

# 218 E-8 Borrow Pit Demolition Site Clean Closure Soil Evaluation Report



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



Hanford Operations and Engineering Contractor for the  
U.S. Department of Energy under Contract DE-AC06-87RL10930

Approved for Public Release

T-2-1  
cross ref: 0041628

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) RCRA Unit Closures	4. Related EDT No.: NA
5. Proj./Prog./Dept./Div.: 01821	6. Cog. Engr.: D. M. Korematsu-Olund	7. Purchase Order No.: NA
8. Originator Remarks: This report summarizes the sampling activities and the analytical results obtained during soil characterization at the 218 E-8 Borrow Pit Demolition Site.		9. Equip./Component No.: NA
11. Receiver Remarks:		10. System/Bldg./Facility: NA
		12. Major Assm. Dwg. No.: NA
		13. Permit/Permit Application No.: NA
		14. Required Response Date: NA

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-TI-300		0	218 E-8 Borrow Pit Demolition Site Clean Closure Soil Evaluation Report	NA	2	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	1. Approved	4. Reviewed no/comment
		2. Release	5. Post-Review	2. Approved w/comment	5. Reviewed w/comment
		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved w/comment	6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G)	(H)	(J) Name (K) Signature (L) Date (M) MSIN				(J) Name (K) Signature (L) Date (M) MSIN				(G)	(H)
Reason	Disp.									Reason	Disp.
1	1	Cog. Eng. D.M. Korematsu-Olund <i>[Signature]</i> 6/12/95 H6-23				OSTI (2) <i>[Signature]</i> 6/12/95 L8-07				3	
1	1	Cog. Mgr. F.A. Ruck III <i>[Signature]</i> 6/12/95 H6-23				Central Files (orig + 1) <i>[Signature]</i> L8-04				3	
		QA									
		Safety									
		Env.									

18. D. M. Korematsu-Olund <i>[Signature]</i> 6/12/95 Signature of EDT Originator	19. D. M. Korematsu-Olund <i>[Signature]</i> 6/12/95 Authorized Representative for Receiving Organization	20. F. A. Ruck III <i>[Signature]</i> 6/12/95 Cognizant Manager	21. DOE APPROVAL (if required) Ctrl. No. <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments
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## RELEASE AUTHORIZATION

**Document Number:** WHC-SD-EN-TI-300, Rev. 0

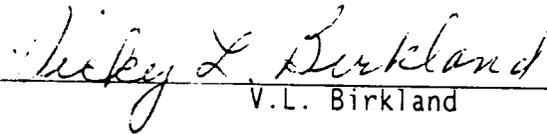
**Document Title:** 218 E-8 Borrow Pit Demolition Site Clean Closure  
Soil Evaluation Report

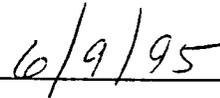
**Release Date:** 06/09/95

This document was reviewed following the  
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U.S. Department of Commerce  
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Springfield, VA 22161  
Telephone: (703) 487-4650

SUPPORTING DOCUMENT

1. Total Pages 24

2. Title

218 E-8 Borrow Pit Demolition Site Clean Closure  
Soil Evaluation Report.

3. Number

WHC-SD-EN-TI-300

4. Rev No.

0

5. Key Words

Soil Evaluation, 218 E-8 Borrow Pit, Demolition  
Site, RCRA Closure

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Organization/Charge Code 01821/A5GF1

7. Abstract

This report summarizes the sampling activities undertaken and the analytical results obtained in a soil sampling and analyses study performed for the 218 E-8 Borrow Pit Demolition Site (218 E-8 Demolition Site). The 218 E-8 Demolition Site is identified as a Resource Conservation and Recovery Act (RCRA) treatment unit that will be closed in accordance with the applicable laws and regulations.

No constituents of concern were found in concentrations indicating contamination of the soil by 218 E-8 Demolition Site activities.

8. RELEASE STAMP

OFFICIAL RELEASE  
BY 4000  
DATE JUN 12 1995  
35 Station 21

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1 218 E-8 BORROW PIT DEMOLITION SITE CLEAN CLOSURE  
2 SOIL EVALUATION REPORT  
3  
4

5 1.0 INTRODUCTION  
6  
7

8 1.1 PURPOSE AND SCOPE  
9

10 The purpose of this report is to describe the soil sampling performed at  
11 the 218 E-8 Borrow Pit Demolition Site (218 E-8 Demolition Site) and to  
12 present the analytical results of the verified soil samples and compare these  
13 results to clean closure criteria.  
14

15 The scope of this report is the evaluation of the analyte concentrations  
16 for the nine samples taken to represent the unit soil. This report does not  
17 describe analytical methodology, nor does it provide raw analytical data or  
18 the sampling validation report. A description of the sampling plan is  
19 presented in the 218 E-8 Demolition Site closure plan (DOE-RL 1994a). The  
20 sampling plan was discussed and agreed to by all parties during the Data  
21 Quality Objective (DQO) meeting held May 24, 1994. All analytical data were  
22 validated according to *Data Validation Procedures for Chemical Analysis*  
23 (WHC 1993). The laboratory data package and data validation report have been  
24 transmitted to Ecology as the regulatory lead for closure of this unit  
25 (DOE-RL 1994c).  
26

27 The 218 E-8 Demolition Site is a *Resource Conservation and Recovery Act*  
28 (RCRA) of 1976 treatment unit located in the 200 East Area of the Hanford  
29 Site. A single demolition event in November 1984 occurred at the  
30 218 E-8 Demolition Site. This demolition event was a form of thermal  
31 treatment for discarded explosive chemical products. Because it will no  
32 longer be used for this thermal activity, the unit will be closed. Soil  
33 sampling of the 218 E-8 Demolition Site for the purposes of clean closure  
34 occurred in July 1994 in accordance with the 218 E-8 Demolition Site Closure  
35 Plan, Revision 1 (DOE-RL 1994a).  
36

37  
38 1.2 SUMMARY OF RESULTS  
39

40 To meet the criteria for clean closure of the 218 E-8 Demolition Site,  
41 analytical results must verify that the concentration of all detonation  
42 activity residues is at or below action levels. Action levels are defined as  
43 levels above the Hanford Site soil background threshold levels identified in  
44 *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*  
45 (DOE-RL 1994b) and the Model Toxics Control Act (MTCA) (WAC 173-340) Method B  
46 residential levels. No constituents of concern were found in concentrations  
47 indicating contamination of the soil at the 218 E-8 Demolition Site (i.e.,  
48 concentrations above action levels).  
49

