was to prepare and store samples of irradiated graphite, uranium, and flux wires from the 305 "Test Pile". Irradiated samples were stored in cardboard containers, providing the "Box" code word for the facility. It was also called the "special machine shop" because it housed lathes, drills, saws, and other equipment used to prepare samples for destructive analysis. It is located near the east fence about 200 ft east of the 384 Building.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
3745	RADIOLOGICAL CALIBRATIONS AND STANDARDS It's function was to house personnel and equipment used to calibrate various radiation detection instruments. It housed a variety of alpha, gamma, neutron, and X-ray sources. This equipment has been moved to the 318 Building. The building contained a large calibration room, three laboratories, a reinforced concrete vault, and ventilation equipment room. It is located in the southwestern corner of the area, about 100 ft south of the 3706 Building. Reference drawings H-3-6489 and H-3-26622, photo #8306228-29.
3745-T2	LABORATORY This single wide trailer was modified to provide space for the development and presentation of site produce movies and sound-slide presentations. Reference drawing H-3-41394, photo #8400580-27.
3745-T3 (M0010)	OFFICE TRAILER Provides office space for 300 Area PNL personnel. Reference drawing H-3-41395, photo #8402281-4.
3745-A	ELECTRON ACCELERATOR Is a shielded laboratory space containing a 200 mev Van de Graff accelerator and a 600 KVP flash X-ray machine. The building is connected to the 300 Area Process Sewer system. Reference drawings H-3-683 and H-3-26623, photo #8306228-42.
3745-B	POSITIVE ION ACCELERATOR Provided shielded laboratory space for research using a 2 mev accelerator. A concrete block storage area was added in 1981. Bottled gas storage is provided on the west side. The building is connected to the 300 Area Process Sewer system. Reference drawings H-3-8157 sheet 2, H-3-9084, and H-3-26624, photo #8306228-43.
3746	RADIOLOGICAL PHYSICS BUILDING Originally constructed as the "Control Building", it's function was to perform tests to verify the composition of process substances. It contained a laboratory, shop, dark room, offices, storeroom, and two rest rooms. It was modified sometime prior to 1984 by the addition of a connecting hallway to the 3746A Building. It is located about 200 ft southwest of the 3706 Building. Reference drawings H-3-6687 and H-3-26625, photo #8306228-50.
3746-A	RADIOLOGICAL PHYSICS LABORATORY Provides office and laboratory space for the PNL Radiological Sciences Department. It is connected to the 300 Area Process Sewer. Reference drawing H-3-39710, photo #8306228-48.
3746-D	TECHNICAL SERVICE ANNEX Provides storage space for photo paper and chemicals used in the nearby 3705 Building. Silver recovery operations are conducted within the facility and the sanitary sewer drain provided in the facility is likely to contain chemical contaminants from this process. It is also known as the Craft Training Hutment, it was used to conduct training classes for craftsmen. Reference drawings H-3-16746 and H-3-27953, photo #8305228-41.
3760	TECHNICAL INFORMATION BUILDING Provides offices for management, a 100-seat conference room, a display room, technical library, and classified document vault. Reference drawings H-3-4650 sheets 2 and 3 and H-3-26613 sheets 1 and 2, photo #8306228-75.
3760-T1	OFFICE TRAILER Provides office space for PNL Property Accounting Section personnel. Reference drawing H-3-32958, photo #8306228-181.
3760-T2	STORAGE TRAILER Provides storage space for reference materials from the 3760 Building. Reference drawing H-3-41931, photo #8400580-5.
3760-T3	OFFICE TRAILER Provides office space for PNL Financial Support Services, Project Management, and Engineering Services Departments. Reference drawing H-3-54282, photo #840580-4.
3762	LABORATORY SAFETY OFFICES Provides office and conference room space. The building was moved to the 300 Area in 1974 from 100-H Area and was formerly the 1761-H Building. Reference drawing H-3-29809, photo #8306228-21.
3763	OFFICES
3764	OFFICES Chemical Engineering Laboratory Office Annex.
H0-64-335	MOBILE OFFICE TRAILER Located directly west of the 3764 Building, it provides office space for personnel.
3765	OFFICES
3765-T1	MOBILE OFFICE TRAILER Located north of the 3765 Building.
3765-T2	MOBILE OFFICE TRAILER Located north of the 3765 Building.

