

Addendum No. 8 to
Master Work Plan/Field Sampling and Analysis
Plan, Co-Located Chemical Sampling at Area IV
Santa Susana Field Laboratory, Ventura County,
California

EPA Northern Buffer Zone Soil Sampling

- Phase 1 Co-Located Soil Chemical Sampling
- Phase 2 Co-Located Soil Chemical Random
Sampling

Prepared for:

Department of Energy
Energy Technology and Engineering Center
P.O. Box 10300
Canoga Park, California 91309

Prepared by:

CDM Federal Programs Corporation
155 Pringle Avenue, Suite 300
Walnut Creek, California 94596

Prepared under:

US Department of Energy
EM Consolidated Business Center
Contract DE-AM09-05SR22404
CDM Task Order DE-AT30-08CC60021/ET17

Addendum No. 8 to

Master Work Plan/Field Sampling and Analysis
Plan, Co-Located Chemical Sampling at Area IV
Santa Susana Field Laboratory, Ventura County,
California

EPA Northern Buffer Zone Soil Sampling

- Phase 1 Co-Located Soil Chemical Sampling
- Phase 2 Co-Located Soil Chemical Random
Sampling

Contract DE-AM09-05SR22404

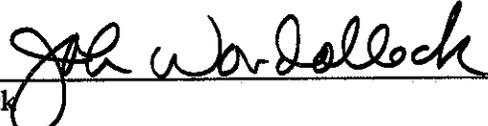
CDM Task Order DE-AT30-08CC60021/ET17

I certify that this document and all attachments were prepared under my
direction or supervision in accordance with a system designed to assure that
qualified personnel properly gather and evaluate the information submitted.
Based on my inquiry of the person or persons who manage the system, or
those persons directly responsible for gathering the information, the
information submitted is, to the best of my knowledge and belief, true, accurate,
and complete.

Prepared by: 
Margaret Bloisa, P.G.
CDM Geologist



March 8, 2012
Date

Approved by: 
John Wondolleck
CDM Project Manager

March 7, 2012
Date

Introduction

This document supports the field implementation of the soil sampling program addressed in the *Master Work Plan (WP)/Field Sampling and Analysis Plan (FSAP), Co-located Chemical Sampling at Area IV, Santa Susana Field Laboratory* (Master WP/FSAP, CDM 2011). The Master WP/FSAP dictates the field sampling, analytical, quality control, and data review procedures for the collection and chemical analysis of soil samples within Area IV of the Santa Susana Field Laboratory (SSFL) and the Northern Buffer Zone (NBZ), collectively termed the Area IV study area. As part of a radiological characterization study, the United States Environmental Protection Agency (EPA) is collecting surface and subsurface soil samples throughout Area IV of SSFL and the NBZ for the presence of radioactive elements (radionuclides). The California Department of Toxic Substances Control (DTSC) and Department of Energy (DOE) requested that soil collected by EPA also be analyzed for chemical analytes. DTSC and DOE agreed that the chemical sampling be done by DOE's contractor, CDM Federal Programs Corporation (CDM Smith).

Purpose of Addendum

This addendum documents the rationale for the location of drainage, surface and subsurface chemical soil samples to be collected during Phase 1 (Co-located) and Phase 2 (Random) of soil sampling within the NBZ as described in the document *Northern Buffer Zone FSP Addendum, Santa Susana Field Laboratory Site, Area IV Radiological Study*, (HGL 2012). Phase 1 soil sampling is based on EPA's historical site assessment (HSA) of the NBZ that also included a gamma survey, geophysical survey, and review of prior data. EPA and its contractor Hydrogeologic Inc. (HGL) have identified sample locations based on several lines of evidence to address radionuclide sample concerns as identified in their assessment of the NBZ.

At the same time that EPA samples the NBZ at targeted sample locations identified through the HSA, they will also collect random samples throughout the NBZ. EPA has employed a random sample location program to select the sampling locations as described in its Northern Buffer Zone FSP Addendum (HGL 2012).

EPA's consultant will collect co-located soil samples at all EPA-identified sampling locations. DOE and its consultants have reviewed the proposed EPA sampling locations relative to chemical data needs for the NBZ. The recommendations from the review of the location distribution are to sample all targeted drainage locations for primary and secondary analytes (Table 3), minus alcohols and glycols. Soil samples from all targeted non-drainage locations will be analyzed for all primary and secondary analytes. Soil samples collected at EPA's random sample locations will be analyzed for primary analytes only.