50 Regulator acceptance of the findings presented in this report will  
51 qualify the treatment unit for clean closure in accordance with *Washington*

1 *Administrative Code* (WAC) 173-303-610, "Dangerous Waste Regulations," without  
 2 further sampling or soil removal and/or decontamination.  
 3  
 4

5 **1.3 TREATMENT UNIT INFORMATION**  
 6

7 The 218 E-8 Demolition Site closure area is located in the northeast  
 8 portion of the 200 East Area, as shown in Figure 1. The closure area occupies  
 9 an area 20 feet (6 meters) by 20 feet (6 meters) square. It is located within  
 10 a multi-use borrow pit area, as shown in Figure 2. The entire multi-use  
 11 borrow pit area is approximately 600 feet (180 meters) by 900 feet  
 12 (270 meters) in size with a gravelly, sparsely vegetated landscape.  
 13

14 In November 1984, a demolition event consisting of a single explosion  
 15 occurred at the 218 E-8 Demolition Site. Discarded explosive chemical  
 16 products (DOE-RL 1994a) were placed in a shallow depression, 6 to 12 inches  
 17 (15 to 30 centimeters) deep, dug expressly for the demolition activity. The  
 18 discarded explosive chemical products were detonated in their original metal  
 19 and glass containers. Conventional explosives (i.e., nitroglycerin dynamite  
 20 and detonating cord) were placed around and on top of the chemical containers.  
 21 After the detonation event, the area was inspected to confirm that no intact  
 22 chemicals or containers remained.  
 23  
 24  
 25

26 **2.0 SAMPLING**  
 27  
 28

29 Soil sampling was performed on July 12, 1994, as specified in the  
 30 sampling and analysis plan (SAP) provided in the 218 E-8 Demolition Site  
 31 Closure Plan (DOE-RL 1994a). Nine samples were collected (8 samples and  
 32 1 collocated duplicate). Two blank samples were included during sampling:  
 33 a trip blank and an equipment blank. The trip blank is used to test for  
 34 contamination due to sample handling. The equipment blank is used to  
 35 determine whether decontamination of sampling equipment is adequate.  
 36  
 37

38 **2.1 SAMPLE LOCATIONS**  
 39

40 The sample locations and the intervals are shown in Figure 3. The nine  
 41 soil samples were taken within a 5.5-foot (1.7-meter)-radius centered around  
 42 the blasting pit. Before sampling, the blasting pit was reconstructed by  
 43 removing wind-blown sand to create a 6-inch (15 centimeter)-deep, 3-foot  
 44 (91-centimeter) diameter hole (original diameter 1.5 feet [46 centimeters]).  
 45 Sample intervals within the reconstructed crater (Figure 3, shaded area) were  
 46 based on the configuration of the reconstructed crater. All nine sample  
 47 locations were authoritatively selected to ensure comprehensive coverage in  
 48 the inner radius of the pit and to account for the effects of prevailing wind  
 49 patterns on the pit. The collocated duplicate sample was taken at the center  
 50 of the crater at an interval of 0 to 6 inches (0 to 15 centimeters).  
 51  
 52

## 2.2 SAMPLE COLLECTION

The nine samples required by the closure plan were assigned Hanford Environmental Information System (HEIS) (WHC 1990) numbers BOCBN1, BOCBN2, and BOC961 through BOC969 (Figure 3). The trip blank sample was numbered BOCBN2 and the equipment blank sample was numbered BOC964.

Engineering support personnel used hand tools (i.e., stainless steel spoon and bowl) to obtain the soil samples in accordance with information provided in Figure 3. Sampling depth ranged from 0 to 18 inches (0 to 46 centimeters). Samples were collected for offsite laboratory analyses per SW-846 as requested on the Sample Analysis Form 94-329 (Figure 4). The sampling equipment was decontaminated in the 1706 KE Laboratory in accordance with Environmental Investigation Instruction 5.5, "Laboratory Cleaning of RCRA/CERCLA Sampling Equipment" (WHC 1988). A complete set of decontaminated equipment was provided for each sample. All sampling equipment was later returned to the 1706 KE Laboratory for decontamination.

Because samples going offsite are required to show a certificate of nondangerous radioactivity, additional aliquots were taken for total activity readings. These aliquots were transported to the 222-S Laboratory on the following day, July 13, 1994. The evaluation of the total activity results allowed release of the samples for offsite transfer on July 14, 1994. All samples were packaged, handled, and shipped in accordance with WHC Environmental Investigations Instructions (WHC 1988). All samples were cooled to 4 °Celsius during storage and transportation to the offsite laboratory. Samples are listed in Table 1.

## 2.3 QUALITY CONTROL SAMPLES

Figure 3 summarizes sample identification, location, and QC designation.

A duplicate sample (BOC953) was taken at the location of sample BOC952. The sample number BOC952 and the collocated duplicate were taken from the center of the crater at an interval of 0 to 6 inches (0 to 15 centimeters). Duplicate samples are collected as close as possible to the same point in space and time; however, they are stored in separate containers and analyzed independently. Duplicates are used to estimate the precision of the sampling process.

Trip blanks are used when samples are taken for volatile organics analysis. The trip blank for this study consisted of clean sand that was placed in a sample bottle in an uncontaminated area. The trip blank was subjected to the same handling as the routine samples and was analyzed to determine if contamination originated from the sample container or transportation and storage procedures. The trip blank was submitted to the analytical laboratory with the routine samples.