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
3766	OFFICES
3767	OFFICES
3768	OFFICES
3769	OFFICES
3770	OFFICES
3790	SECURITY OFFICE BUILDING
3802-A	STEAM PRESSURE REDUCING VALVE STATION Connected to the 300 Area Process Sewer.
3902-A	WEST ELEVATED WATER TANK Connected to the 300 Area Process Sewer.
3902-B	EAST ELEVATED WATER TANK Connected to the 300 Area Process Sewer.
M0007	MOBILE OFFICE TRAILER
M0009	MOBILE OFFICE COMPUTERIZED SIGN SHOP Provides work space and office space for sign graphics personnel.
M0019	MOBILE OFFICE TRAILER
M0044	MOBILE OFFICE TRAILER
M0046	MOBILE OFFICE TRAILER PNL office space, located to the west of the 339A Building.
M0051	MOBILE OFFICE TRAILER IRM WCC Training Center.
306-T4 (M0059)	MOBILE OFFICE TRAILER
M0103	MOBILE OFFICE TRAILER
M0105	MOBILE OFFICE TRAILER
M0258	MOBILE OFFICE TRAILER
M0259	MOBILE OFFICE TRAILER
M0260	MOBILE OFFICE TRAILER
M0261	MOBILE OFFICE TRAILER
M0262	MOBILE OFFICE TRAILER
M0263	MOBILE OFFICE TRAILER
M0264	MOBILE OFFICE TRAILER
M0265	MOBILE OFFICE TRAILER
M0270	MOBILE OFFICE TRAILER
M0271	MOBILE OFFICE TRAILER
M0350	CHANGEROOM

Table 7-1. 300 Area Buildings, Facilities, and Structures. (14 sheets)

Facility	Comments
M0394	MOBILE OFFICE TRAILER
M0395	MOBILE OFFICE TRAILER
M0557	MOBILE OFFICE TRAILER Kaiser Construction Forces.
M0558	MOBILE OFFICE TRAILER Kaiser Construction Management.
M0558-B	MOBILE OFFICE TRAILER Conference trailer.
M0558-C	MOBILE OFFICE TRAILER Kaiser offices space.
M0709	MOBILE OFFICE TRAILER
M0830	MOBILE OFFICE TRAILER Kaiser Pipefitter lunch room and office space, includes nearby metal equipment and materials storage buildings.
M0842	MOBILE OFFICE TRAILER Kaiser Electricians lunch room and office space. Includes several nearby metal equipment and materials storage buildings.
306-T5 (M0861)	MOBILE OFFICE TRAILER
306-T7 (M0902)	MOBILE OFFICE TRAILER Provides office and laboratory space for 306-E Building personnel.
M0903	MOBILE OFFICE TRAILER
M0904	MOBILE OFFICE TRAILER
M0926	MOBILE OFFICE TRAILER
M0933	MOBILE OFFICE TRAILER
M0974	MOBILE OFFICE TRAILER Temporary Change Trailer located outside south access to the South Process Ponds.

8.0 REFERENCES

AEC/GE, 1964, *Catalog of Hanford Buildings and Facilities--300 Area*, Atomic Energy Commission/General Electric Company, Richland, Washington.

Backman, G. E., P. C. Jerman, R. E. Roberts, and J. W. Vanderbeek, 1963, *Burial of Hanford Radioactive Wastes*, HW-77274, General Electric Company, Radiation Protection Operation, Richland, Washington, 15 April 1963.

Bauer, R. E., R. J. Pulgh, and R. H. Jones, 1989, *New Fast Flux Test Facility Experiments in Fusion Materials*, WHC-SA-0636-S, Westinghouse Hanford Company, Richland, Washington, June 1989.