Under the co-located soil sampling program, HGL will physically collect the soil material. CDM personnel will be responsible for the sample container preparation, sample handling and documentation, sample shipment, laboratory coordination, chemical analyses of the samples, and chemical data review and validation. Co-

located soil samples collected by CDM will be analyzed for chemical analytes as stipulated in Table 4-1 (Data Quality Objectives) and Table 6-1 (Analytical Methods, Containers, Preservatives, and Holding Times) of the Master WP/FSAP (CDM 2011).

This FSAP Addendum addresses sampling in the Northern Buffer Zone. Figure 1 shows the NBZ relative to the entirety of Area IV. Figure 2 provides the sample locations in the western half of the NBZ, and Figure 3 provides the sample locations in eastern half of the NBZ. The proposed sample locations were taken from EPA's FSP Addendum for the Northern Buffer Zone (HGL 2012).

Ninety three targeted sample locations were identified by EPA as a result of the site assessment they completed for the NBZ. EPA has selected 50 random locations in the western NBZ and 50 random locations in the eastern NBZ for sampling. Table 1 provides the rational and analytical suites for the targeted samples in the NBZ; Table 2 provides the same information for random samples in the NBZ.

Selection of Locations for Chemical Sampling

EPA's identified sample locations are based on radiological sampling needs as determined through its HSA review and lines of evidence. Sampling locations were not selected based on chemical sampling needs for characterization of Area IV and the NBZ. The sampling protocol for targeting the depths of soil samples for chemical analyses are illustrated in Figures 5-1 and 5-2 of the Master WP/FSAP.

Soil samples for chemical analyses will be collected from all proposed 93 EPA targeted locations (assuming all are accessible and sampled by EPA) identified for the NBZ and addressed in this FSAP Addendum. Due to the lack of historical data for the NBZ, no EPA-identified sample location will be de-selected for chemical sample collection.

In addition to EPA's targeted sample locations, 100 random sample locations have been selected for radiological sampling. All random locations will also be sampled for chemical analyses.

Reduction of Analytes for Chemical Sampling

Following the February 22, 2012 Technical Work Group meeting with the community, DTSC and DOE discussed the proposed analytical suites for each sample location. The primary analytical suite will form the basis for chemical analyses for all soil samples. However, chemical test methods were selected among the secondary analytical suite based on chemical process knowledge and site characterization needs. Table 3 provides the chemical test methods (analytical suites) that are discussed below.

Table 3 – Co-located Soil Sampling Analytical Methods and Suites

Analyses within Primary Analytical Suite	Analyses within Secondary Analytical Suite
PAHs - EPA 8270C SIM	Energetics - EPA 8330A
SVOCs - EPA 8270C	Alcohols - EPA 8015B
Polychlorinated Biphenyls - EPA 8082	Terphenyls - EPA 8015B
Perchlorate - EPA 314.0 & 6850	Glycols - EPA 8015B
Dioxins/Furans - EPA 1613B	TPH - EPA 8015B
Metals (including mercury)- EPA 6010B/6020/7471A	NDMA - EPA 1625
Chromium VI - EPA 7199	Formaldehyde - 8315A
Fluoride - EPA 300.0	Cyanide - EPA 9012B
pH - EPA 9045C	Nitrates - EPA 300.0
Analyses with Sample Target Rationale	Sampling Rationale
Volatile Organic Compounds - EPA 8260B	Targeted features, observed staining, field instrument readings
Dioxane - EPA 8260B SIM	Targeted features, observed staining, field instrument readings
Pesticides - EPA 8081A	Surface soil samples only
Herbicides - EPA 8151	Surface soil samples only

NDMA = n-Nitrosodimethylamine

SIM = select ion monitoring

Perchlorate by method 6850 in 10% of samples (including NDMA by 8270 SIM)

TPH = total petroleum hydrocarbons includes gasoline range organics (GRO) and extractable fuel hydrocarbons (EFH)

PAHs = polycyclic aromatic hydrocarbons

SVOCs = semivolatile organic hydrocarbons

All targeted non-drainage samples will be analyzed for the primary and secondary suites of chemicals. The rationale is that the HSA indicates potential for disturbance and the analyses would identify any chemical disposed of or spilled at these locations. The rationale for sediment (surface and subsurface) analytical suites, primary plus secondary excluding alcohols and glycols, is that given the exposed, mobile nature of the sediment, any alcohols or glycols would have volatilized. Stained sediment will be analyzed for all secondary analytes if encountered. Random samples will be analyzed for the primary suite only given there is no indication of disturbance at those locations.

