FEB 13 1996 (21) Sta. 21

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 161194

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Distribution	Generator and Waste Acceptance Services	
5. Proj./Prog./Dept./Div.:	6. Cog. Engr.:	7. Purchase Order No.:
Low-Level Burial Grounds	B.M. Barnes	NA
8. Originator Remarks:		9. Equip./Component No.:
For release.		NA
		10. System/Bldg./Facility:
		Low-Level Burial Grounds
11. Receiver Remarks:		12. Major Assm. Dwg. No.:
		NA
		13. Permit/Permit Application No.:
		NA
		14. Required Response Date:

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-EN-WAP-002		0	Waste Analysis Plan for the Low-Level Burial Grounds	EQ	1	1	1

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 4. Review 2. Release 5. Post-Review 3. Information 6. Dist. (Receipt Acknow. Required)	1. Approved 4. Reviewed no/comment 2. Approved w/comment 5. Reviewed w/comment 3. Disapproved w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1	1	Cog.Eng. B.M. Barnes	Brett M Barnes	1/15/96	T3-04	H.C. Boynton	H C Boynton	1-10-96		1	1
1	1	Cog. Mgr. R.D. Pierce		1/7/96		P.J. Crane	P J Crane	2/3/96	T3-04	1	1
		QA NA				D.B. Powell, Jr.	D B Powell	2/7/96	T4-03	3	4
		Safety NA				D.A. Pratt	D A Pratt			3	5
1	1	Env. S.E. Campbell	S E Campbell	1/15/96	T3-04	G.D. Cummins				3	
1	1	P.L. Hapke	P L Hapke	1/16/96		N.P. Willis				3	
1	1	C.K. Girres	C K Girres	1/8/96	T3-04						

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
Signature of EDT Originator Date	Authorized Representative for Receiving Organization Date	Cognizant Manager Date	[ ] Approved [ ] Approved w/comments [ ] Disapproved w/comments

BD-7400-172-2 (04/94) GEF097

BD-7400-172-1 (07/91)

INSTRUCTIONS FOR COMPLETION OF THE ENGINEERING DATA TRANSMITTAL

(USE BLACK INK OR TYPE)

BLOCK	TITLE	
(1)*	EDT	• Pre-assigned EDT number.
(2)	To: (Receiving Organization)	• Enter the individual's name, title of the organization, or entity (e.g., Distribution) that the EDT is being transmitted to.
(3)	From: (Originating Organization)	• Enter the title of the organization originating and transmitting the EDT.
(4)	Related EDT No.	• Enter EDT numbers which relate to the data being transmitted.
(5)*	Proj./Prog./Dept./Div.	• Enter the Project/Program/Department/Division title or Project/Program acronym or Project Number, Work Order Number or Organization Code.
(6)*	Cognizant Engineer	• Enter the name of the individual identified as being responsible for coordinating disposition of the EDT.
(7)	Purchase Order No.	• Enter related Purchase Order (P.O.) Number, if available.
(8)*	Originator Remarks	• Enter special or additional comments concerning transmittal, or "Key" retrieval words may be entered.
(9)	Equipment/Component No.	• Enter equipment/component number of affected item, if appropriate.
(10)	System/Bldg./Facility	• Enter appropriate system, building or facility number, if appropriate.
(11)	Receiver Remarks	• Enter special or additional comments concerning transmittal.
(12)	Major Assm. Dwg. No.	• Enter applicable drawing number of major assembly, if appropriate.
(13)	Permit/Permit Application No.	• Enter applicable permit or permit application number, if appropriate.
(14)	Required Response Date	• Enter the date a response is required from individuals identified in Block 17 (Signature/Distribution).
(15)*	Data Transmitted	
	(A)* Item Number	• Enter sequential number, beginning with 1, of the information listed on EDT.
	(B)* Document/Drawing No.	• Enter the unique identification number assigned to the document or drawing being transmitted.
	(C)* Sheet No.	• Enter the sheet number of the information being transmitted. If no sheet number, leave blank.
	(D)* Rev. No.	• Enter the revision number of the information being transmitted. If no revision number, leave blank.
	(E) Title or Description of Data Transmitted	• Enter the title of the document or drawing or a brief description of the subject if no title is identified.
	(F)* Impact Level	• Enter the appropriate Impact Level (Block 15). Also, indicate the appropriate approvals for each item listed, i.e., SQ, ESQ, etc. Use NA for non-engineering documents.
	(G) Reason for Transmittal	• Enter the appropriate code to identify the purpose of the data transmittal (see Block 16).
	(H) Originator Disposition	• Enter the appropriate disposition code (see Block 16).
	(I) Receiver Disposition	• Enter the appropriate disposition code (see Block 16).
(16)	Key	• Number codes used in completion of Blocks 15 (G), (H), and (I), and 17 (G), (H) (Signature/Distribution).
(17)	Signature/Distribution	
	(G) Reason	• Enter the code of the reason for transmittal (Block 16).
	(H) Disposition	• Enter the code for the disposition (Block 16).
	(J) Name	• Enter the signature of the individual completing the Disposition 17 (H) and the Transmittal.
	(K)* Signature	• Obtain appropriate signature(s).
	(L)* Date	• Enter date signature is obtained.
	(M)* MSIN	• Enter MSIN. Note: If Distribution Sheet is used, show entire distribution (including that indicated on Page 1 of the EDT) on the Distribution Sheet.
(18)	Signature of EDT Originator	• Enter the signature and date of the individual originating the EDT (entered prior to transmittal to Receiving Organization). If the EDT originator is the cognizant engineer, sign both Blocks 17 and 18.
(19)	Authorized Representative for Receiving Organization	• Enter the signature and date of the individual identified by the Receiving Organization as authorized to approve disposition of the EDT and acceptance of the data transmitted, as applicable.
(20)*	Cognizant Manager	• Enter the signature and date of the cognizant manager. (This signature is authorization for release.)
(21)*	DOE Approval	• Enter DOE approval (if required) by letter number and indicate DOE action.

*Asterisk denote the required minimum items check by Configuration Documentation prior to release; these are the minimum release requirements.

Waste Analysis Plan for the Low-Level Burial Grounds

Brett M. Barnes
Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

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Key Words: transuranic, radioactive, LLBG, burial ground, waste acceptance, waste designation, waste characterization, QA/QC, sampling and analysis, certification program summaries

Abstract: This waste analysis plan (WAP) has been prepared for the Low-Level Burial Grounds that are located in the 200 East and 200 West Areas of the Hanford Facility, Richland, Washington. This WAP documents the methods used to characterize and obtain and analyze representative samples of waste managed at this unit.

Release Approval

Date

Release Stamp

Approved for Public Release

CONTENTS

CONTENTS (cont)

APPENDICES

FIGURES

TABLES

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GLOSSARY

ACRONYMS

ALARA	as low as reasonably achievable
ASTM	American Society for Testing and Materials
COLIWASA	composite liquid waste sampler
CFR	Code of Federal Regulations
DD	direct disposal
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQO	data quality objective
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
FR	Federal Register
HOC	halogenated organic compound
IH	industrial hygienist
LDR	land disposal restriction
LLBG	Low-Level Burial Grounds
mrem	millirem (roentgen equivalent man)
MSDS	material safety data sheet
MW	mixed waste
OVA	organic vapor analyzer
PCB	polychlorinated biphenyl
pH	negative concentration logarithm of the hydrogen-ion concentration
QA/QC	quality assurance and quality control
RCRA	*Resource Conservation and Recovery Act of 1976*
TCLP	toxicity characteristics leaching procedure
TOX	total organic halides
VOC	volatile organic compound
WAC	Washington Administrative Code
°C	degrees Celsius
°F	degrees Fahrenheit

METRIC CONVERSION CHART

The following conversion chart is provided to the reader as a tool to aid in conversion.

Into metric units

If you know	Multiply by	To get
Length		
inches	25.40	millimeters
inches	2.54	centimeters
feet	0.3048	meters
yards	0.914	meters
miles	1.609	kilometers
Area		
square inches	6.4516	square centimeters
square feet	0.092	square meters
square yards	0.836	square meters
square miles	2.59	square kilometers
acres	0.404	hectares
Mass (weight)		
ounces	28.35	grams
pounds	0.453	kilograms
short ton	0.907	metric ton
Volume		
fluid ounces	29.57	milliliters
quarts	0.95	liters
gallons	3.79	liters
cubic feet	0.03	cubic meters
cubic yards	0.76	cubic meters
Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius

Out of metric units

If you know	Multiply by	To get
Length		
millimeters	0.0393	inches
centimeters	0.393	inches
meters	3.2808	feet
meters	1.09	yards
kilometers	0.62	miles
Area		
square centimeters	0.155	square inches
square meters	10.7639	square feet
square meters	1.20	square yards
square kilometers	0.39	square miles
hectares	2.471	acres
Mass (weight)		
grams	0.0352	ounces
kilograms	2.2046	pounds
metric ton	1.10	short ton
Volume		
milliliters	0.03	fluid ounces
liters	1.057	quarts
liters	0.26	gallons
cubic meters	35.3147	cubic feet
cubic meters	1.308	cubic yards
Temperature		
Celsius	multiply by 9/5ths, then add 32	Fahrenheit

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

1.0 FACILITY DESCRIPTION

The purpose of this waste analysis plan (WAP) is to document the waste acceptance process, sampling methodologies, analytical techniques, and overall processes that are undertaken for waste accepted for disposal at the Low-Level Burial Grounds (LLBG) which are located in the 200 East and 200 West Areas of the Hanford Facility, Richland, Washington. Because dangerous waste does not include the source, special nuclear, and by-product material components of mixed waste, radionuclides are not within the scope of this documentation. The information on radionuclides is provided only for general knowledge.

1.1 LOW-LEVEL BURIAL GROUNDS DESCRIPTION

The LLBG are classified as a landfill and cover a total area of approximately 225.0 hectares. The landfill is divided into eight burial grounds. Six of the burial grounds are located in the 200 West Area and two are located in the 200 East Area as follows (Figures 1-1 and 1-2):

200 West Area	200 East Area
218-W-3A	218-E-10
218-W-3AE	218-E-12B
218-W-4B	
218-W-4C	
218-W-5	
218-W-6	

Trench configuration within a burial ground is subject to change as disposal techniques improve or as waste management needs dictate. Mixed waste is disposed in *Resource Conservation and Recovery Act* (RCRA) *of 1976*-compliant lined trenches or in unlined trenches that are exempt from the liner/leachate collection system requirements. The unlined trenches are used for radioactive waste disposal and are not subject to RCRA or Washington Administrative Code (WAC) 173-303 regulations.

The following sections provide a brief description of the individual burial grounds as well as identifying the generic types of waste disposed in the LLBG. The LLBG operating organization maintains an electronic database that documents each waste receipt and the type and location of waste disposed in the LLBG.

1.1.1 218-W-3A Burial Ground

The 218-W-3A Burial Ground (Figure 1-3) began receiving waste in 1970, and covers approximately 20.4 hectares. Examples of waste placed in this burial ground include ion exchange resins and industrial waste (e.g., failed equipment, tanks, pumps, ovens, agitators, heaters, hoods, jumpers, vehicles, and accessories) and retrievable transuranic waste.

1.1.2 218-W-3AE Burial Ground

The 218-W-3AE Burial Ground (Figure 1-4) began receiving waste in 1981, and covers approximately 20.0 hectares. Examples of waste placed in this burial ground include rags, paper, rubber gloves, disposable supplies, broken tools, and industrial waste.

1.1.3 218-W-4B Burial Ground

The 218-W-4B Burial Ground (Figure 1-5) began receiving waste in 1968, and covers approximately 3.5 hectares. Examples of waste placed in this burial ground include rags, paper, rubber gloves, disposable supplies, broken tools, industrial waste, and retrievable transuranic waste.

1.1.4 218-W-4C Burial Ground

The 218-W-4C Burial Ground (Figure 1-6) began receiving waste in 1978, and covers approximately 20.9 hectares. Examples of waste placed in this burial ground include contaminated soil, decommissioned pumps, pressure vessels, and retrievable transuranic waste.

1.1.5 218-W-5 Burial Ground

The 218-W-5 Burial Ground (Figure 1-7) began receiving waste in 1986, and covers approximately 37.2 hectares. Examples of waste placed in this burial ground include rags, paper, rubber gloves, disposable supplies, broken tools, and industrial waste. This burial ground currently contains lined mixed waste trenches (Figure 1-8). Adjacent to lined mixed waste trenches are greater-than-90-day leachate storage tanks. Examples of waste to be placed in the lined mixed waste trenches include dangerous waste that has been treated to meet land disposal restriction (LDR) requirements (including bulk waste), macro-encapsulated long-length contaminated equipment, industrial waste, and polychlorinated biphenyls (PCB).

1.1.6 218-W-6 Burial Ground

The 218-W-6 Burial Ground (Figure 1-9) covers approximately 18.0 hectares, and has not received any waste as of the issuance of this WAP.

1.1.7 218-E-10 Burial Ground

The 218-E-10 Burial Ground (Figure 1-10) began receiving waste in 1960, and covers approximately 36.1 hectares. Examples of waste placed in this burial ground include failed equipment and industrial waste.

1.1.8 218-E-12B Burial Ground

Burial ground 218-E-12B (Figure 1-11) began receiving waste in 1967, and covers approximately 69.0 hectares. An example of waste placed in this burial ground includes defueled reactor compartments, industrial waste, and retrievable transuranic waste.

1.1.9 Leachate Storage Tanks

Each LLBG lined mixed waste disposal trench is supported by a greater-than-90-day leachate storage tank (Figure 1-12). Typically, leachate storage tanks are aboveground, carbon steel tanks, internally coated with an amine-cured epoxy. The storage tanks are located adjacent to the disposal trench so that the feed piping remains within the confines of the lined trench. The storage tanks are provided with a typical portable enclosure to protect the tank and secondary containment from the elements (i.e., rain, snow, etc.).

Each leachate storage tank currently has a storage capacity of 37,854 liters; however, future leachate storage tank capacity might change to accommodate various sized lined trenches or other operating conditions.