Bennett, R. A., C. L. Bennett, L. R. Campbell, K. D. Dobbin, and E. L. Tang, 1991, *Fast Flux Test Facility Fuel and Test Management--The First 10 Years*, WHC-SA-1088-FP, Westinghouse Hanford Company, Richland, Washington, July 1991.

Bloom, R. W., 1990, *400 Area Secondary Cooling Water Stream-Specific Report*, WHC-EP-0342, Addendum 28, Westinghouse Hanford Company, Richland, Washington, August 1990.

BNI, 1993; *400 Area Sanitary Waste Engineering Study*; Task Order B-93-08; Purchase Order MMW-SVV-061460; Bovay Task 1842-308; Bovay Northwest, Inc.; 30 September 1993.

BPA, 1989, *BPA TSCA Inspection, DOE 351 Substation*, U.S. Department of Energy, Bonneville Power Administration, Snake River Area, Walla Walla, Washington.

BPA, 1991, *Draft Environmental Appraisal, H. J. Ashe Substation and Maintenance Headquarters, January 1991*, Bonneville Power Administration, Snake River Area, Walla Walla, Washington.

Brehm, W. F., R. A. Burk, D. F. Hicks, C. E. Grenard, and W. J. Schuck, 1991, *Fast Flux Test Facility Chemistry Experience--A Success Story*, WHC-SA-1047-VA, Westinghouse Hanford Company, Richland, Washington, October 1991.

Briggs, F. H., 1982, *A Radiological History of HEDL Laboratories and General 300 Area Environs*, 300-IU-1, Westinghouse Hanford Company, Richland, Washington.

Brown, R. E., and Ruppert, R. G., 1950, *The Underground Disposal of Liquid Wastes at the Hanford Works, Washington*, HW-17088, General Electric Company, Richland, Washington.

Cramer, K. H., 1987, *Hanford Site Waste Management Units Report*, U.S. Department of Energy, Richland Field Office, Richland, Washington, May 1987.

Cramer, K. H., 1988, *Hanford Site Waste Management Units Report*, Westinghouse Hanford Company, Richland, Washington.

Cushing, C. E., 1988, *Hanford Site National Environmental Policy Act (NEPA) Characterization*, PNL-6415, Pacific Northwest Laboratory, Richland, Washington.

Dahl, N. R., 1991, *Facility Effluent Monitoring Plan for the Fast Flux Test Facility*, WHC-EP-0475, Westinghouse Hanford Company, Richland, Washington, November 1991.

Denham, D. H., *1970 Failure of 307 Basin Transfer Line and Resultant Ground Contamination*, BNWL-CC-2617, Battelle Pacific Northwest Laboratory, Richland, Washington.

DOE, 1992, *Environmental Assessment for the Storage of Fast Flux Test Facility Unirradiated Fuel in the Plutonium Finishing Plant Complex, Hanford Site, Richland, Washintgon*, DOE/EA-0538, U.S. Department of Energy, Washington, D.C., January 1992.

DOE-RL, 1985, *RCRA Part B Permit Application Alkali Metal Treatment and Storage Facilities*, DOE-0150, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1988a, *Registration of Hanford Site Class V Underground Injection Wells*, DOE/RL-88-11, U.S. Department of Energy, Richland Field Office, Richland, Washington, May 1988.