Equipment blanks consist of clean sand poured over or through the sampling device after decontamination; these blanks are collected in a sample bottle and transported to the laboratory for analysis. Equipment blanks test

1 for residual contamination from inadequate decontamination of the sampling  
2 equipment at the 1706 KE Facility. One equipment blank was collected after  
3 the sampling event was completed.  
4  
5  
6

### 7 3.0 PERFORMANCE STANDARDS 8 9

10 The performance standards, or action levels, for soils are defined in the  
11 218 E-8 Demolition Site closure plan (DOE-RL 1994a), Chapter 6, Section 6.1.  
12 To meet action levels for clean closure, analytical results must verify that  
13 potentially dangerous waste constituents treated at the unit are not present  
14 in concentrations above these levels. Action levels are defined as levels  
15 above the Hanford Site soil background threshold levels identified in *Hanford*  
16 *Site Background: Part 1, Soil Background for Nonradioactive Analytes*  
17 (DOE-RL 1994b) and *Model Toxics Control Act* (MTCA) (WAC 173-340) Method B  
18 levels. If analysis determines that concentration are above both guidelines,  
19 a phase two investigation will be developed. Additional information on the  
20 Hanford Site Background threshold levels is provided in Section 3.1 and is  
21 listed in Tables 2 and 3. Information on MTCA Method B health-based levels is  
22 provided in Section 3.2 and calculations are described in *Model Toxics Control*  
23 *Act* (MTCA) [WAC 173-340-740 (3)(a)(iii)] Method B. In this report, the  
24 analytical results have been evaluated and compared with action levels to  
25 verify that the concentration of all detonation activity residues is at or  
26 below action levels.  
27  
28

### 29 3.1 BACKGROUND LEVELS 30

31 The background action levels used in this report are based on a sitewide  
32 approach to determining background levels and were developed as an alternative  
33 to local unit-based background determinations at the Hanford Site  
34 (DOE-RL 1994b). Using local background for each treatment, storage, and/or  
35 disposal (TSD) unit can lead to different definitions of contamination and  
36 different assessments of remediation goals and risk for various TSD units.  
37 The Hanford Site Background approach is based on the premise that (1) the  
38 waste management units are located on or in a common sequence of vadose zone  
39 sediments, and (2) the basic characteristics that control the chemical  
40 composition of these sediments are similar throughout the Hanford Site. The  
41 range of natural soil compositions is used to establish a single set of soil  
42 background data. Use of the Hanford Site Background for environmental  
43 restoration on the Hanford Site is technically preferable to the use of the  
44 unit-based background because the former more accurately represents the  
45 natural variability in soil composition and also provides a more consistent  
46 and efficient basis for evaluating contamination in soil.  
47

48 The Hanford Site Background threshold levels are summarized in Tables 2  
49 and 3. The background threshold is the concentration level defining the upper  
50 limit of the background population. Background thresholds are based on a  
51 tolerance interval approach. The calculated threshold levels depend on the  
52 confidence interval and percentile used in the calculation. The

1 WAC 173-340-708(11)(d) specifies a tolerance coefficient of 95 percent and a  
2 coverage of 95 percent. The Hanford Site Background threshold levels are  
3 based on this 95/95 confidence interval. Statistical calculations are  
4 described in the source document (DOE-RL 1994b).  
5  
6

### 7 3.2 HEALTH-BASED LEVELS 8

9 The health-based action levels used in this report are based on  
10 calculations from the equations, risk levels, and exposure assumptions found  
11 in the MTCA Method B [WAC 173-340-740 (3)(a)(iii)]. For noncarcinogens, the  
12 principal variable is the reference dose. The reference dose, as defined in  
13 the Environmental Protection Agency's (EPA) *Integrated Risk Information System*  
14 (IRIS) database (EPA 1995), is an estimate of a daily exposure to the human  
15 population that likely is to be without an appreciable risk of deleterious  
16 effects during a lifetime. For carcinogens, the cancer slope factor is the  
17 basis for determining human health effects; it is a measurement of the risk  
18 per unit dose. The reference dose and the cancer slope factor are chemical-  
19 specific and are obtained from IRIS. If not available in IRIS, secondary  
20 sources for these toxicity values include the Ecology Cleanup Levels and Risk  
21 Calculation database (Ecology 1995) and EPA Health Effects Assessment Summary  
22 Tables (EPA 1994).  
23  
24  
25

## 26 4.0 ANALYSES 27 28

29 All samples were analyzed for volatile organic compounds (VOC),  
30 detonation residues, anions, and total nitrogen. Semi-volatile organic  
31 compound (Semi-VOC) analysis was performed on selected samples (Figure 3).  
32 Semi-VOCs are not part of the inventory of known discarded explosive chemical  
33 products that were detonated at the 218 E-8 Demolition Site, nor are they  
34 listed on the inventory of known detonation materials used at the  
35 218 E-8 Demolition Site. However, during the DQO meeting, all parties agreed  
36 to analyze a limited number of samples for semi-VOC for informational  
37 purposes.  
38

39 All samples were sent to IT-Quanterra Laboratory in Knoxville, Tennessee,  
40 for analysis. Table 1 lists the analytical methods for 218 E-8 Demolition  
41 Site soils. Anions and total nitrogen results are grouped together in the  
42 data package "General Chemistry" and will be discussed in this report under  
43 the subtitle of "Inorganic Compounds." Each analyte group, except  
44 nitroexplosives and VOCs, has a concentration comparison table that lists and  
45 identifies chemical concentrations (see Tables 2 and 3). All known  
46 nitroexplosives and VOCs data were reported as undetected. No further  
47 evaluation will be presented for these undetected analytes.  
48

49 All analytical data were validated according to *Data Validation*  
50 *Procedures for Chemical Analysis* (WHC 1993) (refer to Section 5.0).  
51  
52

1 **4.1 ORGANIC ANALYSES**  
2

3 Samples were analyzed for VOCs and semi-VOCs, including standard target  
4 analytes and Appendix IX VOCs and semi-VOCs, using gas chromatography/mass  
5 spectroscopy (GS/MS), which is based on EPA SW-846 methods 8240 and 8270. Any  
6 unidentified compounds were subjected to a computer-generated library search  
7 and mass spectral interpretation. Those unidentified analytes that generally  
8 correlate with known compound spectra are listed as tentatively identified  
9 compounds (TICs). The volatile organic analysis was performed by purge and  
10 trap with capillary column on a GC/MS. All samples were analyzed and all  
11 analytes were reported as undetected. Matrix spike and matrix duplicate  
12 samples were analyzed for sample BOC961 and met all QC method specified  
13 limits.  
14

15 The semi-VOC analysis was performed by direct injection of sample extract  
16 on a capillary column on a GC/MS. The samples did not contain any Appendix IX  
17 compounds. Matrix spike and matrix spike duplicate were analyzed for sample  
18 BOC961 and passed all QC criteria.  
19  
20