Schedule

EPA is scheduled to initiate soil sampling within the Northern Buffer Zone on March 12, 2012. Surface and subsurface soil sampling will be conducted simultaneously.

References

CDM Federal Programs Corporation (CDM). 2011. *Master Work Plan/Field Sampling and Analysis Plan Co-Located Chemical Sampling at Area IV, Santa Susana Field Laboratory, Ventura County, California*. February 16.

HydroGeoLogic, Inc. 2012. *Northern Buffer Zone FSP Addendum, Santa Susana Field Laboratory Site, Area IV Radiological Study, Santa Susana Field Laboratory*. February.

FIGURES

FIGURES

Figure 1
Subarea Designation
Santa Susana Field Laboratory

U.S. EPA Region 9



Legend

-  Subarea
-  Area IV & Northern Buffer Zones
- Centerline Roads**
 -  Primary
 -  Secondary
 -  Tertiary

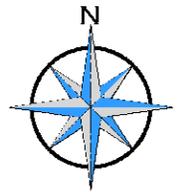


Filepath: Y:/Santa_Susana/EP9038/SubArea_SurveySection/Overall/
Subarea_Designation_20101221.mxd
Project: EP9038
Edited By: PL 20101221
Source: CIRGIS 2007, HGL 2010

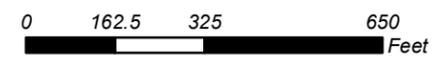




Northern Buffer Zone - West



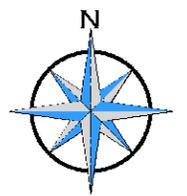
- Legend**
- Proposed Northern Buffer Zone Sample Locations
 - Area IV Subarea