DOE-RL, 1988b, *Information on Hanford Site Cribs and Septic Systems*, DOE/RL-88-21, Vol. 3, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1990a, *The 300 Area Waste Acid Treatment System Closure Plan*, DOE/RL-90-11, Rev. 0, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1990b, *305-B Storage Facility Dangerous Waste Permit Application*, DOE/RL-90-01, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1991a, *Engineering Evaluation of the 618-9 Burial Ground Expedited Response Action*, DOE/RL-91-38, Draft B, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1991b, *303-K Radioactive Mixed-Waste Storage Facility Closure Plan*, DOE/RL-90-04, Rev. 1, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1991c, *304 Concretion Facility Closure Plan*, DOE/RL-90-03, Rev. 1, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1992a, *3718-F Alkali Metal Treatment and Storage Facility Closure Plan*, DOE-RL-91-35, Rev. 1, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1992b, *State Waste Discharge Permit Application for Industrial Discharges to Land: 400 Area Secondary Cooling Water*, DOE/RL-94-89, Rev. 0, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1993a, *Hanford Facility Dangerous Waste Part A Permit Application*, DOE/RL-88-21, Vols. 1-3, U.S. Department of Energy, Richland Field Office, Richland, Washington, April 1993.

DOE-RL, 1993b, *618-11 Burial Ground Expedited Response Action Proposal*, DOE-RL-93-49, Draft A, U.S. Department of Energy, Richland Field Office, Richland, Washington.

EPA, 1992, *Hanford Federal Facility U.S. Department of Energy Bonneville Power Administration Units, RCRA Facility Assessment, Final Report*, U.S. Environmental Protection Agency, Office of Waste Programs Enforcement, Washington, D.C.

Gerber, M. S., 1992, *Compilation of Historical Information of 300 Area Facilities and Activities*, WHC-MR-0388, Westinghouse Hanford Company, Richland, Washington.

Gerber, M. S., 1993, *Multiple Missions: The 300 Area in Hanford Site History*, WHC-MR-0440, Westinghouse Hanford Company, Richland, Washington.

Graves, C. E., 1994, *Stability of the Plutonium Recycle Test Reactor Main Ion Exchange and Resin Disposal Vaults*, WHC-SD-SP-ER-002, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Haney, W. A., 1960, *Disposal of Radioactive Liquid Wastes From 300 Area Laboratories*, HW-64292, General Electric Company, Richland, Washington.

Hoover, J. D., 1989, *300 Area Solvent Evaporator Interim Status Closure Plan Rev. 2*, DOE/RL-88-08, Rev. 2, U.S. Department of Energy, Richland Field Office, Richland, Washington

Jacques, I. D., 1990, *Review of Hanford Site Waste Management Units Report*, DSI from Duane Jacques to Sherry Griffin, Westinghouse Hanford Company, Richland, Washington, 26 October 1990.

McCarthy, M. J., 1989, *Westinghouse Hanford Company Effluent Report for 300, 400, and 1100 Area Operations for Calendar Year 1988*, WHC-EP-0267, Westinghouse Hanford Company, Richland, Washington, June 1989.

Millikin, E. J., 1988, *Low Volume Effluent Evaluation*, WHC-SD-WM-EV-011, Rev. 0, Westinghouse Hanford Company, Richland, Washington, August 1988.

Nickels, J. M., 1991, *Facility Effluent Monitoring Plan Determinations for the 400 Area Facilities*, WHC-EP-0442, Westinghouse Hanford Company, Richland, Washington, November 1991.

Paas, H. J., 1955, *Unconfined Underground Radioactive Waste and Contamination in the 300 Area and Miscellaneous Areas Not Included In Other Reports*, HW-39076, General Electric Company, Richland, Washington.

Paas, H. J., and K. R. Heid, 1955, *Radioactive Contamination in Liquid Wastes Discharged to the Ground at Separation Facilities Thru June 1955*, HW-38562, General Electric Company, Richland, Washington.

Pedersen, L. T., 1992, *Remote CCTV Survey of the 300-FF-1 Operable Unit Retired Radioactive Liquid Waste System*, WHC-SD-GN-WP-30008, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Phillips, S. J., L. L. Ames, R. E. Fitzner, G. W. Gee, G. A. Sandness, C. S. Simmons, 1980, *Characterization of the Hanford 300 Area Burial Grounds: Final Report Decontamination and Decommissioning*, PNL-2557, Pacific Northwest Laboratory, Richland, Washington.