21 **4.2 INORGANIC ANALYSES**  
22

23 Samples were analyzed for the following inorganic analytes: fluoride,  
24 chloride, phosphate, sulfate, nitrate, and nitrite. The EPA Method 300  
25 (EPA 1993) was used to determine the fluoride, chloride, phosphate, and  
26 sulfate concentrations. The EPA Method 353.2 (EPA 1993) was used to determine  
27 the nitrate/nitrite concentrations. It should be noted that EPA Method 300  
28 (EPA 1993) reports values for nitrate and nitrite and these are included in  
29 the validation data package (DOE-RL 1994c). However, for the purpose of this  
30 report, only the results from Method 353.2 (EPA 1993) will be used as agreed  
31 to during the DQO process.  
32  
33  
34  
35  
36  
37

38 **5.0 DATA VALIDATION**  
39

40 Data validation was performed by Golder Associates Inc. (GAI), in  
41 accordance with Level D as defined in *Data Validation Procedures for Chemical*  
42 *Analysis* (WHC 1993). Level D validation includes evaluation and qualification  
43 of results based on analytical holding times, method blank results, matrix  
44 spikes and duplicates, surrogate recoveries, and analytical method blanks.  
45

46 The criteria and limits for the validation procedures are listed in the  
47 source document. Results of the data validators' review of the QC applied in  
48 this sampling event were transmitted to the regulators with the validated data  
49 packages (DOE-RL 1994c).  
50

51 The data validation procedure establishes the following qualifiers and  
definitions to describe the associated data:

- 1 U Indicates the compound or analyte was analyzed for and not detected  
 2 in the sample.  
 3
- 4 UJ Indicates the compound or analyte was analyzed for and not detected  
 5 in the sample. Because of a quality control deficiency identified  
 6 during data validation, the associated quantitation limit is an  
 7 estimate. These data are useable for decision-making purposes.  
 8
- 9 J Indicates the compound or analyte was analyzed for and detected.  
 10 The associated concentration is an estimate by the laboratory  
 11 because it is below the method detection limit. These data are  
 12 usable for decision-making purposes.  
 13
- 14 JN Indicates a tentatively identified compounds (TIC) that has been  
 15 determined to be valid in terms of identification and quantitation.  
 16
- 17 UR Indicates the compound or analyte was analyzed for and not detected  
 18 in the sample. As a result of a major quality control deficiency  
 19 identified during data validation, the associated data have been  
 20 qualified as unusable for decision-making purposes.  
 21
- 22 R Indicates the compound or analyte was analyzed for and detected. As  
 23 a result of a major quality control deficiency identified during  
 24 data validation, the concentration reported has been qualified as  
 25 unusable. The associated data should be considered unusable for  
 26 decision-making purposes.  
 27
- 28 B For organic data, indicates that the analyte was detected in both  
 29 the sample and the associated blank. For inorganic data, indicates  
 30 that the analyte concentration is less than the contract required  
 31 detection limit, but greater than the instrument detection limits.  
 32

33 All TICs reported during the organics analyses are deemed as estimated  
 34 and presumptive and are qualified as estimated during the data validation  
 35 process (WHC 1993).  
 36

37 Some discrepancies were noted in the validation of the laboratory data  
 38 resulting in the data being qualified. The qualifiers are listed in Tables 2  
 39 and 3. The following qualifiers were applied to the data as described and  
 40 required in the data validation guidelines (WHC 1993):  
 41

- 42 • For the volatile organic analysis (VOA), methylene chloride and  
 43 acetone were detected in the laboratory blank. This resulted in some  
 44 data being qualified as non-detect (U).  
 45
- 46 • For general chemistry analyses (anions), the holding times for some  
 47 phosphate results were exceeded and the applicable results were  
 48 qualified as estimated (J) or rejected (R). However, this is due to  
 49 applying holding times established for water samples to these soil  
 50 samples. There are currently no holding times established for soil  
 51 samples.  
 52

- 1 • For chloride, sample spike recovery was slightly below control limits  
2 and the applicable results were qualified as estimated (J).  
3
- 4 • No deficiencies were noted for the semi-VOA and nitroexplosives data.  
5

6 Additional information on the above noted laboratory discrepancies can be  
7 found in the data validation packages (DOE-RL 1994c).  
8  
9

## 10 6.0 DATA EVALUATION

11 The closure plan proposed comparing concentrations in soil of  
12 constituents of concern to health-based action levels. Analytical results  
13 below the detection limits are not considered to signify contamination. The  
14 samples will be considered clean with respect to that analyte. The health-  
15 based action levels will be based on MTCA Method B or Hanford Site Background  
16 threshold levels for soil. Any analyte found in concentrations greater than  
17 this health-based level will require further evaluation.  
18  
19  
20  
21

### 22 6.1 ORGANICS

23 No VOCs were reported. For the semi-volatiles analyses, discussed below,  
24 all of the compounds found can be dismissed due to their low concentrations or  
25 their status as common laboratory contaminants.  
26  
27  
28

29 Phthalate compounds were identified in two samples including the  
30 equipment blank (BOC962, BOC964). According to data validation guidelines,  
31 these are common laboratory contaminants when detected in concentrations less  
32 than 4,000 parts per billion in soil samples. Because all values were below  
33 this limit, all phthalate compounds are being dismissed as attributable to  
34 laboratory contaminants.  
35

36 There are no Hanford Site Background threshold levels or MTCA, Method B  
37 levels or practical quantitative level (PQL) for TICs. TICs are purely a  
38 qualitative measure of whether or not a compound is detected, the result is  
39 strictly estimated. The TICs found in this study are not an EPA listed  
40 hazardous substance (40 CFR 261) nor are they WAC dangerous waste constituents  
41 having a waste designation level (WAC 173-303). No toxicity (oral reference  
42 dose) information or carcinogenicity (cancer potency factor) information is  
43 available from the EPA. Because TICs have no established action levels or  
44 bearing on dangerous waste regulations and are present at such low  
45 concentration levels, they are considered to be below a level of concern.  
46

47 The field duplicate sample BOC962 contained TICs (identified in Table 2)  
48 that were not found in the original sample (number BOC961). No constituents,  
49 except a phthalate, were detected in the duplicate. Compounds not found in  
50 both the original and duplicate samples do not show reproducibility and,  
51 therefore, are dismissed as anomalies.  
52

1 TICs identified as hexanoic acid, hexadecanoic acid, and 2-methoxy-2-  
2 propoxy propane were found in the equipment blank in low concentrations and  
3 can be attributed to, and dismissed as, equipment contamination.  
4