1.2 DESCRIPTION OF THE LOW-LEVEL BURIAL GROUNDS PROCESS AND ACTIVITIES

The LLBG are classified as a landfill and will be permitted under WAC 173-303. The LLBG currently accept radioactive waste and mixed waste according to the characteristics of the waste. All mixed waste is disposed in lined mixed waste trenches or other approved alternatives. Waste accepted can be either containerized or bulk solids. Leachate collected from lined trenches is stored in greater-than-90 day leachate storage tanks located in proximity to the lined-trenches. The LLBG receive mixed waste from onsite generating units or offsite generators. Typical onsite generating units include research laboratories, chemical and nuclear reprocessing units, decommissioning of structures, waste retrieval and cleanup, waste sampling, etc. Typical offsite generators include research laboratories, chemical and nuclear processing plants, test sites, etc.

Low-level radioactive waste received at the LLBG is placed in trenches and covered with soil for permanent disposal. Mixed waste that meets LDR requirements, as specified in 40 Code of Federal Regulations (CFR) Part 268 and WAC 173-303-140, is disposed in lined trenches with leachate collection and removal systems. The Hanford Facility is required to test such waste to ensure that the waste or treatment residuals are in compliance with applicable treatment standards. Such testing is performed according to the frequency specified in this WAP.

Containerized transuranic waste has been placed in various trenches of the LLBG since May 1970. Transuranic waste containers were placed on asphalt pads on the bottom of the trenches or placed on plywood-lined trenches. An earthen cover over the trenches provides radiological protection. This waste

eventually will be retrieved, processed, and disposed of in accordance with current federal and state requirements. The low-level portion of the transuranic waste will be returned to the LLBG and disposed of as low-level waste. This disposal might take place in the trenches in which the transuranic waste was removed. The pre-1987 mixed waste portion of the transuranic waste will be disposed in lined trenches. The transuranic portion will be processed and prepared for offsite disposal. It is assumed that the retrieval of transuranic waste will be conducted and completed during the operational phase of the LLBG. No transuranic mixed waste has been placed into the LLBG since November 23, 1987.

Two types of mixed waste currently are disposed in the LLBG under exemption allowed by WAC 173-303-806: remote-handled mixed waste and special waste (DOE/RL-88-20, Supplement 1, Rev. 1 and DOE/RL-90-12, Rev. 2). Special waste refers to waste requiring special handling or unusual waste such as decommissioned reactor vessels.

Hanford Facility waste generating activities are conducted under a common U.S. Environmental Protection Agency (EPA)/State identification number (WA7890008967). All waste management activities carried out under the assigned identification number are considered to be 'onsite' as defined in WAC 173-303.

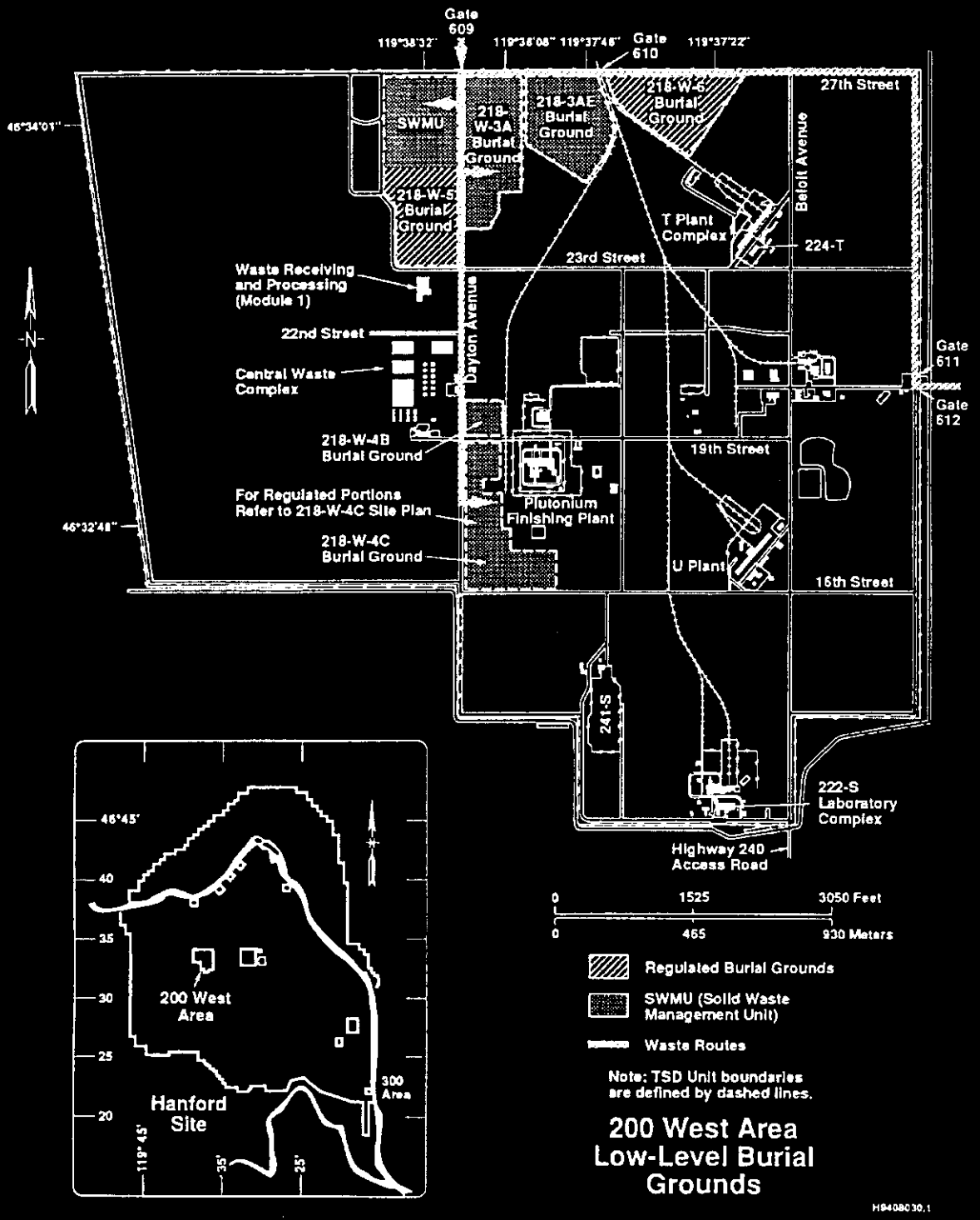

Figure 1-1. Locations of Low-Level Burial Grounds in the 200 West Area.

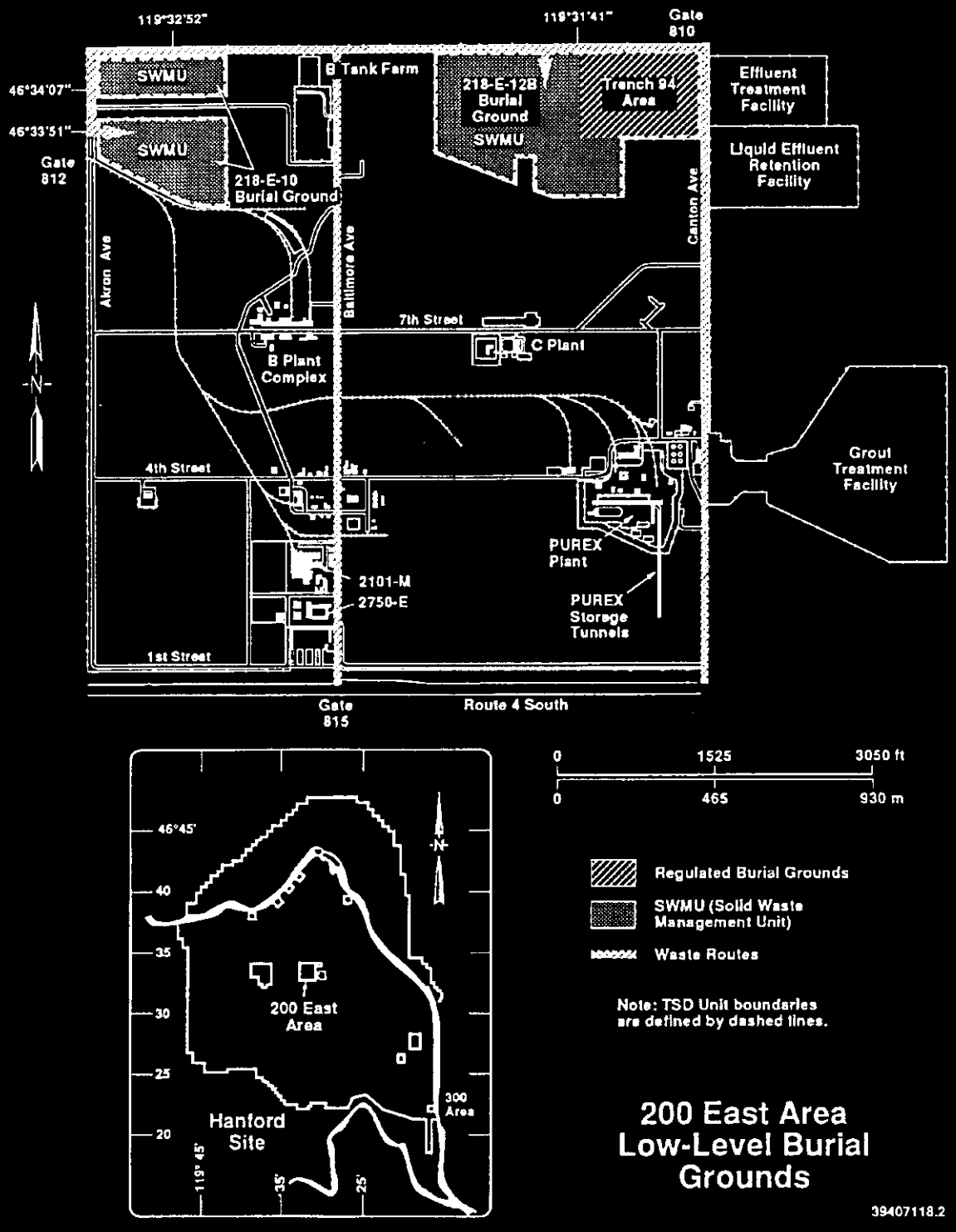

Figure 1-2. Locations of Low-Level Burial Grounds in the 200 East Area.

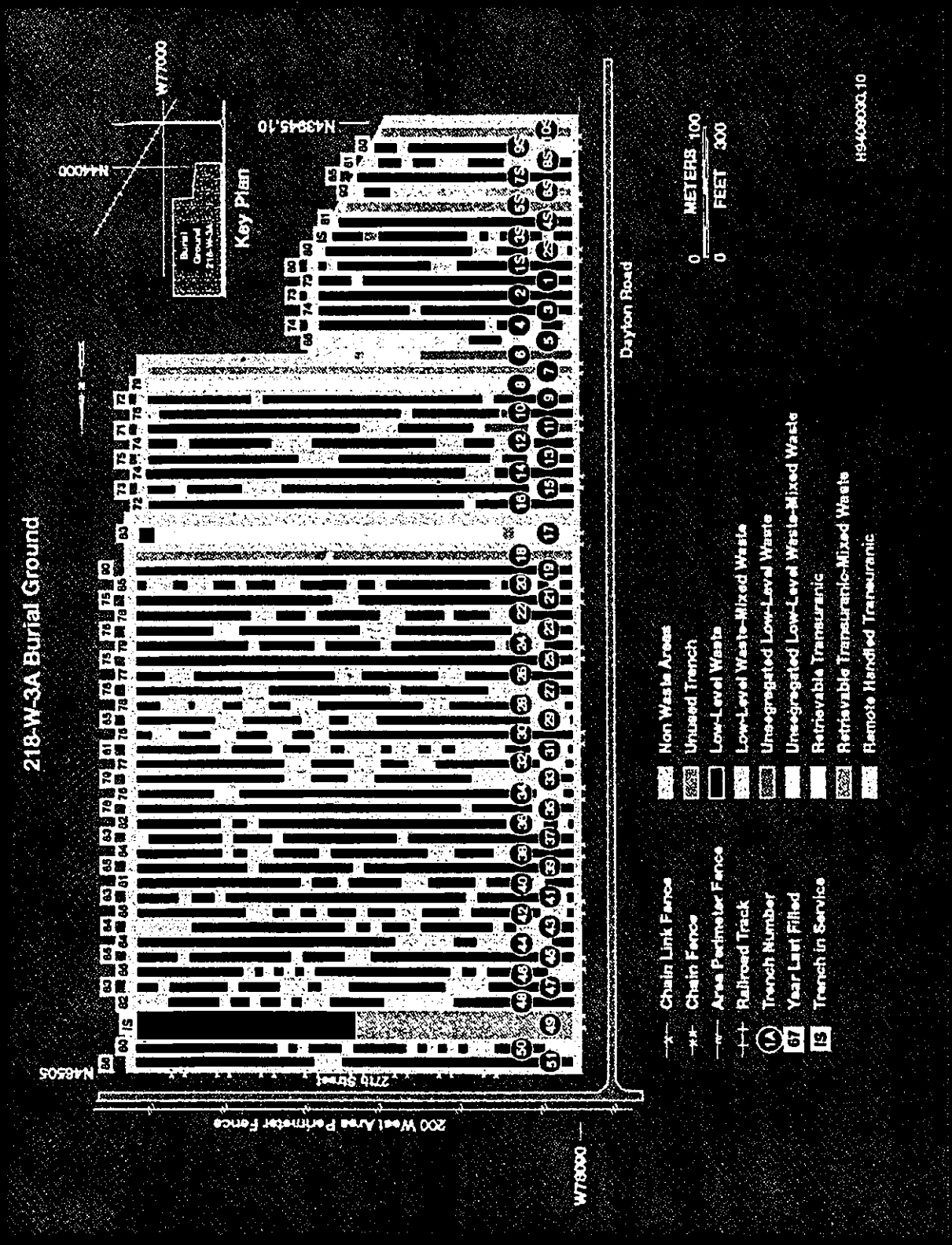

Figure 1-3. 218-W-3A Burial Ground.