Pitner, A. L., and R. B. Baker, 1992, *Metal Fuel Test Program in the Fast Flux Test Facility*, WHC-SA-1579-FP, Westinghouse Hanford Company, Richland, Washington, October 1992.

PNL, 1975, *Resource Book - Disposition (D&D) of Retired Contaminated Facilities at Hanford*, PNL-MA-588 (Formerly BNWL-MA-88), Volumes 1-4, Ed. K. M. Harmon, Pacific Northwest Laboratory, Richland, Washington, August 1975.

PNL, 1981, *Unusual Occurrence Report No. 79-2 (325-2)*, Rev. 1, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1984, *Facilities Catalog*, PNL-MA-587, Pacific Northwest Laboratory, Richland, Washington.

PNL; 1986; *618-7 Burial Ground--Potential Safety Hazard*; Project TJM:123-86; Internal Letter from T. J. McLaughlin to J. M. V. Carlile, K. H. Cramer, and D. R. Sherwood; Pacific Northwest Laboratory; Richland; Washington; 21 April 1986.

PNL, 1993a, *Occurrence Report RL-PNL-325-1992-0011*, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1993b, *Occurrence Report RL--PNL-325-1991-1023*, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1993c, *Occurrence Report RL--PNL-325-1991-1007*, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1993d, *Occurrence Report RL--PNL-325-1991-0044*, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1993e, *Occurrence Report RL--PNL-325-1991-0026*, Pacific Northwest Laboratory, Richland, Washington.

PNL, 1994, *Greenie*, Volume 31, Issue 2, Pacific Northwest Laboratory, Richland, Washington, 14 January 1994.

Relander, C., 1956, *Drummers and Dreamers*, Caxton Printers, Caldwell, Idaho.

Roos, R. C., and K. A. Woodworth, 1989, *Mystery Site Field Data Sheets: UFO Landing Site*, Westinghouse Hanford Company, Richland, Washington, 23 January 1989.

Saltos, N. T., and T. M. Burke, 1990, *Probabilistic Evaluation of Sodium Leaks and Leak Detection Efficiency at the Fast Flux Test Facility*, WHC-SA-0833-S, Westinghouse Hanford Company, Richland, Washington, January 1990.

Seamans, J. A., 1992, *400 Area Secondary Cooling Water Sampling and Analysis Plan*, WHC-SD-FF-PLN-002, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Stenner, R. D., K. H. Cramer, K. A. Higley, S. J. Jette, D. A. Lamar, T. J. McLaughlin, D. R. Sherwood, and N. C. Van Houten, 1988, *Hazard Ranking System Evaluation of CERCLA Inactive Waste Sites at Hanford*, PNL-6456, UC-70, Vols. 1-3, Pacific Northwest Laboratory, Richland, Washington, October 1988.

Steward, T. C., 1992, *Operating Records List for 4843 Storage Facility*, TRAC-0669, Westinghouse Hanford Company, Richland, Washington.

Swaim, D. J., 1991, *FFTF Description, Capabilities, Accomplishments*, TRAC-0173, Westinghouse Hanford Company, Richland, Washington, May 1991.

Swaim, D. J., J. B. Waldo, and O. A. Farabee, 1991a, *Ten Years Operating Experience at the Fast Flux Test Facility: A Decade of Excellence*, WHC-SA-1064-FP, Westinghouse Hanford Company, Richland, Washington, July 1991.

Swaim, D. J., J. B. Waldo, and O. A. Farabee, 1991b, *Ten Years Operating Experience at the Fast Flux Test Facility: A Decade of Excellence*, WHC-SA-1064-VA, Westinghouse Hanford Company, Richland, Washington, October 1991.

UNC, 1973, *Unusual Occurrence Report No. 73-27*, UNC Nuclear Industries, Richland, Washington.

UNC, 1986, *Unusual Occurrence Report No. 86-01*, UNC Nuclear Industries, Richland, Washington.

Valcich, P., 1992, *Waste Information Data System Information Acquisition Form for the 600 Area Army Munitions Burial Site*, Westinghouse Hanford Company, Richland, Washington.