Santa Susana Field Laboratory
 Ventura County, California
Figure 2



Aerial Source: Bing Maps, (c) 2010 Microsoft Corporation and its data suppliers



Legend

- Proposed Northern Buffer Zone Sample Locations
- Area IV Subarea

Aerial Source: Bing Maps, (c) 2010 Microsoft Corporation and its data suppliers

Northern Buffer Zone - East



Santa Susana Field Laboratory
Ventura County, California

Figure 3



TABLES

Table 1
Summary of Soil Sampling Targeted Locations and Chemical Suites

Location ID	Sample Type	EPA Location Description	EPA Technical Justification	Analytical Suite ¹
1	Drainage	NBZ West - Northwestern portion of the NBZ. West of the Arness fire road.	Area may have been used as open storage in the past based on access via the Arness fire road.	Primary/Secondary - Alcohols/Glycols
2	Surface	NBZ West - Northwestern portion of the NBZ. East of the Arness fire road.	Area may have been used as open storage in the past based on access via the Arness fire road.	Primary/Secondary + Alcohols/Glycols
2	Subsurface	NBZ West - Northwestern portion of the NBZ. East of the Arness fire road.	Area may have been used as open storage in the past based on access via the Arness fire road.	Primary/Secondary + Alcohols/Glycols
3	Surface	NBZ West - Northwest portion of the NBZ in flat area on the Arness fire road, along the northern boundary.	Area may have been used as open storage in the past based on access via the Arness fire road.	Primary/Secondary + Alcohols/Glycols
3	Subsurface	NBZ West - Northwest portion of the NBZ in flat area on the Arness fire road, along the northern boundary.	Area may have been used as open storage in the past based on access via the Arness fire road.	Primary/Secondary + Alcohols/Glycols
4	Drainage	NBZ West - Drainage leading to the northeast from the Arness fire road.	Drainage may have received surface water run-off from the Arness fire road and area of potential open storage activity.	Primary/Secondary - Alcohols/Glycols
5	Subsurface	NBZ West - North side of dirt road leading to the northeast from the Arness fire road.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
6	Subsurface	NBZ West - North side of dirt road leading to the northeast from the Arness fire road.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
7	Subsurface	NBZ West - North side of dirt road leading to the northeast from the Arness fire road.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
8	Subsurface	NBZ West - North of the FSDF, approximately 220 feet northwest of Outfall 5.	Area may have been used as open storage in the past based on access via dirt road and proximity to the FSDF.	Primary/Secondary + Alcohols/Glycols
9	Drainage	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 5.	Drainage may have received surface water flow from the FSDF and Outfall 5.	Primary/Secondary - Alcohols/Glycols
9	Drainage Subsurface	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 5.	Drainage may have received surface water flow from the FSDF and Outfall 5.	Primary/Secondary - Alcohols/Glycols
10	Subsurface	NBZ West - Approximately 250 feet north of Outfall 6, in the flat area at the end of the dirt road that leads northeast from the Arness fire road.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
11	Drainage	NBZ West - In drainage that flows to the northeast from the flat area at the end of the dirt road that leads northeast from the Arness fire road.	Drainage may have received surface water flow from possible open storage activities based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
11	Drainage Subsurface	NBZ West - In drainage that flows to the northeast from the flat area at the end of the dirt road that leads northeast from the Arness fire road.	Drainage may have received surface water flow from possible open storage activities based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
12	Drainage	NBZ West - In drainage approximately 510 feet northeast of Outfall 6.	Potential radiological contamination from surface water flow from the FSDF and Outfall 6.	Primary/Secondary - Alcohols/Glycols
12	Drainage Subsurface	NBZ West - In drainage approximately 510 feet northeast of Outfall 6.	Potential radiological contamination from surface water flow from the FSDF and Outfall 6.	Primary/Secondary - Alcohols/Glycols
13	Drainage	NBZ West - In drainage leading north from Outfall 7. Approximately 985 feet north of Building 4100.	Potential radiological contamination from surface water flow from activities associated with Building 4100.	Primary/Secondary - Alcohols/Glycols
13	Drainage Subsurface	NBZ West - In drainage leading north from Outfall 7. Approximately 985 feet north of the Building 4100.	Potential radiological contamination from surface water flow from activities associated with Building 4100.	Primary/Secondary - Alcohols/Glycols
14	Drainage	NBZ West - In drainage leading north from Outfall 7. Approximately 1,500 feet north of the Building 4100.	Potential radiological contamination from surface water flow from activities associated with Building 4100.	Primary/Secondary - Alcohols/Glycols
14	Drainage Subsurface	NBZ West - In drainage leading north from Outfall 7. Approximately 1,500 feet north of the Building 4100.	Potential radiological contamination from surface water flow from activities associated with Building 4100.	Primary/Secondary - Alcohols/Glycols
15	Surface	NBZ West - Approximately 510 feet northwest of the Building 4019	Area may have been used as open storage in the past based on access via dirt road. Debris noted during the gamma scanning survey.	Primary/Secondary + Alcohols/Glycols
15	Subsurface	NBZ West - Approximately 510 feet northwest of the Building 4019.	Area may have been used as open storage in the past based on access via dirt road. Debris noted during the gamma scanning survey.	Primary/Secondary + Alcohols/Glycols
16	Drainage	NBZ West - Approximately 400 feet north of the Building 4019.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
16	Drainage Subsurface	NBZ West - Approximately 400 feet north of the Building 4019.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
17	Drainage	NBZ West - Approximately 500 feet north of the Building 4019.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols

Table 1
Summary of Soil Sampling Targeted Locations and Chemical Suites

Location ID	Sample Type	EPA Location Description	EPA Technical Justification	Analytical Suite ¹
17	Drainage Subsurface	NBZ West - Approximately 500 feet north of the Building 4019.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
18	Drainage	NBZ West - Approximately 450 feet north of the Building 4019.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
18	Drainage Subsurface	NBZ West - Approximately 450 feet north of the Building 4019.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
19	Surface	NBZ West - Approximately 450 feet north of the Building 4019.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
19	Subsurface	NBZ West - Approximately 450 feet north of the Building 4019.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
20	Drainage	NBZ West - Approximately 700 feet down gradient of Outfall 3 and approximately 810 feet west-northwest of the RMHF Building 4075.	Potential radiological contamination from surface water run-off from the Outfall 3 and the RMHF.	Primary/Secondary - Alcohols/Glycols
20	Drainage Subsurface	NBZ West - Approximately 700 feet down gradient of Outfall 3 and approximately 810 feet west-northwest of the RMHF Building 4075.	Potential radiological contamination from surface water run-off from the Outfall 3 and the RMHF.	Primary/Secondary - Alcohols/Glycols
21	Surface	NBZ West - Approximately 270 feet west of the RMHF Building 4075.	Potential contamination from debris pile, and surface water run-off from RMHF holding pond (Site 4614).	Primary/Secondary + Alcohols/Glycols
21	Subsurface	NBZ West - Approximately 270 feet west of the RMHF Building 4075.	Potential contamination from debris pile, and surface water run-off from RMHF holding pond (Site 4614).	Primary/Secondary + Alcohols/Glycols
22	Surface	NBZ West - Approximately 290 feet west of the RMHF Building 4075.	Potential contamination from debris pile, and surface water run-off from RMHF holding pond (Site 4614).	Primary/Secondary + Alcohols/Glycols
22	Subsurface	NBZ West - Approximately 290 feet west of the RMHF Building 4075.	Potential contamination from debris pile, and surface water run-off from RMHF holding pond (Site 4614).	Primary/Secondary + Alcohols/Glycols
23	Surface	NBZ West - Approximately 230 feet west of the RMHF Building 4075.	Potential contamination from debris pile, and surface water run-off from RMHF holding pond (Site 4614).	Primary/Secondary + Alcohols/Glycols
23	Subsurface	NBZ West - Approximately 230 feet west of the RMHF Building 4075.	Potential contamination from debris pile, and surface water run-off from RMHF holding pond (Site 4614).	Primary/Secondary + Alcohols/Glycols
24	Surface	NBZ West - Approximately 275 feet west of the RMHF Building 4075.	Potential contamination from debris pile, and surface water run-off from RMHF holding pond (Site 4614).	Primary/Secondary + Alcohols/Glycols
24	Subsurface	NBZ West - Approximately 275 feet west of the RMHF Building 4075.	Potential contamination from debris pile, and surface water run-off from RMHF holding pond (Site 4614).	Primary/Secondary + Alcohols/Glycols
25	Surface	NBZ West - Approximately 200 feet north of the RMHF Building 4075.	PGRAY PIC-14 and vicinity to the RMHF	Primary/Secondary + Alcohols/Glycols
25	Subsurface	NBZ West - Approximately 200 feet north of the RMHF Building 4075.	PGRAY PIC-14 and vicinity to the RMHF.	Primary/Secondary + Alcohols/Glycols
26	Surface	NBZ West - Approximately 200 feet north of the RMHF Building 4075.	PGRAY PIC-15 and vicinity to the RMHF.	Primary/Secondary + Alcohols/Glycols
26	Subsurface	NBZ West - Approximately 200 feet north of the RMHF Building 4075.	PGRAY PIC-15 and vicinity to the RMHF.	Primary/Secondary + Alcohols/Glycols
27	Surface	NBZ West - Approximately 360 feet northwest of the SRE Complex. West of Cs-137 PGRAYs found in Subarea 6	Geophysical anomaly, "Magnetometer" and near area where Cs-137 was detected during the gamma scanning survey for Subarea 6.	Primary/Secondary + Alcohols/Glycols
27	Subsurface	NBZ West - Approximately 360 feet northwest of the SRE Complex. West of Cs-137 PGRAYs found in Subarea 6	Geophysical anomaly, "Magnetometer" and near area where Cs-137 was detected during the gamma scanning survey for Subarea 6.	Primary/Secondary + Alcohols/Glycols
28	Surface	NBZ West - Approximately 360 feet northwest of the SRE Complex. West of Cs-137 PGRAYs found in Subarea 6	Geophysical anomaly, "Magnetometer" and near area where Cs-137 was detected during the gamma scanning survey for Subarea 6.	Primary/Secondary + Alcohols/Glycols
28	Subsurface	NBZ West - Approximately 360 feet northwest of the SRE Complex. West of Cs-137 PGRAYs found in Subarea 6	Geophysical anomaly, "Magnetometer" and near area where Cs-137 was detected during the gamma scanning survey for Subarea 6.	Primary/Secondary + Alcohols/Glycols
29	Surface	NBZ West - Approximately 360 feet northwest of the SRE Complex. West of Cs-137 PGRAYs found in Subarea 6	Geophysical anomaly, "Magnetometer" and near area where Cs-137 was detected during the gamma scanning survey for Subarea 6.	Primary/Secondary + Alcohols/Glycols
29	Subsurface	NBZ West - Approximately 360 feet northwest of the SRE Complex. West of Cs-137 PGRAYs found in Subarea 6	Geophysical anomaly, "Magnetometer" and near area where Cs-137 was detected during the gamma scanning survey for Subarea 6.	Primary/Secondary + Alcohols/Glycols
30	Surface	NBZ West - Approximately 360 feet northwest of the SRE Complex. West of Cs-137 PGRAYs found in Subarea 6	Geophysical anomaly, "Magnetometer" and near area where Cs-137 was detected during the gamma scanning survey for Subarea 6.	Primary/Secondary + Alcohols/Glycols