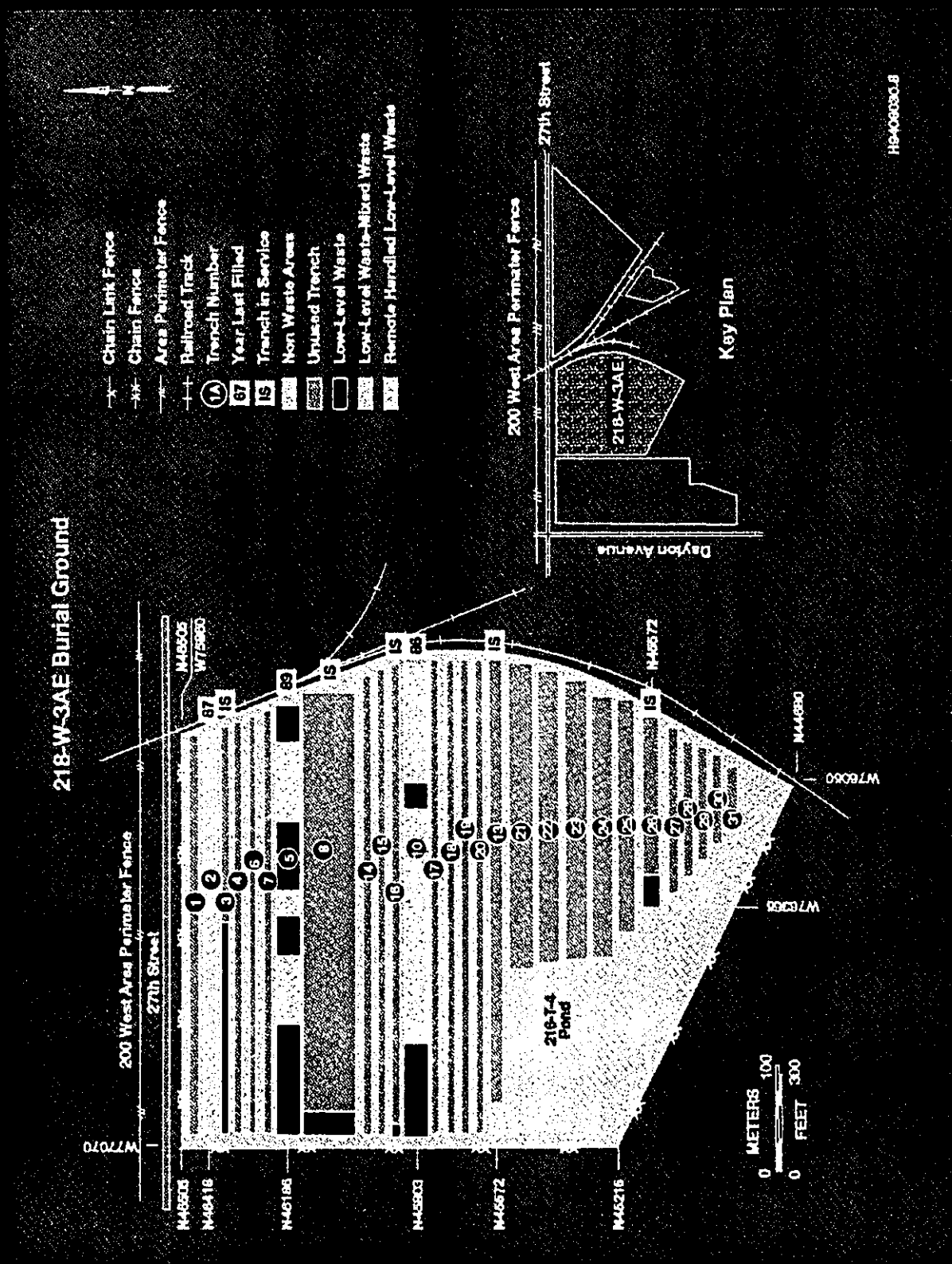

Figure 1-4. 218-W-3AE Burial Ground.

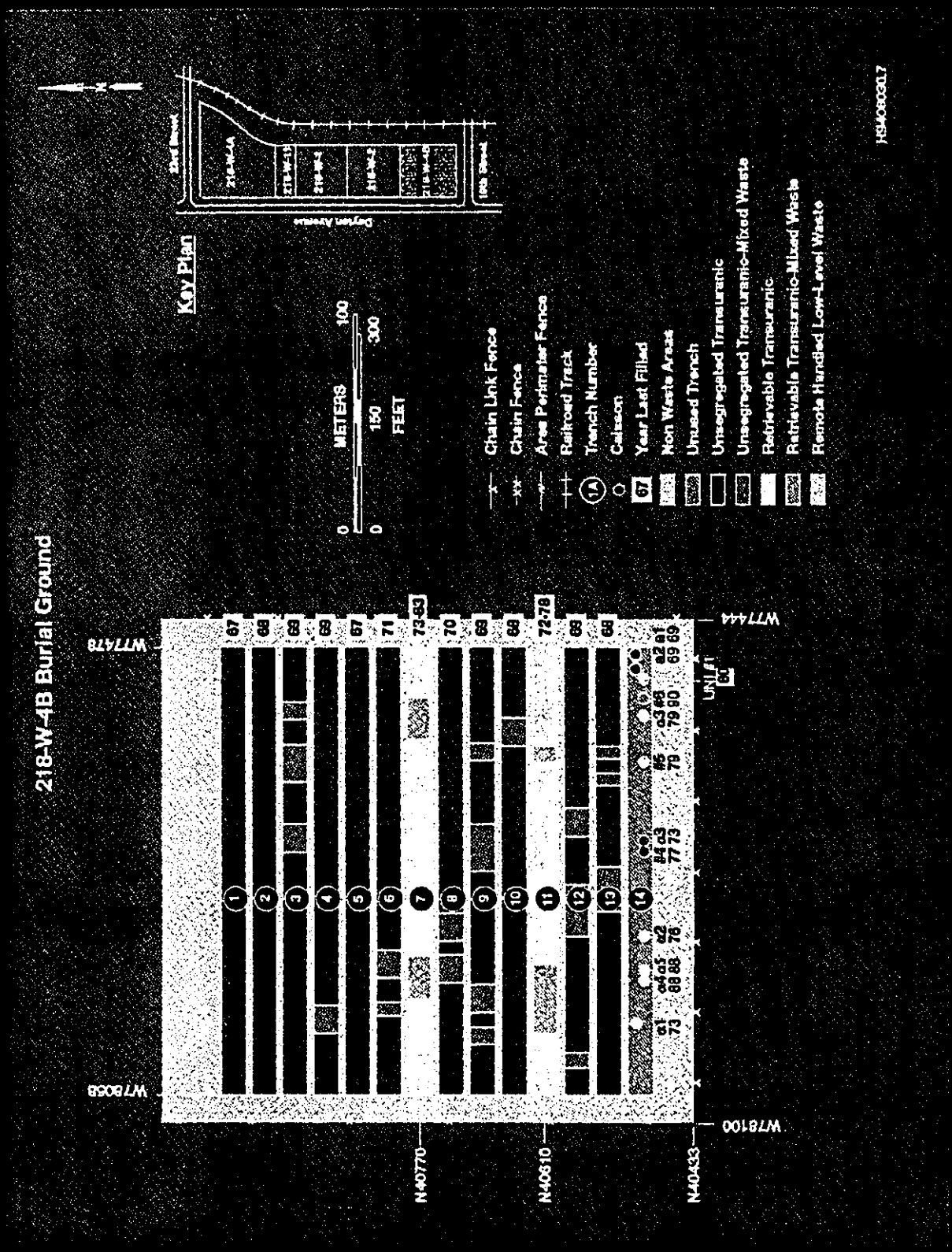

Figure 1-5. 218-W-4B Burial Ground.

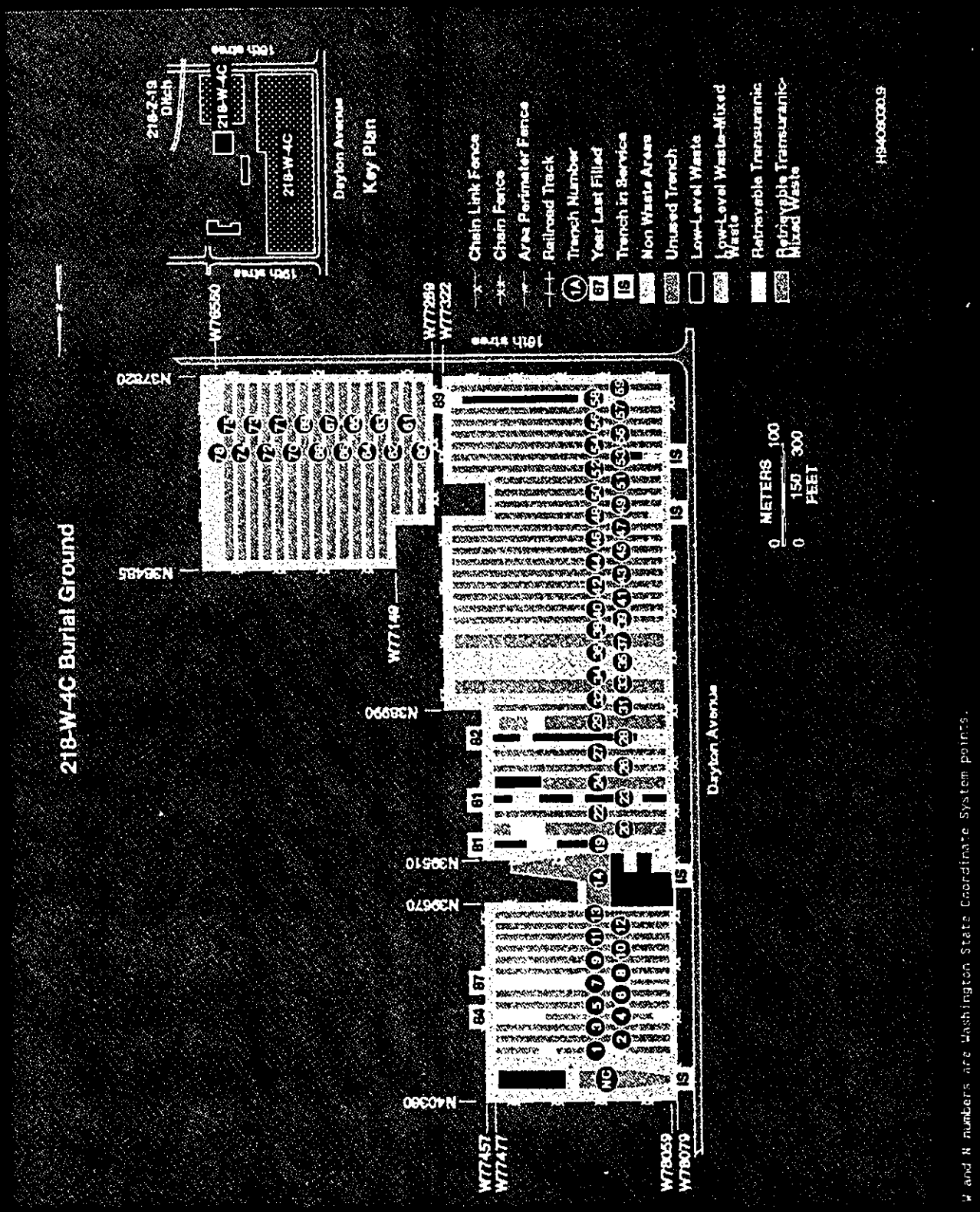

Figure 1-6. 218-W-4C Burial Ground.

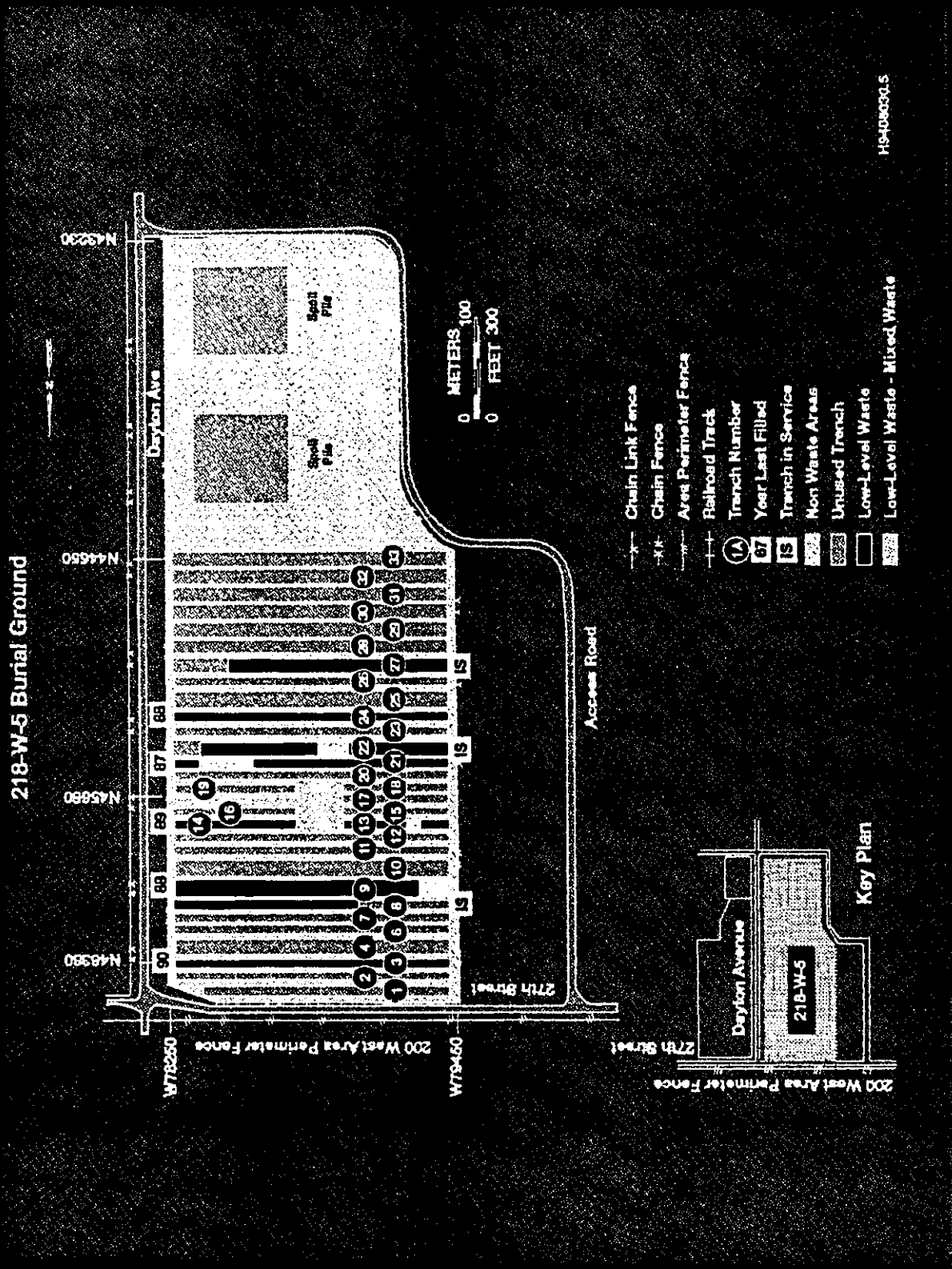

Figure 1-7. 218-W-5 Burial Ground.