5 In sample number BOC963, one TIC was identified as pentacosane at  
6 260 parts per billion. Pentacosane is a long single chain hydrocarbon  
7 categorized as a wax bi-product. It is not subject to the dangerous waste  
8 regulations and is present at such low concentration levels that it is  
9 considered to be below a level of concern.  
10

11 A TIC identified as 2,6-dimethyl-heptadecane was detected in sample  
12 numbers BOC961, BOC962, and BOC963 in the 100 parts per billions range. The  
13 2,6-dimethyl-heptadecane is not subject to the dangerous waste regulations and  
14 is present at such low concentration levels that it is considered to be below  
15 a level of concern.  
16

## 17 6.2 INORGANICS

18 No nitroexplosives were reported. The anions analyses are summarized in  
19 Table 3. Chloride and phosphate results that were qualified with a J indicate  
20 that the data are estimated but considered usable for decision-making purposes  
21 through data validation. Anion analyses reported above the laboratory  
22 instrumentation detection limits were compared to MTCA, Method B and/or  
23 Hanford Site Background threshold levels (DOE-RL 1994b). Fluoride, chloride,  
24 phosphate, sulfate, and nitrite-nitrate concentrations were all found to be  
25 below action levels indicating no contamination present. Chloride and sulfate  
26 were detected in the equipment blank indicating that the source was from the  
27 sampling equipment.  
28  
29  
30

## 31 7.0 CONCLUSIONS

32 The sampling and analysis activities identified few analyte  
33 concentrations above detection. No volatile organic compounds or  
34 nitroexplosives were detected. When MTCA, Method B and Hanford Site  
35 Background threshold levels were available, all analytes were below action  
36 levels. Of the semi-VOCs for which no action levels were available, all were  
37 TICs whose concentrations were below quantitation limits. The semi-VOC  
38 detections were dismissed for any one of the following reasons:  
39

- 40 • low concentrations
  - 41 • attributed to common laboratory contaminants
  - 42 • contamination by equipment
  - 43 • constituents were not hazardous substances or dangerous waste  
44 constituents.
- 45  
46  
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1 All inorganic concentrations are below MTCA, Method B and/or Hanford Site  
2 Background threshold levels, indicating no inorganic contamination is present  
3 at the 218 E-8 Demolition Site.  
4

5 In summary, the analytical results for the 218 E-8 Demolition Site soils  
6 meet the criteria for clean closure verifying that the concentration of all  
7 detonation activity residues are below action levels. No constituents of  
8 concern were found in concentrations indicating contamination of the soil at  
9 the 218 E-8 Demolition Site (i.e., concentrations above action levels).

10 Consequently, under the provisions of WAC 173-303-610, this RCRA unit  
11 qualifies for clean closure.

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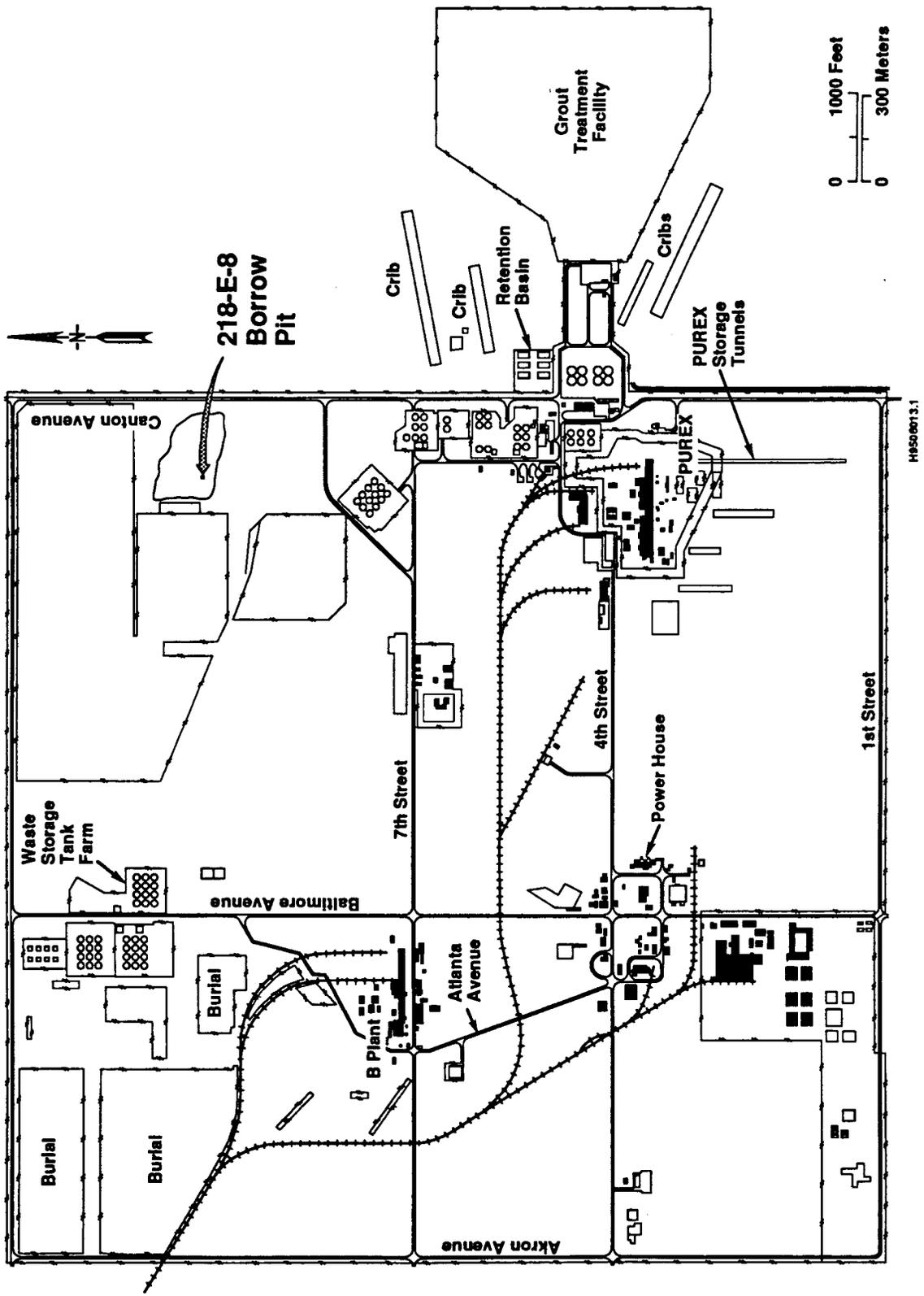


Figure 1. 200 East Area.