WADCO, 1971, *Catalog of HEDL Facilities--300 Area*, WADCO Corporation, A Subsidiary of Westinghouse Electric Corporation, Pittsburgh, Pennsylvania.

Webb, C. R., 1993a, *Miscellaneous Information Regarding Operation and Inventory of 618-10 Burial Ground*, WHC-MR-0415, Westinghouse Hanford Company, Richland, Washington.

Webb, C. R., 1993b, *Miscellaneous Information Regarding Operation and Inventory of 618-11 Burial Ground*, WHC-MR-0416, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990a, *300 Area Process Wastewater Stream-Specific Report*, WHC-EP-0342, Addendum 1, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990b, *300 Area Process Sewer Engineering Study to Identify Flow and Constituent Reductions*, WHC-SD-XE07-003, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990c, *300 Area Process Sewer Final Report*, WHC-SD-NR-RPT-003, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990d, *Fast Flux Test Facility Fuel Storage Assessment*, WHC-SD-FM-TA-002, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991, *WIDS Database Field Descriptions and Data*, WHC-MR-0056, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

WHC, 1992a, *Groundwater Impact Assessment Report for the 400 Area Ponds*, WHC-EP-0587, Westinghouse Hanford Company, Richland, Washington, October 1992.

WHC, 1992b, *Phase II Liquid Effluent Program (Project W-252) Wastewater Engineering Report and BAT/AKART Studies*, WHC-SD-W252-ER-001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993a, *Revised Inventory of Miscellaneous Streams*, WHC-SD-EN-EV-014, Westinghouse Hanford Company, Richland, Washington, April 1993.

WHC, 1993b DRAFT, *300 Area Process Sewer System and Sanitary Waste system Piping Configuration Verification Program Results*, WHC-SD-RPT-20001, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1993c, *Waste Information Data System (WIDS) General Summary for 300 Area Operable Units, October 20, 1993 (Excluding 300-FF-1 and 300-FF-5)*, WHC-EP-0216, Westinghouse Hanford Company, Richland, Washington.

WHC, 1994, *Fast Flux Test Facility Shutdown Program Plan*, WHC-SD-FF-SSP-004, Rev. 0, Westinghouse Hanford Company, Richland, Washington, 4 March 1994.

Young, J. S., and J. S. Fruchter, 1991, *Addendum to Data Compilation Task Report for the Source Investigation of the 300-FF-1 Operable Unit Phase 1 Remedial Investigations*, EMO-1026, Environmental Management Operations, Battelle Pacific Northwest Laboratory, Richland, Washington.

9.0 BIBLIOGRAPHY

This bibliography includes documents that were reviewed during the study as sources of general information without being specifically referenced in the document.

AEC/GE, 1964, *Catalog of Hanford Buildings and Facilities 300 Area*, Atomic Energy Commission/General Electric Company, Richland, Washington.

Cramer, K. H., 1988, *Hanford Site Waste Management Units Report*, Westinghouse Hanford Company, Richland, Washington.

DOE-RL, 1991, *303-K Radioactive Mixed-Waste Storage Facility Closure Plan*, DOE/RL-90-04, Rev. 1, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1993, *Hanford Facility Dangerous Waste Part A Permit Application*, DOE/RL-88-21, Vol. 3, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1993, *Phase 1 Remedial Investigation Report for the 300-FF-1 Operable Unit*, DOE/RL-92-43, Rev. 0, U.S. Department of Energy, Richland Field Office, Richland, Washington, November 1993.

Hoover, J. D., 1989, *300 Area Solvent Evaporator Interim Status Closure Plan Rev. 2*, DOE/RL-88-08, Rev. 2, U.S. Department of Energy, Richland Field Office, Richland, Washington.

Gerber, M. S., 1992, *Past Practices Technical Characterization Study, 300 Area, Hanford Site*, WHC-MR-0388, Westinghouse Hanford Company, Richland, Washington.