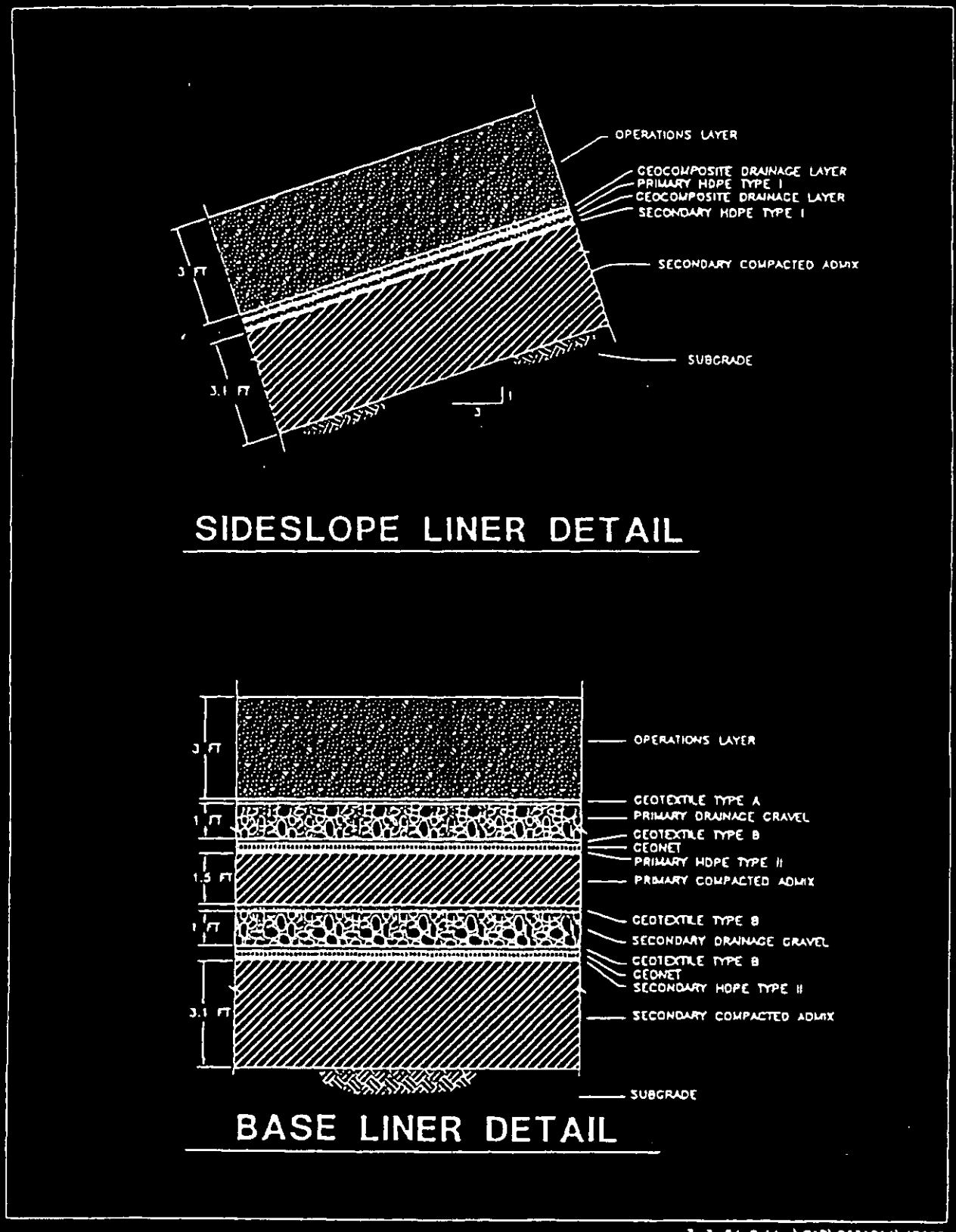

Figure 1-8. Typical Resource Conservation and Recovery Act-Compliant Liner System.

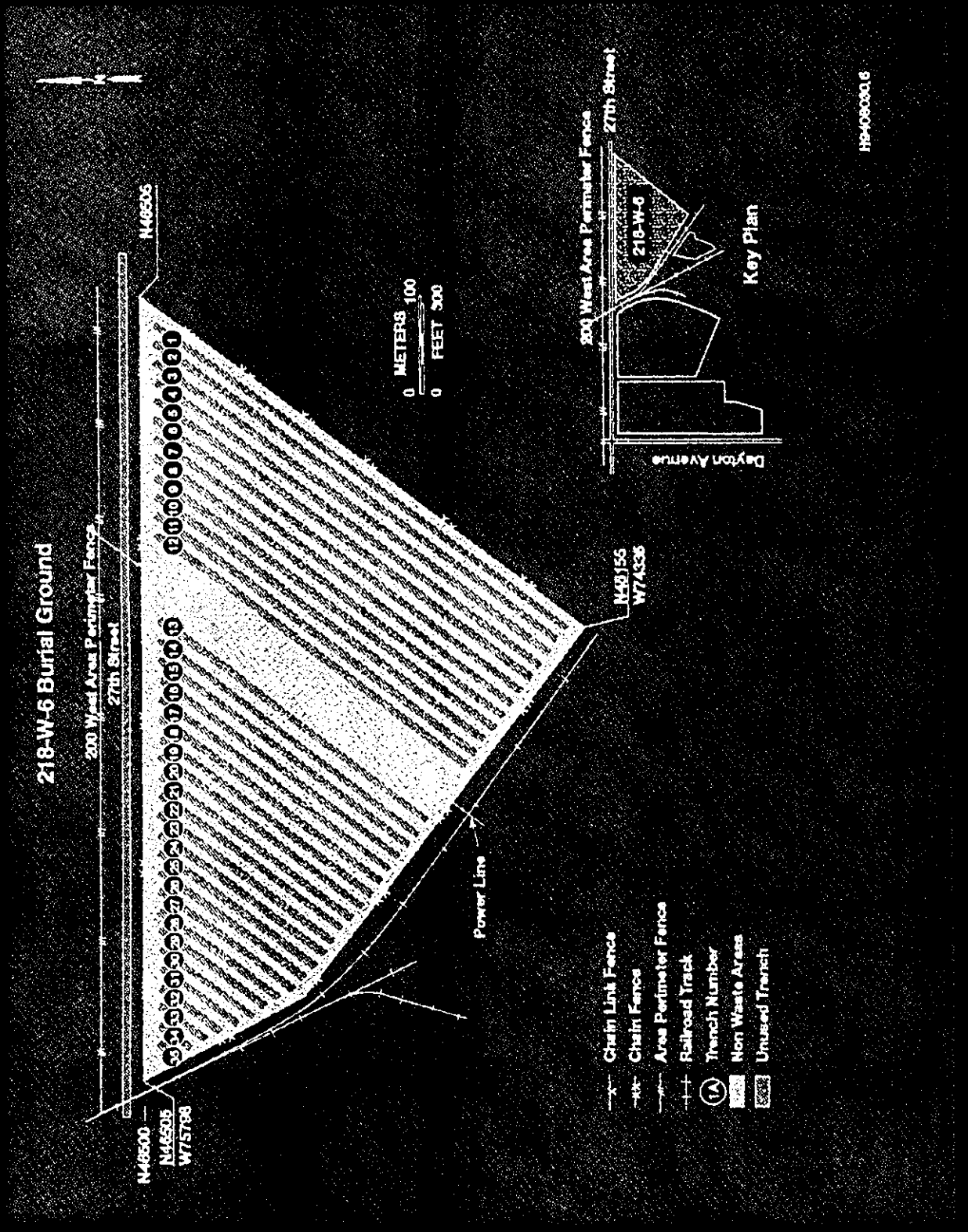

Figure 1-9. 218-W-6 Burial Ground.

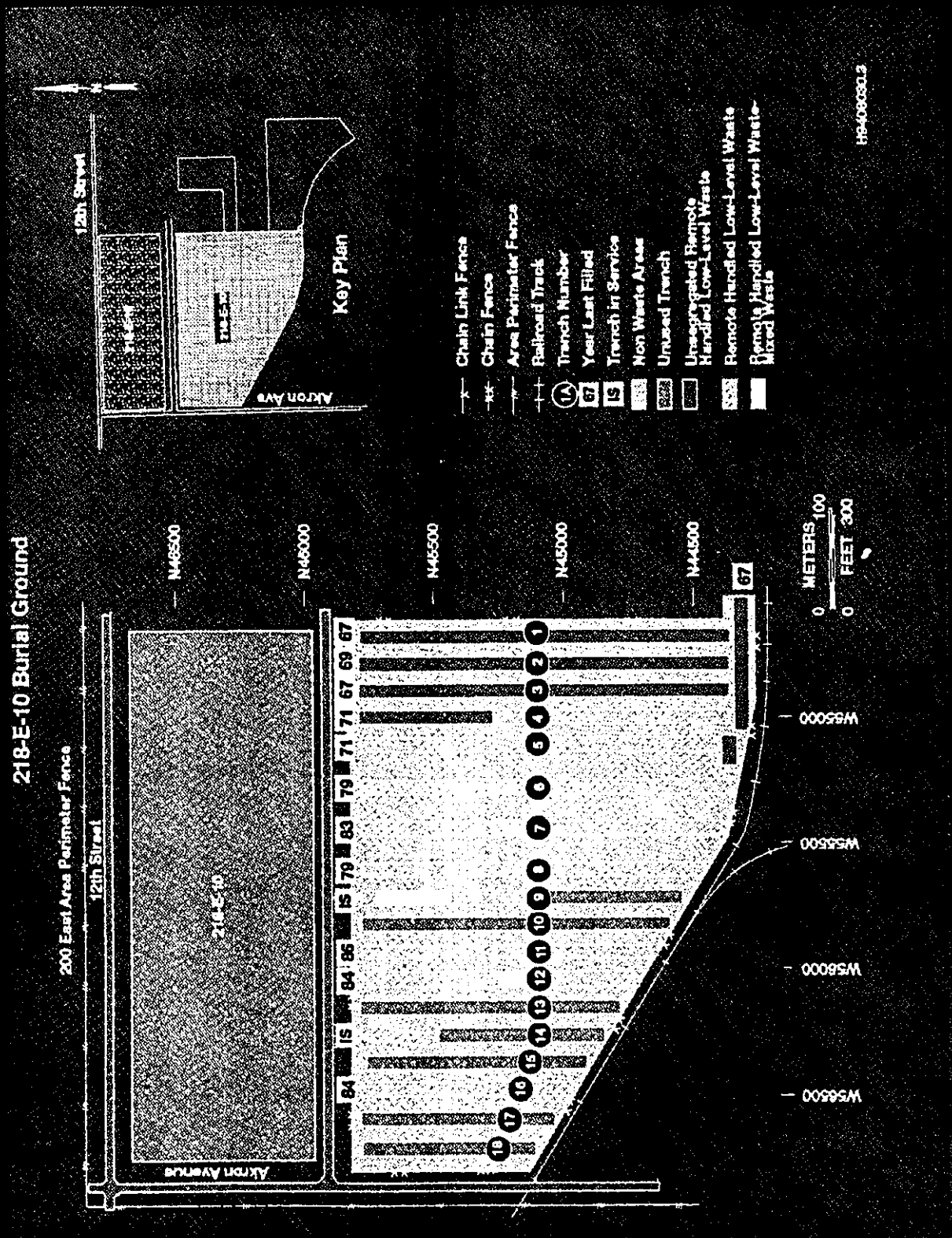

Figure 1-10. 218-E-10 Burial Ground.