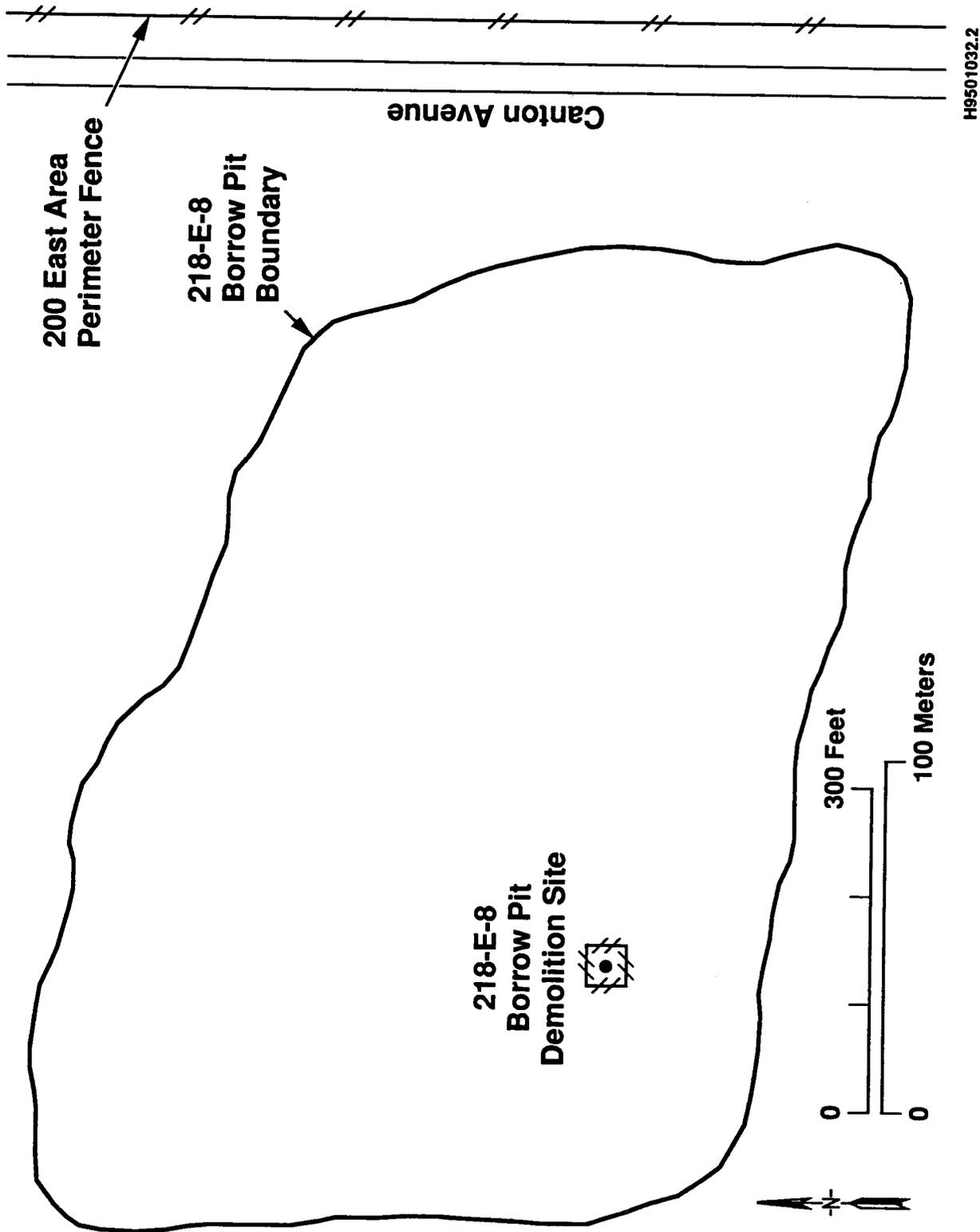
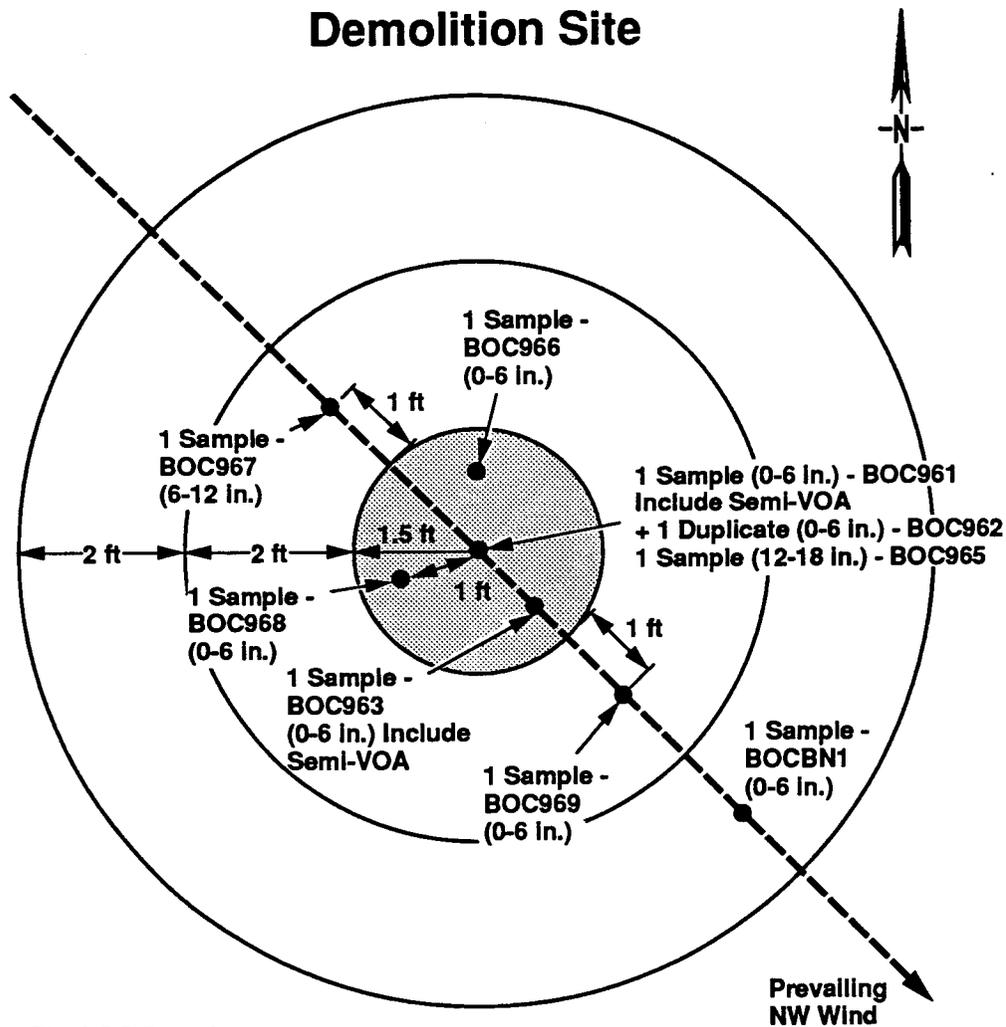