Gerber, M. S., 1993, *Multiple Missions: The 300 Area in Hanford Site History*, WHC-MR-0440, Westinghouse Hanford Company, Richland, Washington.

McCarthy, M. J., 1990, *Westinghouse Hanford Company Effluent Report for 300, 400, and 1100 Area Operations for Calendar Year 1989*, WHC-EP-0267-1, Westinghouse Hanford Company, Richland, Washington.

Paas, H. J., 1955, *Unconfined Underground Radioactive Waste and Contamination in the 300 Area*, HW-39076, General Electric Company, Richland, Washington.

Paas, H. J., and K. R. Heid, 1955, *Radioactive Contamination in Liquid Wastes Discharged to the Ground at Separation Facilities Thru June 1955*, HW-38562, General Electric Company, Richland, Washington.

Phillips, S. J., L. L. Ames, R. E. Fitzner, G. W. Gee, G. A. Sandness, and C. S. Simmons, 1980, *Characterization of the Hanford 300 Area Burial Grounds: Final Report Decontamination and Decommissioning*, PNL-2557, Pacific Northwest Laboratory, Richland, Washington.

RHO, 1978, *Engineering Study of Dry Near-Surface Interim Storage of Fast Flux Test Facility Spent Fuel*, RHO-LD-66, Rockwell Hanford Operations, Richland, Washington, November 1978.

Stenner, R. D., K. H. Cramer, D. A. Lamar, 1988, *Hazard Ranking System Evaluation of CERCLA Inactive Waste Sites at Hanford Volume 1, 2, 3*, PNL-6456, Pacific Northwest Laboratory, Richland, Washington.

WHC, 1991a, *618-9 Burial Ground Interim Response Action, Phase 1 Sampling and Analysis Plan*, WHC-SD-EN-AP-047, Westinghouse Hanford Company, Richland, Washington.

WHC, 1991b, *618-9 Burial Ground Expedited Response Action, Soil Sampling Plan*, WHC-SD-EN-AP-053, Westinghouse Hanford Company, Richland, Washington.

Young, J. S., and J. S. Fruchter, 1991, *Addendum to Data Compilation Task Report for the Source Investigation of the 300-FF-1 Operable Unit Phase 1 Remedial Investigation*, EMO-1026, Environmental Management Operations, Richland, Washington, January 1991.

Young, J. S., R. M. Fruland, and J. S. Fruchter, 1990, *Data Compilation Task Report for the Source Investigation of the 300-FF-1 Operable Unit Phase I Remedial Investigation*, PNL-7241, Pacific Northwest Laboratory, Richland, Washington, February 1990.

10.0 HANFORD SITE DRAWINGS REFERENCED IN TEXT

Drawing Number	Description
H-3-5288	316-4, Scale-Up Waste Disposal: Waste Disposal Bed
H-3-5305	316-4, Scale-Up Waste Disposal Plot Plan: Disposal Area and Road
H-3-5562	323 Tanks, Structural Floor Plan Section and Details
H-3-5678	323 Tank 4, Service Piping Plans
H-3-9951, Sh. 2, 3	618-11 Burial Ground Plot Plan, 300 Wye Burial Ground, North Portion Enlarged
H-3-14190	315 RSDF, Plot Plan: Water Treatment Plant
H-3-17798	311-TK-40, Plot Plan: 311 Tank Farm
H-3-18520	UPR-300-14, 334 Tank Farms Key Plan (Dated 1960; shows the location of the neutralizing box)
H-3-18525, Sh. 1	UPR-300-14, Neutralizing Box and Miscellany
H-3-18525, Sh. 2	UPR-300-14, Neutralizing Box Dimensions
H-3-20998	As Built: 318-9 West Burial Ground
H-3-23706, Sh. 1, 2	300 Area Operating Plan: Process Sewer Lines
H-3-23799, Sh. 1, 2	300 Area Burial Ground Number 7, Expansion Plan and Access Road, Site Plan
H-3-27735, Sh. 1, 2	323 Tank 4, Prototype Remote Cell, 321-A Building
H-3-28591	335 and 336 Retired Sanitary Drain Field Piping Plan and Details (Dated 1968)
H-3-32585	300 Area Waste and Well Sites
H-3-50310	307 Process Trenches, Laboratory Works Area Process Waste System
H-3-55807	311-TK-50, Civil/Piping: 311 Tank Farm Plan and Sections
H-3-57400	UPR-300-5, Ground Test Facility Plot Plan
H-4-11008, Sh. 1	Piping and Instrument Diagram: Service Piping Well Water Pumps and Storage Tanks, System 23