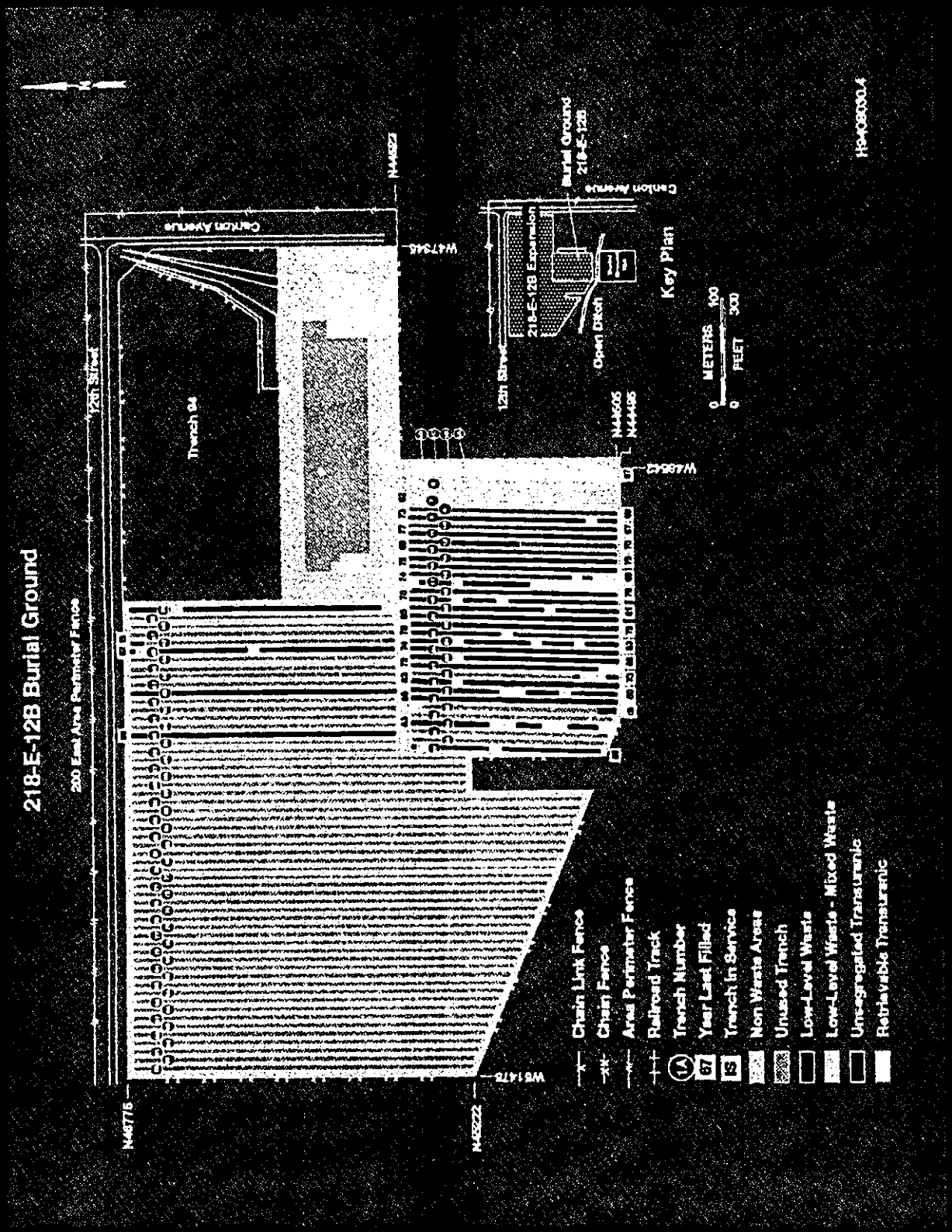

Figure 1-11. 218-E-12B Burial Ground.

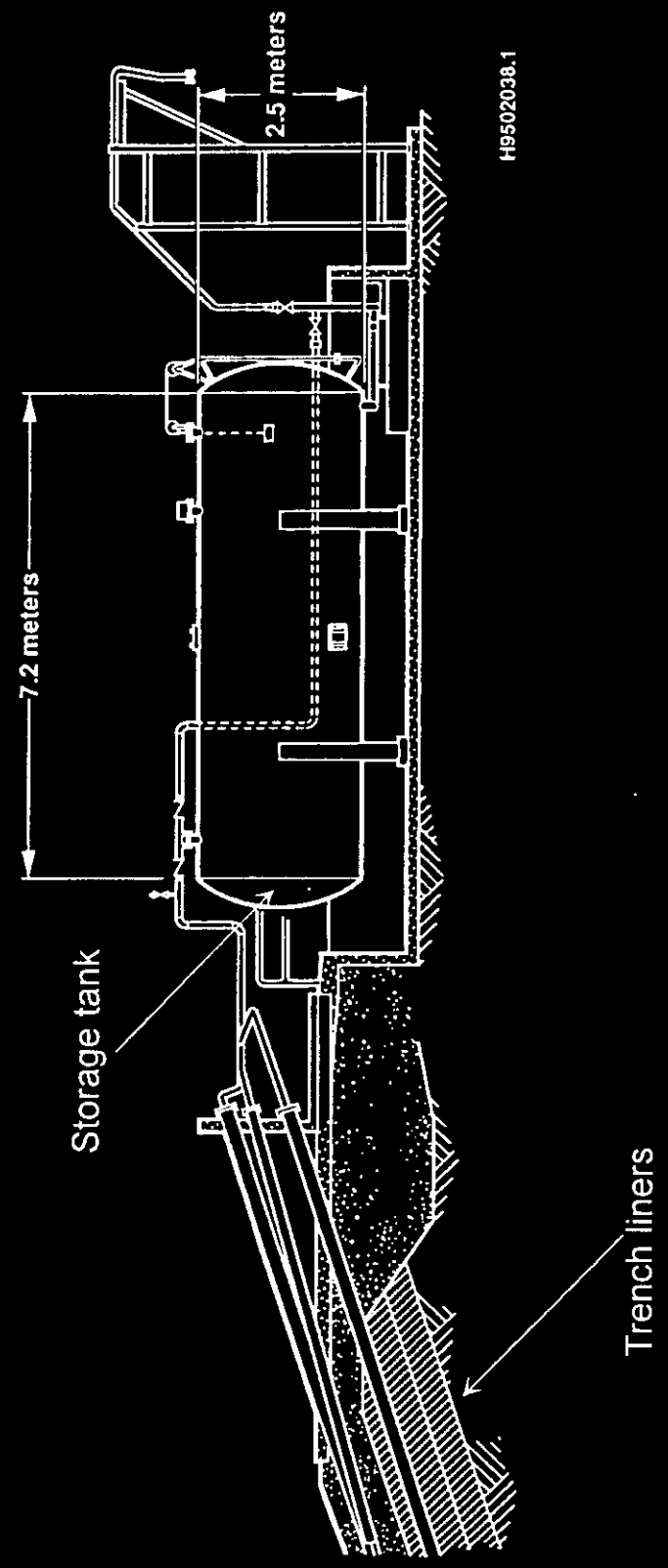

Figure 1-12. Typical Leachate Storage Tank for Trenches 31 and 34.

2.0 WASTE ACCEPTANCE PROGRAM

This section covers the waste acceptance process for the proper management of waste in the LLBG.

2.1 WASTE CERTIFICATION PROGRAM

The onsite generating unit or offsite generator (for the purposes of this WAP, permitted treatment and storage facilities are classified as either onsite generating units or offsite generators) must have a program to certify characterization of their waste. The onsite generating unit or offsite generator must document their waste certification program on a stream-by-stream basis in the form of waste certification summaries. Each waste certification summary must include a description of methods used for characterizing the applicable waste stream(s). Characterization efforts provide the data quality needed for management of the waste and ensure that waste is packaged properly. A description of the type of information that must be included in a waste certification summary is provided in the following sections.

2.1.1 Waste Certification Information

The basic information required for each waste stream includes the following:

- General information on waste generating process
- Physical characteristics of the waste
- Chemical characteristics of the waste
- Radiological characteristics of the waste
- Packaging
- Supporting documentation (e.g., laboratory analysis, etc.)
- LDR certification (if applicable)

2.1.2 Waste Characterization

Waste must be characterized sufficiently to ensure that the waste meets the acceptance criteria for disposal. It is the responsibility of the onsite generating units and offsite generators to completely and correctly identify and quantify the dangerous constituents of their waste. Characterization can occur using either process knowledge or detailed laboratory analysis or a combination of both. Adequate process knowledge and/or analysis must be available to accurately identify all existing dangerous waste numbers in accordance with WAC 173-303-070, as well as determine the LDR status of the waste. Specific characterization techniques depend on the waste generating process are as follows:

- Characterization of consistently-generated waste streams

  If the waste is being generated through a continuing process, such that the composition of the waste is not expected to vary appreciably over time, waste characterization requirements can be met through administrative and engineering controls on the process. Initially, the waste stream must be characterized through a campaign of sampling and analysis. However, if it can be shown that certain parameters are expected to remain within known limits or where representative sampling is not possible because of the physical form of the waste, gross measurements (e.g., pH, radioactivity screening) and related process knowledge could be substituted for specific chemical sampling and analysis. For each waste stream the following information should be provided in the waste certification summary:

  - Specific parameters expected to remain constant (metal content, radionuclide content, etc.)

  - Method of ensuring the waste stream characterization remains reliable between sampling campaigns, including an estimate of its reliability as an indicator of correct characterization. Depending on the process involved, gross measurements, process indicators, or other techniques might be appropriate.

  - Frequency of recharacterization - if sampling and analysis are required, these must be performed annually, at a minimum, and more frequently if the waste generating process is subject to changes.

- Characterization of Batch Waste Streams

  If the waste is being generated through a short-term or infrequent operation, such that the composition of the waste is expected to vary appreciably over time, the waste could be characterized as a batch process. For such operations, the waste certification summary should describe the method for determining batch sizes and the mechanism for grouping waste into batches.

  Batches can be defined by the specific waste generating operation with several similar operations grouped together (e.g., the applicable waste collected from several different chemistry laboratories), by the type of waste being generated (e.g., waste oils regardless of the point of origin), by point of origin (e.g., all applicable waste - either soil, liquid, or sludge, but not combinations of the three - from a given structure, regardless of the generating process), or by some other method appropriate to the specific onsite generating unit or offsite generator. For this type of waste stream, the following information should be included in the waste certification summary:

  - Method of grouping waste into batches (e.g., by waste type, by point of origin)

- Size of batches characterized in this manner (e.g., the amount of waste collected in 1 week, the number of containers)

- Waste characterization technique (e.g., sampling and analysis or process knowledge).

2.1.3 Process Knowledge

If process knowledge is used in the characterization process, a complete description of the process generating the waste [e.g., original product material safety data sheets (MSDS)] and published characterization methodology on the specific waste stream and/or characterization methodology on similar waste streams must be provided. Field analysis can be used to confirm process knowledge.

If adequate process knowledge exists to ensure a particular constituent is not present in the waste, there is no requirement to analyze for that constituent. However, the waste certification summary must establish that there is no reason to suspect the constituent is in the waste. This can be accomplished by including a detailed process description and/or published data of the process.

2.1.4 Sampling and Analysis

In cases where process knowledge is unavailable or incomplete, the onsite generating units and/or offsite generators characterize the waste by sampling and analyzing the waste stream. Knowledge of the history and origin of the waste can be used to decide the analytical testing needed to determine the dangerous constituents of the waste (e.g., if no reason exists to suspect certain chemical compounds like pesticides, there is no reason to test for such parameters).

The onsite generating units and/or offsite generators determine the appropriate sampling method, conduct all field and sampling quality assurance and quality control (QA/QC) [QA will be based on SW-846, the *Hanford Analytical Services Quality Assurance Plan* (DOE/RL-94-55), or and approved equivalent] (Section 4.0), arrange for and coordinate with appropriate analytical laboratories, and document the sampling and analysis activities. The onsite generating units and/or offsite generators must certify that the waste analysis information is complete and accurate.

2.1.5 Analytical Methodologies

Specific analytical methodologies that should be used for each parameter should adhere to the guidance provided in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846*, (latest edition) (EPA 1986), other pertinent references accepted by Ecology, the EPA, and/or the DOE-RL and other equivalent methods approved by Ecology, the EPA, and/or the DOE-RL.

2.2 PRE-SHIPMENT REVIEW

Pre-shipment review takes place before waste can be scheduled for transfer or shipment to the LLBG. The review focuses on whether the waste stream is accurately defined and the LDR status determined correctly. Only waste determined to be acceptable for disposal is scheduled. This determination is based on the information that the onsite generating unit or offsite generator provides. The following sections discuss the pre-shipment review process.

2.2.1 Pre-Shipment Review Process

For each waste transfer or shipment that is a candidate for disposal, the onsite generating unit or offsite generator provides (1) all pertinent chemical, radiological, and physical data requested on the shipping paper; (2) other supporting documentation such as MSDS, analytical data, etc.; (3) a description of the waste contents on the container inventory record; and (4) LDR notification/certification information or equivalent documentation (e.g., national capacity variance, contained-in determination variance, etc.,) as applicable. The pertinent information is entered into the solid waste information tracking system.

Based on waste identification information provided, the waste designation is reviewed to ensure consistency with waste designations per WAC 173-303-070, as well as for technical accuracy to ensure the waste meets the waste acceptance criteria. If the transfer or shipment information is found to be acceptable, a final operations review is completed and the transfer or shipment is scheduled by a solid waste disposal organization.

Where potential nonconformances exist in the information provided, waste characteristics do not match the waste certification summary, or additional constituents are expected to be present that do not appear on the documentation, the onsite generating unit or offsite generator is contacted by the LLBG operating organization or an approved designated organization for resolution.

2.2.2 Methodology to Ensure Compliance with Land Disposal Restrictions Requirements

Only mixed waste that meets the treatment standards of 40 CFR 268 and WAC 173-303-140 will be considered for disposal at the LLBG. Because waste treatment to meet LDR criteria does not occur at the LLBG, all onsite generating units and offsite generators are subject to LDR or any LDR-related variances and are required to submit all the notifications and certifications described in 40 CFR 268.7. The following are general requirements for notifications and supporting documentation.

- The waste is subject to LDR and the onsite generating unit and offsite generator or a permitted treatment unit has treated the waste.

- The onsite generating unit or offsite generator or a permitted treatment unit supplies the appropriate LDR certification information and the analytical data that demonstrate compliance with the LDR treatment standards of 40 CFR 268 and WAC 173-303-140.

- The waste is subject to LDR and the onsite generating unit or offsite generator has determined that the waste naturally meets the LDR treatment standard for disposal.

  - The onsite generating unit or offsite generator supplies the appropriate LDR certification information and analytical data necessary to demonstrate compliance with the LDR treatment standards of 40 CFR 268 and WAC 173-303-140.

  - If the onsite generating unit or offsite generator develops the certification based on process knowledge, analytical data also might be necessary to demonstrate compliance with the appropriate LDR treatment standard.

- The waste is subject to an exemption from a prohibition on landfill disposal.

  - The onsite generating unit and offsite generator submits a notice stating the waste is not prohibited from land disposal as required by 40 CFR 268.7(a)(3).