Figure 2. Layout of 218 E-8 Demolition Site Closure Area.

## 218 E-8 Borrow Pit Demolition Site



**Field QC Samples**

- BOC962 - 1 Duplicate (Located at Center 0-6 in.)
- BOC964 - 1 Equipment Blank (Clean Silica Sand)
- BOCBN2 - 1 Trip Blank (Clean Silica Sand)

**Environmental Characterization Samples → 8**

**Crater**



H9405002.2

Figure 3. 218 E-8 Demolition Site Closure Area,  
Sampling Locations, and Sample Intervals.

OFFICE OF SAMPLE MANAGEMENT FIELD SAMPLING REQUIREMENTS				94-329 SAF Number	
Requirements are for IT				06/27/94	
REV 0	PARAMETER/ ANALYSIS	ANALYTICAL METHODS	CONTAINER <sup>1</sup> / VOLUME	PRESERVATION	HOLDING TIME
1. VOA		8240 Appendix IX	Gs <sup>2</sup> 125 mL	Cool 4°C	7 Days
2. Semi-VOA		8270 Appendix IX	aG 125 mL	Cool 4°C	14 Days <sup>3</sup>
3. Detonation Residue		8330	aG 125 mL	Cool 4°C	14 Days <sup>3</sup>
4. Anions - F, Cl, SO, - PO <sub>4</sub> , NO <sub>2</sub> , NO <sub>3</sub>		EPA 300.0	G 125 mL	Cool 4°C	28 Days 48 Hours
5. NO <sub>2</sub> - NO <sub>3</sub>		EPA 353.1	P/G 125 mL	Cool 4°C	28 Days
6. ICP Metals AA Metals - Arsenic - Lead - Selenium - Mercury		6010 7060 7421 7740 7471	G 125 mL	Cool 4°C	6 Months 6 Months 6 Months 28 Days
7. Activity Scan (IT)		Lab Specific	G/P 40 mL	Cool 4°C	ASAP
8. Rod Screen (222-S)		Lab Specific	G/P small vial (at least 1 g)	None	ASAP

<sup>1</sup> Container Types:  
 P = Plastic (Polyethylene)  
 G = Glass  
 Gs = Glass w/septum cap  
 Gw = Glass/wide mouth jar  
 Gs<sup>2</sup> = Glass w/septum cap--  
 No head space in container

<sup>2</sup> 7 Days for Extraction, 40 Days for Analysis  
<sup>3</sup> 14 Days for Extraction, 40 Days for Analysis

PW = Plastic (Polyethylene)/wide mouth jar  
 PP = Polypropylene  
 aG = Amber Glass  
 T = Fluorocarbon Resins  
 aGs = Amber Glass w/septum cap  
 aGs<sup>2</sup> = Amber Glass w/septum cap  
 No head space in container

Figure 4. Sample Analyses Form 94-329.

Table 1. Routine and Quality Control Samples.

Sample number	Constituent Analysis <sup>a</sup>	Analytical Method
BOC961	VOC, Semi-VOC, Detonation residue, Anions, TN	SW-846:8240, 8270, 8330 <sup>b</sup> EPA 300.0, 353 <sup>c</sup>
BOC962 Duplicate	VOC, Semi-VOC, Detonation residue, Anions, TN	SW-846:8240, 8270, 8330 EPA 300.0, 353
BOC963	VOC, Semi-VOC, Detonation residue, Anions, TN	SW-846:8240, 8270, 8330 EPA 300.0, 353
BOC964 Equipment Blank	VOC, Semi-VOC, Detonation residue, Anions, TN	SW-846:8240, 8270, 8330 EPA 300.0, 353
BOC965	VOC, Detonation residue, Anions, TN	SW-846:8240, 8330 EPA 300.0, 353
BOC966	VOC, Detonation residue, Anions, TN	SW-846:8240, 8330 EPA 300.0, 353
BOC967	VOC, Detonation residue, Anions, TN	SW-846:8240, 8330 EPA 300.0, 353
BOC968	VOC, Detonation residue, Anions, TN	SW-846:8240, 8330 EPA 300.0, 353
BOC969	VOC, Detonation residue, Anions, TN	SW-846:8240, 8330 EPA 300.0, 353
BOCBN1	VOC, Detonation residue, Anions, TN	SW-846:8240, 8330 EPA 300.0, 353
BOCBN2 Trip Blank	VOC	SW-846:8240

NOTE: All samples submitted to IT-Quanterra, Knoxville, Tenn.

TN = nitrate-nitrite

<sup>a</sup> Sample locations and analytical requirements in Figure 3 and 4.

<sup>b</sup> EPA 1986.

<sup>c</sup> EPA 1993.

Table 2. 218 E-8 Demolition Site Results, Semi-Volatile Organics Analysis.