Table 1
Summary of Soil Sampling Targeted Locations and Chemical Suites

Location ID	Sample Type	EPA Location Description	EPA Technical Justification	Analytical Suite ¹
30	Subsurface	NBZ West - Approximately 360 feet northwest of the SRE Complex. West of Cs-137 PGRAYs found in Subarea 6	Geophysical anomaly, "Magnetometer" and near area where Cs-137 was detected during the gamma scanning survey for Subarea 6.	Primary/Secondary + Alcohols/Glycols
31	Surface	NBZ West - Approximately 575 feet northwest of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
31	Subsurface	NBZ West - Approximately 575 feet northwest of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
32	Surface	NBZ West - Approximately 575 feet northwest of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
32	Subsurface	NBZ West - Approximately 575 feet northwest of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
33	Surface	NBZ East - Approximately 575 feet north of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
33	Subsurface	NBZ East - Approximately 575 feet north of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
34	Surface	NBZ East - Approximately 575 feet north of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
34	Subsurface	NBZ East - Approximately 575 feet north of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
35	Surface	NBZ East - Approximately 575 feet north of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
35	Subsurface	NBZ East - Approximately 575 feet north of the SRE Complex.	Possible contamination from Solid Radioactive Waste Storage area associated with the SRE. Down gradient of debris pile described in the Subarea 6 HSA.	Primary/Secondary + Alcohols/Glycols
36	Subsurface	NBZ East - Approximately 925 feet West-northwest of the Electrical Substation.	Geophysical anomaly, "Conductivity".	Primary/Secondary + Alcohols/Glycols
37	Subsurface	NBZ East - Approximately 925 feet West-northwest of the Electrical Substation.	Geophysical anomaly, "Conductivity".	Primary/Secondary + Alcohols/Glycols
38	Drainage	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Potential radiological contamination from surface water run-off associated with debris pile noted during geophysical survey. Geophysical anomaly, "Magnetometer and Conductivity".	Primary/Secondary - Alcohols/Glycols
38	Drainage Subsurface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Potential radiological contamination from surface water run-off associated with debris pile noted during geophysical survey. Geophysical anomaly, "Magnetometer and Conductivity".	Primary/Secondary - Alcohols/Glycols
39	Subsurface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Down gradient of potential radiological contamination from surface water run-off from debris pile noted during gamma scanning survey.	Primary/Secondary + Alcohols/Glycols
40	Surface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Potential radiological contamination from debris pile noted during gamma scanning survey.	Primary/Secondary + Alcohols/Glycols
40	Subsurface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Potential radiological contamination from debris pile noted during gamma scanning survey.	Primary/Secondary + Alcohols/Glycols
41	Subsurface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Down gradient of potential radiological contamination from surface water run-off from debris pile noted during geophysical survey.	Primary/Secondary + Alcohols/Glycols
42	Surface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Potential radiological contamination from debris pile noted during gamma scanning survey.	Primary/Secondary + Alcohols/Glycols
42	Subsurface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Potential radiological contamination from debris pile noted during gamma scanning survey.	Primary/Secondary + Alcohols/Glycols
43	Subsurface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Down gradient of potential radiological contamination from surface water run-off from debris pile noted during gamma scanning survey.	Primary/Secondary + Alcohols/Glycols
44	Surface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Potential radiological contamination from debris pile noted during geophysical survey.	Primary/Secondary + Alcohols/Glycols
44	Subsurface	NBZ East - Approximately 725 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Potential radiological contamination from debris pile noted during geophysical survey.	Primary/Secondary + Alcohols/Glycols
45	Surface	NBZ East - Approximately 550 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Potential radiological contamination from debris pile noted during geophysical survey.	Primary/Secondary + Alcohols/Glycols
45	Subsurface	NBZ East - Approximately 550 feet west-northwest of the Electrical Substation.	Geophysical anomaly, "Magnetometer and Conductivity". Potential radiological contamination from debris pile noted during geophysical survey.	Primary/Secondary + Alcohols/Glycols