A representative sample of the waste may be required to be submitted for analysis to ensure that LDR requirements are met. This sample could be submitted directly to the laboratory of the LLBG operating organization's choice for analysis.

2.3 WASTE VERIFICATION

Waste verification, which includes LDR verification, consists of testing key physical and chemical properties. Waste verification parameters are selected based on the following criteria:

- The need to identify restricted waste

- Parameters important to the proper management of waste at the LLBG

- Parameters that can be used to corroborate that waste received matches the identity of waste specified on accompanying transfer or shipping papers

- The need to protect employees, the public, and the environment

- Verify waste received is LDR compliant as applicable.

Incoming waste verification is accomplished by reviewing applicable documentation and waste tracking forms or manifests against the waste. Selection of waste for verification is based on the following criteria.

- For radioactive waste only containers that are disposed of in unlined trenches, an adequate verification rate based upon process knowledge must be used.

- Each bulk solid mixed waste load disposed in the lined trenches will be sampled and analyzed with the exception of large volumes of a single waste from the same process. In this case, five truck loads out of the first 10 truck loads are sampled. In addition, every truck load is inspected visually, any waste showing visible variations in color, texture, or wetness will be subject to sampling as described in Section 3.0.

- For containers disposed in the lined trenches, at least 5 percent or an alternative rate based on process knowledge and/or analytical data must be used.

Verification is performed using a combination of nondestructive examination, physical examination, and/or chemical screening. Verification is performed by the LLBG operating organization or a designated organization for waste acceptance process at the LLBG.

Exceptions to chemical sampling include the following 'special materials':

- Waste containers precluded from opening because of as low as reasonably achievable (ALARA)

- Empty product containers

- Single substance spill material

- Off-specification, contaminated, and/or outdated commercial products in the original product container

- Contaminated debris and asbestos (does not include liquids or soils)

- Other special-case situations handled on a case-by-case basis.

Special materials have been exempted from chemical screening because these materials potentially are hazardous materials (e.g., remote handled, asbestos); are well defined and nonvariable (e.g., single substance spill material or off-specification products); or are unusually difficult to sample and analyze (e.g., empty product containers, contaminated debris, or demolition materials). For these exceptions, the onsite generating unit or offsite generator supplies sufficient chemical and physical characteristics for proper disposal of the waste.

Exceptions to nondestructive examination include the following:

- Container is shielded
- Container has classified waste
- Container is remote-handled waste
- Container cannot be received for nondestructive examination due to safety, equipment or design limitations.

Exceptions to visual examination include the following:

- Container would be damaged during opening
- Container has a surface dose rate of 20 millirem per hour or greater (unshielded)
- Container alpha curie loading is greater than 10 nanocuries per gram
- Container has classified waste
- Container is remote-handled waste
- Container cannot be received due to safety, equipment, or design limitations.

The methods for ensuring representative sampling are presented in Section 3.0. As practical, the sampling techniques used for specific types of waste correspond to those referenced in SW-846 and WAC 173-303. The analytical methods chosen for the verification parameters are described in Appendix A.

2.4 CORRECTIVE ACTIONS

Corrective action is necessary when significant discrepancies or nonconformances are identified. All applicable acceptance criteria must be met. Nonconformances must be resolved or addressed before accepting the waste for disposal at the LLBG. Depending on the severity of the nonconformance, the action for noncompliance could range from conditional acceptance to rejection of the entire waste transfer or shipment. The following sections describe nonconformances and the resolution process.

2.4.1 Manifest Discrepancies

Manifest and/or onsite waste tracking form discrepancies are significant discrepancies of quantity or type between the dangerous waste identified by documentation and the dangerous waste that the LLBG operating organization actually receives. Significant discrepancies are obvious physical or chemical

differences in dangerous constituents that can be discovered through physical or chemical screening, which would cause the waste to be mismanaged.

2.4.2 Nonconformances

The following are examples of nonconformances that require corrective action:

- Items in a waste container not accounted for on documentation or items not in the container but documented
- Free liquids
- Extensively damaged, leaking, or open containers
- Waste with appearance discrepancies
- Prohibited items including ignitable, reactive, corrosive, or incompatible waste.

2.4.3 Resolution of Nonconformances and Manifest Discrepancies

The following activities are conducted when nonconformances and waste tracking form and/or manifest discrepancies are encountered.

- Incorrect or incomplete entries on the waste tracking forms or Uniform Hazardous Waste Manifest, or other shipping papers can be corrected or completed with concurrence of the onsite generating unit or offsite generator, and the LLBG operating organization. Corrections are made by drawing a single line through the incorrect entry. Corrected entries are initialed and dated by the individual making the correction.
- The waste packages can be held in an appropriate staging area and the onsite generating unit or offsite generator requested to provide written instructions for correcting the condition before the waste is accepted.
- Waste packages can be returned as unacceptable.
- The onsite generating unit or offsite generator could be requested to correct the condition on the Hanford Facility before the waste is accepted.
- If a noncompliant mixed waste package is received from an offsite generator, and the waste package is nonreturnable because of condition, packaging, etc., and if an agreement on disposition cannot be reached among the involved parties, the issue will be referred to the DOE-RL, Ecology, and other appropriate regulatory agencies for resolution.

- An evaluation will be performed to determine the need to sample previously accepted waste from the noncomplying onsite generating unit or offsite generator to determine if any of the waste has the potential for similar nonconformances.

Rejected waste is returned with the waste tracking form or manifest unsigned by the LLBG operating organization. Rejected waste remains the responsibility of the onsite generating unit or offsite generator and the transporter. As an alternative to waste rejection, the onsite generating unit or offsite generator might be allowed to correct the violations at the LLBG when feasible. In cases where containers do not comply with U.S. Department of Transportation requirements, this alternative is required.

For offsite generators, the DOE-RL provides notification to Ecology of unreconciled manifest discrepancies that are not resolved within 15 days. Discrepancies for onsite generating units are handled internally with no notification.

2.4.4 Corrective Actions to Meet Land Disposal Restriction Standards

Waste within tolerances and limits of the LDR treatment standards can proceed to the LLBG lined trenches for disposal. Waste with one or more incoming parameters not within tolerances are considered to have an analytical discrepancy. Discrepancies could be rectified using the following strategy.

- For purposes of evaluating analytical discrepancies, analytical results are classified into the following five classes.

  - Class 1--The results show that the waste is within the applicable treatment standard. No additional constituents or characteristics are detected other than those addressed by the waste specification sheet, manifest, or waste tracking form.

  - Class 2--The results show that the treatment standards are exceeded, but the standards are not applicable because the waste is subject to a statutory or regulatory variance, exemption, or extension.

  - Class 3--The results show that the waste definitely has additional 'new' WAC 173-303 dangerous waste numbers that were not addressed in the waste specification sheet, manifest, or waste tracking form.

  - Class 4--The results show that the waste has the possibility of additional 'new' WAC 173-303 dangerous waste numbers that were not addressed in the waste specification sheet, the manifest, or waste tracking form.

  - Class 5--Treatment standards are exceeded and the waste is not subject to any exemption.

For any waste with analytical results in Class 1 or 2, such waste can be disposed if the waste is otherwise acceptable for disposal.

For waste with analytical results in Classes 3 through 5, the following additional verification activities are required.

- Class 3 Waste

  - The LLBG operating organization checks to make sure the 'new' WAC 173-303 dangerous waste number is on the LLBG Part A, Form 3, permit application.

  - The LLBG operating organization checks to see whether the new WAC 173-303 dangerous waste number is subject to any exemption, extension, variance, or other exclusion from the requirement of 40 CFR 268.

  - If the waste is subject to additional treatment standards, the waste is analyzed for compliance with these additional treatment standards.

  - If the waste is subject to treatment standards and the subsequent analysis shows the waste does not meet the standard, the waste will not be accepted for disposal at the LLBG. Conversely, if the waste meets the treatment standards or if the waste is not subject to the treatment standards and the 'new' WAC 173-303 dangerous waste numbers are on the LLBG Part A, Form 3, permit application and if the waste is otherwise acceptable, the waste can be accepted for disposal at the LLBG.

- Class 4 Waste. There are two subcategories of Class 4 waste: possibly characteristic (4A) and possibly listed (4B).

  - For subcategory 4A, the LLBG operating organization requests analysis of the waste or an extract of the waste for the applicable constituents to determine if a 'new' WAC 173-303 dangerous waste number is applicable to the waste. If a new number is indicated, the LLBG operating organization notifies the onsite generating unit or offsite generator of the finding.

    If the waste is a subcategory 4B, the LLBG operating organization notifies the onsite generating unit or offsite generator of the finding. The LLBG operating organization discusses the finding with the onsite generating unit or offsite generator to determine if a 'new' WAC 173-303 dangerous waste number should be applied to the waste.

  - The LLBG operating organization checks to make sure that the 'new' WAC 173-303 dangerous waste number is on the LLBG Part A, Form 3, permit application.

  - The LLBG operating organization checks to see if the "new" number is subject to any exemption, extension, variance, or other exclusion from the requirements of 40 CFR 268.

- If the waste is subject to additional treatment standards, the LLBG operating organization analyzes the waste for compliance for these additional treatment standards.

- If the waste is subject to additional treatment standards and the subsequent analysis indicates the waste does not meet the standard, the waste is not accepted for disposal at the LLBG. Conversely, if the waste meets the treatment standard, or if the waste is not subject to the treatment standards and the 'new' WAC 173-303 dangerous number is on the LLBG Part A, Form 3, permit application and if the waste meets all other acceptance criteria, the LLBG operating organization accepts the waste for disposal.

- Class 5 Waste. The LLBG operating organization rejects the waste and informs the onsite generating unit or offsite generator that the waste has not been accepted for disposal. If a manifest or waste tracking form discrepancy exists, the LLBG operating organization reports the discrepancy (Section 2.4).

2.4.5 Periodic Evaluation of Nonconformances

All nonconformances from an onsite generating unit or offsite generator are reviewed periodically to determine if waste generation and management practices are satisfactory. Depending on the review, verification percentages could be adjusted for a given waste stream or other action, such as recharacterization of the waste stream, might be required.

2.5 ACCEPTING THE WASTE

When the waste has been evaluated and when the incoming waste acceptance process has been completed, and nonconformances have been resolved or addressed, the following process is followed for receipt of waste:

- The manifest is examined and approved
- The manifest is signed and dated.

The following process is followed for acceptance of the waste.

- The manifest number and/or the waste tracking number is recorded for purposes of waste tracking.

- Weight and dose rates are noted.

- LDR certification is provided if applicable.

- The tracking number is recorded on the manifest.

- A label with the tracking number is placed on each waste container.

- The waste is made ready for disposal (i.e., closing the lid, etc.).

- The waste can proceed as directed to the disposal areas of the LLBG.

Copies of the following records for each waste disposed in the LLBG, as applicable, are maintained by the LLBG operating organization:

- All records providing a description of the waste
- Documentation identifying the dangerous characteristics of the waste
- Laboratory reports with chemical and physical analysis of samples
- Manifests or onsite waste tracking forms.

The onsite generating units and offsite generators maintain copies of onsite waste tracking forms, manifests, and associated documentation identifying the waste characteristics and assigned waste designations.

2.6 MANIFEST SYSTEM

The Hanford Facility has one EPA/State identification number as required by WAC 173-303-060, and all TSD units on the Hanford Facility are part of a single dangerous waste facility. Therefore, onsite transfers of dangerous or mixed waste are not subject to the manifesting requirements specified in WAC 173-303-370 and -180. However, all onsite waste transfers are conducted in a manner to ensure protection of human health and the environment. Onsite waste tracking systems voluntarily are used for transporting waste.

For application in this document, the term "offsite waste" is defined as mixed waste shipped to the LLBG from:

- Any generator or generating unit that is located in an area that is not part of the contiguous Hanford Facility and/or

- Any generator or generating unit from which the shipment of waste is transported over a public access roadway.

Offsite waste shipments are not exempt from the requirements of WAC 173-303-370 and -180.

After scheduling the shipment, the following occurs.

- An offsite generator completes a Uniform Hazardous Waste Manifest for each shipment. An onsite generating unit completes an onsite waste tracking form.

- The transporter receives the waste, and dates and signs the Uniform Hazardous Waste Manifest or onsite waste tracking form. The onsite generating unit or offsite generator dates, signs, and retains a copy of the manifest or the onsite waste tracking form.

- The waste is transported to the LLBG using onsite transportation personnel, or private carrier as applicable. Transporters of offsite mixed waste must have an EPA/State identification number.

Offsite waste arriving at the Hanford Facility is received at the 1100 Area. Receiving personnel inspect the waste containers for damage and proper labeling, and review the transportation documentation for completeness and accuracy. If discrepancies are identified, the shipment is not allowed on the Hanford Facility until the discrepancies are resolved. If the shipment passes inspection, the shipment proceeds to the LLBG.

Following receipt of the waste, the LLBG operating organization ensures the following.

- Manifest discrepancies, if any, are noted on the Uniform Hazardous Waste Manifest or the onsite waste tracking form.

- The transporter is given a signed copy of the Uniform Hazardous Waste Manifest or the onsite waste tracking form.

- For offsite waste shipments, a LLBG operating organization transmits the original Uniform Hazardous Waste Manifest to the offsite generator within 30 days of waste receipt. For onsite waste transfers, the LLBG operating organization transmits a copy of the waste tracking form to the onsite generating unit.

The Uniform Hazardous Waste Manifests and onsite waste tracking forms are maintained in the LLBG operating record.

If a waste arrives at the LLBG in a condition (e.g., bulging, etc.) that could present a hazard to public health or the environment, the building emergency plan for the LLBG is implemented.

2.7 TRACKING SYSTEM

The LLBG operating organization maintains a record of waste received, and rejected and returned, including names, waste tracking numbers, and the reason the waste was rejected.

On approval for disposal, the waste is assigned a unique number used for tracking waste movement and final disposition. This number is written on the manifest or waste tracking form and is placed on a label for each container. The unique number for bulk waste will be tracked in the tracking system only.

2.8 ADDITIONAL REQUIREMENTS FOR WASTE GENERATED OFFSITE

There are no additional requirements for waste generated offsite.