Sample number	Name of Constituent	CAS*	Qualifiers	Concentration $\mu\text{g}/\text{kg}$	MTC Cleanup Level <sup>b</sup> $\mu\text{g}/\text{kg}$	Hanford Site Soil Background 95/95 threshold $\mu\text{g}/\text{kg}$	Hanford Site Background Maximum Conc. $\mu\text{g}/\text{kg}$
80C961	TIC: 2,6-Dimethyl-Heptadecane	54105-67-8	JN	140.00	NA	NA	NA
80C962 Duplicate	DI-N-Butylphthalate TIC: 2,6-Dimethyl-Heptadecane Hexadecanoic Acid 4,7-Dimethylundecane Pentadecane Octacosane	84-74-2 54105-67-8 57-10-3 17301-32-5 629-62-9 630-02-4	J JN JN JN JN JN	100.00 92.0 130.0 78.00 75.00 220.0	8000.0 NA NA NA NA NA	NA NA NA NA NA NA	NA NA NA NA NA NA
80C963	TIC: 2,6-Dimethyl-Heptadecane Pentacosane	54105-67-8 629-99-2	JN JN	87.00 260.0	NA NA	NA NA	NA NA
80C964 equip blank	DI-N-Butylphthalate Bis(2-ethylhexyl)phthalate TIC: Hexanoic Acid Hexadecanoic Acid 2-methoxy-2-propoxy propane	84-74-2 117-81-7 142-62-1 57-10-3	J BJ JN JN J	78.0 61.0 77.00 180.0 2100.0	8000.0 71.0 NA NA NA	NA NA NA NA NA	NA NA NA NA NA

$\mu\text{g}/\text{kg}$  = microgram/kilogram (parts per billion)

NA = not available

J = Indicates the compound or analyte was analyzed for and detected. The associated concentration is an estimate, by the laboratory because it is below the method detection limit.

JN = Tentatively identified compounds (TICs) were reported in the samples and deemed estimated and presumptive

BJ = For organic data, indicates that the compound was detected in both the sample and the associated method blank. The associated concentration is estimated.

\* = Chemical Abstract Services

<sup>b</sup> = Calculation found in Model Toxic Control Act (173-340-740)

Note: MTC, Method B, use the lowest of the two cleanup levels, cancer or noncancer-based, for implementation in closure plans.

Table 3. 218 E-8 Borrow Pit Demolition Site Soil Results, General Chemistry Analysis.  
(sheet 1 of 2)

Sample number	Name of Constituent	Qualifiers	Concentration mg/kg	MTC Cleanup Levels* mg/kg	Hanford Site Soil Background 95/95 threshold <sup>d</sup> mg/kg	Hanford Site Soil Background Maximum Conc. <sup>b</sup> mg/kg
BOC961	Fluoride		0.70	4800.0	13.00	73.30
	Chloride	J	0.90	NA	783.0	1480.0
	Phosphate	J	1.60	NA	12.70	225.0
	Sulfate		2.50	NA	931.0	12600.0
	Nitrate+Nitrite		0.81	130000+8000=138000	208.0*	906.0*
BOC962 Duplicate	Fluoride		0.80	4800.0	13.00	73.30
	Chloride	J	0.90	NA	783.0	1480.0
	Phosphate	J	1.40	NA	12.70	225.0
	Sulfate		2.50	NA	931.0	12600.0
	Nitrate+Nitrite		0.72	130000+8000=138000	208.0*	906.0*
BOC963	Fluoride		0.80	4800.0	13.00	73.30
	Chloride	J	2.00	NA	783.0	1480.0
	Phosphate	J	2.50	NA	12.70	225.0
	Sulfate		4.50	NA	931.0	12600.0
	Nitrate+Nitrite		4.60	130000+8000=138000	208.0*	906.0*
BOC964 equip blank	Fluoride	U	0.40	4800.0	13.00	73.30
	Chloride	J	2.20	NA	783.0	1480.0
	Phosphate	UR	1.00	NA	12.70	225.0
	Sulfate		2.90	NA	931.0	12600.0
	Nitrate+Nitrite		0.88	130000+8000=138000	208.0*	906.0*
BOC965	Fluoride		0.60	4800.0	13.00	73.30
	Chloride	J	1.40	NA	783.0	1480.0
	Phosphate	J	1.20	NA	12.70	225.0
	Sulfate		2.50	NA	931.0	12600.0
	Nitrate+Nitrite		0.55	130000+8000=138000	208.0*	906.0*
BOC966	Fluoride	U	0.40	4800.0	13.00	73.30
	Chloride	J	0.80	NA	783.0	1480.0
	Phosphate	J	1.70	NA	12.70	225.0
	Sulfate		3.30	NA	931.0	12600.0
	Nitrate+Nitrite		1.30	130000+8000=138000	208.0*	906.0*
BOC967	Fluoride		0.40	4800.0	13.00	73.30
	Chloride	J	0.90	NA	783.0	1480.0
	Phosphate	J	1.60	NA	12.70	225.0
	Sulfate		3.20	NA	931.0	12600.0
	Nitrate+Nitrite		1.40	130000+8000=138000	208.0*	906.0*
BOC968	Fluoride		0.40	4800.0	13.00	73.30
	Chloride	J	1.00	NA	783.0	1480.0
	Phosphate	J	1.80	NA	12.70	225.0
	Sulfate		3.30	NA	931.0	12600.0
	Nitrate+Nitrite		2.60	130000+8000=138000	208.0*	906.0*

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Table 3. 218 E-8 Borrow Pit Demolition Site Soil Results, General Chemistry Analysis.  
(sheet 1 of 2)

Sample number	Name of Constituent	Qualifiers	Concentration mg/kg	MCA Method B Cleanup Levels* mg/kg	Hanford Site Soil Background 95/95 threshold <sup>b</sup> mg/kg	Hanford Site Soil Background Maximum Conc. <sup>b</sup> mg/kg
BOC961	Fluoride	J	0.70	4800.0	13.00	73.30
	Chloride	J	0.90	NA	783.0	1480.0
	Phosphate		1.60	NA	12.70	225.0
	Sulfate		2.50	NA	931.0	12600.0
	Nitrate+Nitrite		0.81	130000+8000=138000	208.0*	906.0*
BOC962 Duplicate	Fluoride	J	0.80	4800.0	13.00	73.30
	Chloride	J	0.90	NA	783.0	1480.0
	Phosphate		1.40	NA	12.70	225.0
	Sulfate		2.50	NA	931.0	12600.0
	Nitrate+Nitrite		0.72	130000+8000=138000	208.0*	906.0*
BOC963	Fluoride	J	0.80	4800.0	13.00	73.30
	Chloride	J	2.00	NA	783.0	1480.0
	Phosphate		2.50	NA	12.70	225.0
	Sulfate		4.50	NA	931.0	12600.0
	Nitrate+Nitrite		4.60	130000+8000=138000	208.0*	906.0*
BOC964 equip blank	Fluoride	U	0.40	4800.0	13.00	73.30
	Chloride	J	2.20	NA	783.0	1480.0
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