H-4-11071	Piping and Instrument Diagram: Sanitary Water Service Piping, System 23
H-4-11077	Piping and Instrument Diagram: Cooling Towers and Pumps Service Piping, System 23
H-4-11204	Flow Diagram: Radioactive Solid Waste System 24
H-4-11206 Sh. 1-3	Flow Diagram: Radioactive Liquid Waste System 24
H-4-11240	Flow Diagram: Main Heat Transport System
H-4-11242	Flow Diagram: IDS and Primary Sodium Storage Processing System, System 81
H-4-12704	Fuel Oil Tanks T-19, T-20, and T-21, System 23
H-4-12705	Fuel Oil Storage Tanks T-17 and T-18, System 23
H-4-12710	G-1 Diesel Generator Fuel Oil Day Tank T-15, System 23
H-4-12711	G-2 Diesel Generator Fuel Oil Day Tank T-16, System 23
H-4-14600	Underground Utilities: Electrical, 400 Area
H-4-14602	Underground Utilities: Water, Sewer, and Air Lines, 400 Area
H-4-14606	Underground Utilities: Water, Sewer, and Air Lines, 400 Area
H-4-14647	Process Sewer Dry Well System, Fast Flux Test Facility
H-4-38162	Civil Drawing Index Plot Plan
H-4-38163	Structural Septic Tank and Control Structure--Plans and Sections
H-4-38165	400 Area Process and Sanitary Sewer System Civil Profiles: Sanitary Sewer Main
H-4-50304	618-6 Burial Ground (Dated 1951; shows the burial ground to be in the current location of the 325 Building)
H-4-50310	618-6 Burial Ground (Dated 1951; shows the burial ground to be in the current location of the 325 Building)
H-4-152051, Sh. 1	400 Area Outside Lines, Sewers, Section 1
H-4-152051, Sh. 2	400 Area Outside Lines, Sewers, Section 2

H-4-152051, Sh. 3	400 Area Outside Lines, Sewers, Section 3
H-4-152051, Sh. 6	400 Area Outside Lines, Sewers, Section 6
H-4-152051, Sh. 11	400 Area Outside Lines, Sewers, Section 11
H-4-152051, Sh. 14	400 Area Outside Lines, Sewers, Section 14
H-4-159041	Sanitary Sewer Improvements
H-6-931	618-7: 300 Area Burial Pit Number 7 and Access Road Profile
H-6-934	618-10 Burial Ground Plot Plan (Dated 1979; shows the location of pits and storage drums)
H-6-937	618-7 Burial Ground Number 7 and Access Road, 300 Area
H-6-939	618-2, 618-3, Burial Grounds Number 2 and 3, 300 Area
H-6-951	Hanford Site Map
H-6-1801	400 Area to WPPSS Sanitary Sewer Line, Plan and Profile
H-6-1802, Sh. 2	400 Area to WPPSS Sanitary Sewer Line, Profile Sections
H-6-1803	400 Area to WPPSS Sanitary Sewer Line, Details
M-3600, Sh. 1	300 Area Layout Map, Section 1
M-3904, Sh. 14, 15	335 and 336 RSDF (Dated 1989; indicates that septic tank and drain field were abandoned)
SK-3-7980	323 Tanks, 321-A Architectural Plan and Details
W 705032	323 Tanks, Hanford Engineering Works Building #321 Underground Storage Tanks Arrangement, Piping, Concrete Plan and Details