2.9 METHODOLOGY FOR IGNITABLE, REACTIVE, OR INCOMPATIBLE WASTE

The LLBG does not accept ignitable, reactive, or incompatible waste. All mixed waste accepted for disposal at the lined trenches must meet LDR requirements.

3.0 SAMPLING METHODOLOGY

Specific sampling processes depend on both the nature of the material and the type of packaging (Table 3-1). This section describes the sampling methodology.

3.1 SAMPLING TECHNIQUES

As practical, the sampling techniques used for specific types of waste correspond to those references in SW-846 and WAC 173-303 (Table 3-1).

3.2 SAMPLING STRATEGIES

The sampling strategies selected for any given waste load depends on the type of material to be sampled as well as the method of containment. Most solid waste only requires two composite samples to yield a representative sample. Samples collected for the purpose of LDR verification will be grab samples, unless the waste form requires other alternatives.

The ALARA principle and other worker safety concerns impose a practical limit on the extent of verification evaluation that can be performed on a waste load. The current upper limit set on the surface dose rate for opening containers is 20 millirem per hour. Deviations from this limit can be allowed by a radiation work permit.

In addition to the 20 millirem per hour restriction, the extent of verification evaluation could be limited by an industrial hygienist, who could make a decision that a container not be opened because of the potential for chemical exposure. In both cases, the decision not to open a container is documented in the field files and signed and dated by the industrial hygienist or an authorized representative of radiological control as appropriate. If a waste package is deemed to be hazardous to worker health, additional containers will be examined for sampling suitability.

Samples from individual containers or the point of generation can be composited providing the samples are: (1) from a single onsite generating unit or offsite generator, (2) related to one waste specification record, or (3) similar in appearance and composed of compatible material. If the sample material shows significant variation in moisture content, texture, or color, this material should not be composited to avoid masking potentially regulated constituents.

3.2.1 Container Sampling

Sampling of small containers varies with the nature of the material, as well as the type of container. However, the appropriate SW-846 method or protocol will be followed with each sampling campaign. Solid material that cannot be penetrated to an appropriate depth with standard sampling equipment

is sampled to the best extent possible with available equipment. Otherwise a representative sample will be taken by drawing a full vertical sample of the waste container.

3.2.2 Point of Generation Sampling (Bulk Loads)

If an onsite generating unit or offsite generator produces a large volume of a single waste from the same process, 50 percent of the transfer or shipment is sampled during loading at the point of generation. In addition, every truck is inspected visually during loading and any load showing visible variations in color, texture, or wetness is subject to sampling. If there is no variation among the sampled material, the sampling regime is reduced. If the sampled materials do show variation, 50 percent sampling frequency could be reinstituted for the next 10 loads. If these next 10 loads do not show any variation, the frequency will again be reduced.

3.2.3 Collected Leachate Sampling

To ensure compliance with LDR and to provide continuity of sampling between single-source and multi-source operations, any F039 (multi-source leachate) waste generated is analyzed by the LLBG operating organization to determine what constituents are present. The initial (baseline) analysis will check for all regulated constituents in F039. The LLBG operating organization is responsible for obtaining an initial analysis of constituents in the collected leachate. Based on the results of analysis, and any other information that should be considered, the LLBG operating organization develops a list of constituents to be analyzed on an established schedule. This testing schedule will be supplemented with perhaps less frequent, broader analysis to ensure that changes in the composition of the leachate are detected and noted. This approach alleviates Hanford Facility treatment, storage, and/or disposal units (e.g., Double-Shell Tank System, 200 Area Effluent Treatment Facility, etc.,) receiving leachate from conducting duplicate F039 testing, as well as providing an accurate assessment of the waste constituents.

3.3 LAND DISPOSAL RESTRICTED WASTE SAMPLING

Waste material that is received at a lined landfill must meet LDR. This waste also must have a sample taken. Materials that have been set up in grout or concrete might not be sampled if ALARA concerns prohibit the sampling. One of three sampling scenarios could take place: (1) the onsite generating unit or offsite generator provides a small sample of grouted material in a pre-approved quantity and container for sampling, (2) the waste container is sampled at the point of generation, or (3) the waste container is sampled at the burial trench.

Table 3-1. Low-Level Burial Ground Sampling Methods.

Waste type	Reference in SW-846 (EPA 1986)		Reference in WAC 173-303	
	Waste type	Sampling method	Waste type	Sampling method
Liquids	Free-flowing liquids and slurries	COLIWASA, SW-846, Chapter 9	Extremely viscous liquid	ASTM Standard D140-70
			Containerized liquids	Coliwasa, SW-846, Chapter 9
Solidified liquids	Sludges	Trier, SW-846, Chapter 9	NA	NA
Sludges	Sludges	Trier, SW-846, Chapter 9	NA	NA
Soils	Sand or packed powders and granules	Auger, SW-846, Chapter 9	Soil-like material	ASTM Standard D1452-65
Absorbents	Large-grained solids	Large trier, SW-846, Chapter 9	Soil- and rock-like material	ASTM Standard D420-69
Wet absorbents	Moist powders or granules	Trier, SW-846, Chapter 9	NA	NA
Process solids and salts	Moist powders or granules	Trier, SW-846, Chapter 9	NA	NA
	Dry powders or granules	Thief, SW-846, Chapter 9	Crushed or powdered materials	ASTM Standard D346-75
	Sand or packed powders and granules	Auger, SW-846, Chapter 9	Soil-like material	ASTM Standard D1452-65
	Large-grained solids	Large trier, SW-846, Chapter 9	Soil- and rock-like material	ASTM Standard D420-69
Ion exchange resins	Moist powders or granules	Trier, SW-846, Chapter 9	NA	NA
	Dry powders or granules	Thief, SW-846, Chapter 9	Fly ash-like material	ASTM Standard D2234-86
	Sand or packed powders and granules	Auger, SW-846, Chapter 9	Soil-like material	ASTM Standard D1452-65

COLIWASA = composite liquid waste sampler.
NA = not applicable.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL PROGRAM

The following sections discuss the overall objectives of the waste analysis program, as well as the specific data quality objectives (DQOs) (Table 4-1). Specific field and laboratory QA/QC requirements to meet these objectives also are addressed.

4.1 OBJECTIVES OF THE WASTE ANALYSIS PROGRAM

The primary objective of the waste analysis program is to ensure that the waste disposed at the LLBG is characterized adequately to demonstrate the disposal requirements are met. The waste analysis program is designed to meet this objective, and the general waste analysis requirements of WAC 173-303-300 and the disposal restrictions of WAC 173-303-140(4) and 40 CFR 268.

4.2 DATA QUALITY OBJECTIVES

The data used to support the LLBG waste analysis program needs to be scientifically sound, of known quality, and thoroughly documented. In DQOs for the waste characterization and verification program, the standard parameters (precision, accuracy, compatibility, completeness, and representativeness) were considered (DOE/RL-94-55).

The field data for verification testing will meet EPA quality level I and II criteria. The laboratory data for chemical analyses will meet EPA quality level III criteria. Data from radiological analyses will meet EPA quality level V criteria (DOE/RL-94-55).

4.3 FIELD QUALITY ASSURANCE AND QUALITY CONTROL

Field blanks and replicates are required for samples analyzed in the field as part of verification testing as well as for samples submitted for laboratory analysis. The number of field QA samples is 10 percent of the total number of field samples taken. The 10 percent criterion commonly is accepted as a minimum number of QA/QC samples. The types and frequency of collection for field QA samples are as follows.

- **Field Blanks.** Field blanks refer to an artificial sample designed to monitor the introduction of artifacts into the sample preparation and analysis process. Typically, reagent water is used as a blank matrix. However, a universal blank matrix does not exist for solid samples; therefore, it usually is not appropriate to include a solid matrix blank in a sample batch. Field blanks are prepared and preserved using sample containers from the same lot as the other samples collected that day. Results of the field blank analyses help determine the level of contamination introduced into the sample by the sampling technique and check the water used for decontamination.

- **Field Replicates.** Field replicates are defined as independent samples collected in such a manner that the samples are equally representative of the variables of interest at a given point in space and time. To provide verification, the field replicate is tested for the same parameters for which the original sample was tested. If the field replicates do not agree, an additional two samples are tested. If the second duplicate pair of samples do not agree, all reagents for the test are checked and the test is not used until corrective action is taken.

4.4 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

The laboratory QA/QC requirements outlined in the following apply to laboratory analyses requested by the LLBG operating organization for residuals characterization or for recharacterization as part of a corrective action. Most laboratory analyses for waste characterization are conducted by the onsite generating units or offsite generators, who are required to specify in Section 2.0.

The daily quality of analytical data generated in the contracted analytical laboratories is controlled by the implementation of an analytical laboratory QA plan.

Before commencement of the contract for analytical work, the laboratory submits its QA plan to the waste analysis project manager and the QA officer for approval. At a minimum, the plan documents the following:

- Sample custody and management practices
- Sample preparation and analytical procedures
- Instrument maintenance and calibration procedures
- Internal QA/QC measures, including the use of method blanks
- Sample preservatives used
- Analyses requested.

The following are the types of internal QC checks.

- **Method Blanks.** Method blanks usually consist of laboratory reagent-grade water that is treated in the same manner as the sample (i.e., digested, extracted, distilled). Method blanks are analyzed and reported like a standard sample.

- **Method Blank Spike.** A method blank spike is a sample of laboratory reagent-grade water fortified (spiked) with the analytes of interest, which is prepared and analyzed with the associated sample batch.

- **Laboratory Control Sample for Inorganics.** This is a standard solution with a certified concentration that is analyzed as a sample and used to monitor analytical accuracy. It is equivalent to a method blank spike.

- **Matrix Spikes.** A matrix spike is an aliquot of an investigative sample that is fortified (spiked) with a known quantity of the analytes of interest and analyzed with an associated sample batch to monitor the effects of the investigative sample matrix on the analytical method. Matrix spikes are performed only for selected protocols. Matrix spikes are performed on 5 percent of the samples (1 in 20) or one per batch of samples, whichever is greater.

- **Laboratory Duplicate Samples.** Duplicate samples are obtained by splitting a field sample into two separate aliquots and performing separate analysis on the two aliquots. Analysis of laboratory duplicates monitors the precision of the analytical method for the sample matrix. However, it might be affected by nonhomogeneity of the sample, particularly in the case of nonaqueous samples. Duplicates are performed only for selected protocols. Laboratory duplicates are performed on 5 percent of the samples (1 in 20) or one per batch of samples, whichever is greater. If the precision value exceeds the control limit, the sample set is reanalyzed for the parameter in question.

- **Known QC Check Sample.** This is a reference QC sample of known concentration (as denoted by SW-846) that is obtained from the EPA, the National Institute of Standards and Technology, or an EPA-approved commercial source. This QC sample checks the accuracy of an analytical procedure. It is particularly applicable when a minor revision or adjustment has been made to an analytical procedure or instrument. The results of a QC check standard analysis are compared with the true values and the percent recovery of the check standard is calculated.

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Table 4-1. Low-Level Burial Ground Data Quality Objectives for Waste Analysis Program.

Objective	Waste analysis activity	Data quality/ analytical level
Waste characterization		
Obtain and document the information necessary to properly designate waste	• Specify parameters to be evaluated for waste characterization • Require waste certification summaries for each waste stream • Document in each waste certification summary	Level III for chemical analysis; Level V for radionuclide analysis
Confirm that the data collected for waste characterization are of sufficient quality to support waste management decisions	• Specify information required to document process knowledge • Specify sampling and analytical methods to be used • Waste certification process • Specify QA requirements	Level III for chemical analysis; Level V for radionuclide analysis
Confirm that waste characterization information is up to date	• Implement for all new or nonroutine waste streams • At a minimum, require annual recharacterization of routine waste streams if waste generating process changes	NA
Identify and reject waste that does not meet LLBG's acceptance criteria	• Implement pre-shipment review process • Implement waste verification program	NA
Tests for compliance with numerical treatment standards of 40 CFR 268	• Require concentrations for all LDR with numerical standards constituents • Specify LDR documentation requirements	Level III for chemical analysis
Waste verification		
Confirm that the waste received matches the accompanying documentation and is what was expected by LLBG	• Check completeness of shipping papers and screen all waste containers for surface dose and weight measurements to identify obvious discrepancies between the waste received, and the accompanying documentation • Perform real-time radiography or visual inspection and fingerprint analysis on a percentage of the containers received to confirm that the waste matches the waste tracking forms	Level I/Level II
Confirm that no restricted waste forms are present	• Review inventory for all waste containers received • Perform nondestructive examination or visual inspection on a percentage of containers received	Level I/Level II
Confirm that the data collected during the verification evaluation are of sufficient quality to support waste management decisions	• Require regular, documented calibration and reagent checks for testing equipment and supplies • Require field blanks and replicates	Level I/Level II

LDR = land disposal restriction.
NA = not applicable.
NDE = nondestructive examination
QA = quality assurance.
WAP = waste analysis plan.

5.0 SPECIAL REQUIREMENTS FOR LAND DISPOSAL RESTRICTION WASTE

The LLBG operating organization ensures that all mixed waste restricted from land disposal meets the treatment standards of WAC 173-303-140(4) and 40 CFR 268, Subpart D, before acceptance for disposal. The LLBG operating organization does not place in lined trenches any mixed waste restricted under 40 CFR 268, Subpart C, that does not meet the treatment standards of 40 CFR 268, Subpart D, unless:

- Such waste is subject to a national variance
- Contained-in petition is granted
- Equivalent treatment under 40 CFR 268.42(b) is granted
- A petition under 40 CFR 268.6 is granted
- An extension under 40 CFR 268.5 is given
- A treatment standard variance under 40 CFR 268.44 is granted.

Listed waste numbers F020, F021, F022, F023, F026, and F027 (dioxin-containing waste) are prohibited from land disposal; the LLBG operating organization does not accept waste containing these waste numbers. Also, lab packs are prohibited at the LLBG.

Waste containing halogenated organic compounds (HOCs) in total concentration greater than or equal to 1,000 milligrams per kilogram are prohibited from land disposal and are not accepted for disposal. Specific methods for analyzing the HOCs (otherwise referred to as total organic halides (TOX) are described in Appendix B.

The LLBG operating organization performs detailed physical and chemical analysis in accordance with Section 2.0. This applies to waste that is both treated and that naturally meets the treatment standards specified in 40 CFR 268. At a minimum, corroborative testing will be conducted annually on a designated sample (e.g., the pre-acceptance sample). Waste characterization might be required more frequently under the following circumstances.

- A new waste stream is generated.
- A process generating the waste changes.
- The waste characteristics are highly variable from load to load.
- The LLBG operating organization has reason to suspect a change in the waste based on inconsistencies in manifesting, packaging, or labeling of the waste.

Each waste is analyzed for those LDR constituents contained in the listed and characteristic numbers identified by the onsite generating unit or offsite generator that cause the waste to be dangerous. Onsite generating units or offsite generators might test waste or use process knowledge to determine LDR status. Treatment standards to which the waste is subject use 40 CFR 268, Appendix I, SW-846, or EPA-600 methods. However, when it can be shown that a treatment standard has been met through an analysis other than for the

established analysis methods, the requirement for the analysis of the treatment standard may be waived by the LLBG operating organization.

6.0 RECORDKEEPING

This WAP is maintained with the LLBG operating organization or other approved organizations manuals containing all documents referenced in this plan--except for laboratory documents, which are maintained at the laboratories. Records associated with this WAP and waste verification program are maintained by the LLBG operating organization.

A copy of the waste disposal record for each waste stream accepted at the LLBG also is maintained. Onsite generating units and offsite generators maintain their sampling and analysis records, and the LLBG operating organization could request copies of this information. All records and results of waste analysis are maintained in the LLBG operating record.

This WAP will be revised under the following circumstances.

- Whenever test methods are changed.
- Whenever changes occur in the waste acceptance criteria or the waste categories accepted for disposal that might require a change in the parameters to be tested.
- Whenever referenced personnel, organizations, or procedures are changed.
- Whenever regulation changes occur that affect the WAP.

The DOE-RL may implement any proposed change once Ecology is notified. However, if the change eventually is disapproved, the DOE-RL will be responsible for fulfilling any requirements that were not met because of implementation of the change.

This WAP is maintained as a controlled document under the existing guidelines for document control within the LLBG operating organization. Documents are maintained in the LLBG operating record and are forwarded to the onsite document control organization for permanent storage.

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7.0 REFERENCES

ASTM, 1982, *Annual Book of ASTM Standards*, Parts 15, 19, and 31, American Society for Testing and Materials, Philadelphia, Pennsylvania.

DOE/RL-88-20, *Low-Level Burial Grounds Dangerous Waste Permit Application, Request for Exemption from Lined Trench Requirements and from Land Disposal Restrictions for Residual Liquid at 218-E-12B Burial Ground Trench 94*, Supplement 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-90-12, *Request for Interim Approval to Operate Trench 94 of the 218-E-12B Burial Ground as a Chemical Waste Landfill for Disposal of Polychlorinated Biphenyl Waste in Submarine Reactor Compartments*, Revision 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-94-55, *Hanford Analytical Services Quality Assurance Plan*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, 1980, *Biological Testing Methods*, DOE 80-12, revised July 1984, Washington State Department of Ecology, Olympia, Washington.

EPA, 1986, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1987, *Data Quality Objectives for Remedial Response Activities, Development Processes*, EPA/540-87-003, U.S. Environmental Protection Agency, Washington, D.C.

WHC, 1995, *Waste Specification System*, WHC-EP-0846, Westinghouse Hanford Company, Richland, Washington.

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APPENDICES

CONTENTS

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APPENDIX A

ANALYTICAL PROCEDURES AND RATIONAL

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APPENDIX A

ANALYTICAL PROCEDURES AND RATIONAL

These are analytical procedures designed to identify or screen specific waste components. Because the characterization provides information concerning the distribution and nature of waste constituents within the waste material, and the LLBG operating organization is merely identifying that previously submitted information is correct rather than completely characterizing the waste, a less comprehensive sampling and analytical approach is appropriate.

The analytical screening parameters for waste received at the LLBG for disposal, associated rational, and methods for these analyses are as follows.

- Physical description is used to determine the general characteristics of the waste. This facilitates subjective comparison of the sampled waste with previous waste descriptions or samples. Also, a physical description is used to verify the observational presence or absence of free liquids.

  Methods--samples are inspected and the physical appearance of the waste is recorded. Real-time radiography and/or visual examination is used.

- Radioactivity screen is used to quantify radionuclides for verification of transuranic radionuclide content, non-transuranic radionuclide content, and the waste classification (i.e., low-level waste or transuranic)

  Methods--a sample of the waste is passed by a geiger counter, survey meter, or a waste container is assayed using passive-active neutron or segmented gamma scanning techniques.

- Headspace volatile organic compound analysis is performed to determine the presence or absence of solvents or other volatile organic compounds in waste. This is one of the few methods available to evaluate the presence of volatile organic compounds that could be associated with heterogeneous materials.

  Methods--a sample of the headspace gases in a container are analyzed by one or more of the following: Fourier transform infrared spectroscopy, gas chromatography/mass spectroscopy, HNU, organic vapor analyzer, and colorimetric tubes.

- Paint filter liquids test is used to verify the presence or absence of free liquid in solid or semisolid material to be landfilled.

  Method--to a standard paint filter, 100 centimeters or 100 grams of waste are added and allowed to settle for 5 minutes. Any liquid

passing through the filter signifies failure of the test (SW-846 Method 9095).

- pH screen is used to identify the pH and corrosive nature of an aqueous or solid waste, aid in establishing compatibility strategies, and to indicate if the waste is acceptable for disposal in the LLBG.

  Methods--full range pH is used for the initial screening. If the initial screen indicates a ph below 2 or above 12.5, a pH meter is used. The pH meter is used directly on liquid samples and on the free liquid portion of liquid/solid samples. For solid materials, the pH of the solution from a 1:1 slurry of water to waste is used (or ASTM Method D4980).

- Flammability potential screen is used to determine the fire-producing potential of the waste. This test can be applied to waste liquids, solids, and semisolids.

  Methods--liquids are tested using the HAZCAT[1] combustibility, char and/or oxidizer tests; solids and semisolids are tested using the HAZCAT char and/or oxidizer tests.

- Water reactivity screen is used to determine if the waste has the potential to react vigorously with water to form gases or other reaction products.

  Method--approximately 5 grams of solid or 5 milliliters of liquid waste are mixed with about 5 milliliters of water. For liquid waste, water is added to the waste. The solution is observed for evidence or fuming, bubbling, or spattering. These reactions are considered to be positive evidence that the waste is water reactive.

- Cyanide screen indicates whether the waste produces hydrogen cyanide upon acidification below pH 2.

  Method--to a test tube or beaker containing approximately 5 milliliters of sample, an equal amount of freshly prepared ferrous ammonium citrate is added. 3 Normal hydrochloric acid is then used to reduce the pH of the solution to about 2.0. A deep blue color indicates the presence of cyanide. The test can detect free cyanide and complex cyanides in concentrations above 200 parts per million.

- Sulfide screen is used to indicate if the waste produces hydrogen sulfide upon acidification below pH 2.

  Methods--approximately 5 milliliters of sample is added to beaker or test tube and enough 3 Normal hydrochloric acid is added to bring the pH down to 2.0. A sulfide test strip is placed in the solution. If

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[1] HAZCAT is a registered trademark of Haztech Systems Incorporated, San Francisco, California.

the paper turns brown or silvery black, the presence of sulfides in the sample is indicated. If there is no color change, the total sulfides are reported as nondetectable.

- Metals and elements screen is used to determine the presence of regulated quantities of heavy metals in the waste and confirm the presence or absence of other inorganic elements. This method is used as a confirmation of other test results.

  Method--waste samples are tested using an x-ray fluorescence spectrometer and/or the toxicity characteristics leaching procedure extraction method (SW-846 Method 1311). For the x-ray fluorescence spectrometry method, spectral data are obtained by putting a small sample of waste in special sample cups or by holding the detector up to the waste to be analyzed. The resulting spectra are analyzed for the presence of elements and heavy metals.

- Volatile and semivolatile compounds screen is used to evaluate the presence or absence of volatile and/or semivolatile organic compounds in the waste, and to verify the treatment standards associated with organic chemical content.

  Methods-waste is tested using Fourier transform infrared spectroscopy, fourier transform raman spectroscopy, and/or gas chromatography/mass spectroscopy. Depending on the waste matrix, an experienced spectroscopist uses the testing method best suited for the waste and interprets the results.

- PCB screen is used to indicate whether PCBs are present in oil-bearing waste and to determine if the waste needs to be managed in accordance with the regulations prescribed in the *Toxic Substance Control Act of 1976*.

  Method--the tests to be conducted include the HAZCAT beilstein test, and/or the appropriate organic chlorine test.

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APPENDIX B

TOTAL ORGANIC HALIDES SCREENING FOR INCOMING WASTE ACCEPTANCE

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APPENDIX B

TOTAL ORGANIC HALIDES SCREENING FOR INCOMING WASTE ACCEPTANCE

This appendix addresses the guidelines and processes by which the LLBG operating organization determines the applicability and demonstrates compliance with the LDR regulations for waste with halogenated organic compounds (HOCs). The appropriate screening methods will be used for total organic halides (TOX).

Pre-Shipment Characterization for Halogenated Organic Compounds or Total Organic Halides

A determination as to the applicability of the HOCs is made during the pre-shipment acceptance testing. This determination is based on the results of TOX analysis or based on results of the individual compounds listed in Appendix III of 40 CFR 268. This determination is made by the onsite generating unit or offsite generator before shipment as part of the information to be submitted to the LLBG operating organization.

Waste Verification for Total Organic Halides

The LLBG operating organization samples and analyzes for TOX at least 20 percent of all incoming waste streams that have pre-shipment TOX readings above 500 milligrams per kilogram to ensure the incoming waste arrives with TOX levels below 1,000 milligrams per kilogram.

If the incoming waste contains less than 1,000 milligrams per kilogram of TOX, the material is considered for land disposal if all other waste acceptance criteria are met. If the TOX test indicates greater than 1,000 milligrams per kilogram of TOX is present, the waste is subjected to further analysis to determine if the HOC concentration exceeds 1,000 milligrams per kilogram as described in the next section.

Land Disposal Prohibition for Shipments with Excessive Levels of Total Organic Halides

The LLBG operating organization does not dispose of any mixed waste where waste analysis results for TOX exceeds 1,000 milligrams per kilogram of TOX unless the comprehensive analysis criteria are performed to demonstrate that the HOC level in such waste does not exceed 1,000 milligrams per kilogram. Laboratory analysis, in accordance with EPA approved methods, is performed to determine the concentration of each constituent listed in Appendix III of 40 CFR 268. If the laboratory results indicate the sum of the California List HOCs in the waste does not exceed 1,000 parts per million, the LLBG operating organization land disposes this waste stream after recording these data in the operating record.

Annual Total Organic Halides Analysis and Re-characterization of Waste for High Total Organic Halides

Annually, the LLBG operating organization analyzes a sample of each non-high TOX waste stream for recharacterization of the high TOX classification. The TOX analysis is performed on a sample taken from an incoming shipment. Should the waste exceed 500 milligrams per kilogram of TOX, the waste is recharacterized as a high TOX waste and thereafter is analyzed for TOX at the high TOX frequency. High TOX waste remains high TOX waste thereafter. The annual high TOX recharacterization is not required for high TOX waste because waste already is sampled at the high TOX frequency.

Additional Recordkeeping Requirements for High Total Organic Halides Analysis Results

The LLBG operating organization maintains the following additional records pertaining to TOX analysis in the operating record:

- A list of high TOX waste streams that are accepted at the LLBG
- The results of the annual characterization analysis for high TOX/non-high TOX waste
- The results of the incoming shipment analyses for TOX for both high TOX and non-high TOX waste.

Total Organic Halides Screening Protocol Sample Preparation and Analysis

Method 9020 or 9022 determines TOX as chloride in aqueous waste solutions. Using this method for analysis, the LLBG operating organization prepares and analyzes an extract for all waste that is nonaqueous in nature. The LLBG operating organization uses Method 3540 (soxhlet) or Method 3550 (sonification), which are extraction procedures described in SW-846 to prepare this extract. The extract is referred to as 'solid waste extracts'.

If significant stratification occurs in the waste, each layer might be composited in proportion to the estimated volume. These samples sufficiently are mixed to allow a representative sample of the waste to be analyzed.

APPENDIX C

FINGERPRINT PARAMETER SELECTION

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APPENDIX C

FINGERPRINT PARAMETER SELECTION

The following parameters have been selected for fingerprint analysis of waste materials being received at the LLBG

- Flammability or Head Space VOC/SVOC - Flammability tests will be conducted when safety conditions exist that eliminate the spread of radioactive material to the worker or environment via open flame testing. Head space analysis, volatile organic compounds, or semivolatile organic compound analysis will be tested in place of open flame tests as needed using appropriate analytical equipment. Oxidizing materials that could contribute to the propagation of a fire also will be analyzed.

- Paint Filter Liquid Screening - When needed, this analysis will be used to determine if free liquids potentially are present in a waste shipment.

- pH - pH screening is conducted to identify waste that might mobilize toxic materials and corrode waste handling or storage containers.

- Organic Halogen - This screening is conducted to identify the presence of persistent or land ban materials; a precursor for PCB screening if the test is positive.

- PCBs - PCB waste is regulated specifically by federal and state regulations. These regulations must be met for disposal of PCB waste at the LLBG.

- H_2O Reactivity - This test is conducted to determine if a waste material has the potential to react vigorously with water or form toxic gases.

- Sulfide - This test is conducted to determine if a waste material might produce hydrogen sulfide, a toxic gas formed below pH 2.

- Cyanide - This test is conducted to determine if a waste material might produce hydrogen cyanide below pH 2.

- Metals (as appropriate for Trenches 31 and 34) - When needed, x-ray fluorescence or toxicity characteristic leaching procedure methods will be conducted.

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