Table 1
Summary of Soil Sampling Targeted Locations and Chemical Suites

Location ID	Sample Type	EPA Location Description	EPA Technical Justification	Analytical Suite ¹
65	Subsurface	NBZ East - Approximately 485 feet north of the Electrical Substation, north side of the dirt road.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
66	Subsurface	NBZ East - Approximately 425 feet north of the northwest corner Area II Building 2211.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
67	Subsurface	NBZ East - Approximately 425 feet north of the northwest corner Area II Building 2211.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
68	Subsurface	NBZ East - Approximately 425 feet north of the northwest corner Area II Building 2211.	Area may have been used as open storage in the past based on access via dirt road.	Primary/Secondary + Alcohols/Glycols
69	Subsurface	NBZ East - Approximately 30 feet north of Area II Building 2211.	Potential contamination from possible open storage or other historic activities associated with building 2202.	Primary/Secondary + Alcohols/Glycols
70	Subsurface	NBZ East - Approximately 30 feet north of the Area II Building 2202.	Potential contamination from possible open storage or other historic activities associated with building 2202 activities.	Primary/Secondary + Alcohols/Glycols
71	Subsurface	NBZ East - Approximately 30 feet north of the Area II Building 2203.	Potential contamination from possible open storage or other historic activities associated with building 2203 activities.	Primary/Secondary + Alcohols/Glycols
72	Subsurface	NBZ East - Approximately 800 feet north-northeast of Area II Building 2203.	Potential contamination from possible open storage or other historic activities associated with buildings 2211, 2202, 2203, and 2206.	Primary/Secondary + Alcohols/Glycols
73	Subsurface	NBZ East - Approximately 960 feet north-northeast of the Area II Building 2203.	Potential contamination from possible open storage or other historic activities associated with buildings 2211, 2202, 2203, and 2206.	Primary/Secondary + Alcohols/Glycols
74	Subsurface	NBZ East - Approximately 890 feet north-northeast of the Area II Building 2203.	Potential contamination from possible open storage or other historic activities associated with buildings 2211, 2202, 2203, and 2206.	Primary/Secondary + Alcohols/Glycols
75	Drainage	NBZ East - Approximately 1,400 feet north-northeast of the Area II Building 2203.	Historical concentration of Pu-238 (0.22 pCi/g) in sample collected during 1992 investigation.	Primary/Secondary - Alcohols/Glycols
75	Drainage Subsurface	NBZ East - Approximately 1,400 feet north-northeast of the Area II Building 2203.	Historical concentration of Pu-238 (0.22 pCi/g) in sample collected during 1992 investigation.	Primary/Secondary - Alcohols/Glycols
76	Drainage	NBZ East - Approximately 1,400 feet north-northeast of the Area II Building 2203.	Historical concentration of Pu-238 (0.22 pCi/g) in sample collected during 1992 investigation.	Primary/Secondary - Alcohols/Glycols
76	Drainage Subsurface	NBZ East - Approximately 1,400 feet north-northeast of the Area II Building 2203.	Historical concentration of Pu-238 (0.22 pCi/g) in sample collected during 1992 investigation.	Primary/Secondary - Alcohols/Glycols
77	Drainage	NBZ East - Approximately 1,400 feet north-northeast of the Area II Building 2203.	Historical concentration of Pu-238 (0.22 pCi/g) in sample collected during 1992 investigation.	Primary/Secondary - Alcohols/Glycols
77	Drainage Subsurface	NBZ East - Approximately 1,400 feet north-northeast of the Area II Building 2203.	Historical concentration of Pu-238 (0.22 pCi/g) in sample collected during 1992 investigation.	Primary/Secondary - Alcohols/Glycols
78	Drainage	NBZ East - Approximately 1,300 feet north of the Area II Building 2211.	Potential contamination from Area IV historic activities in sediment along drainage.	Primary/Secondary - Alcohols/Glycols
79	Drainage	NBZ East - Approximately 1,000 feet down gradient of the Outfall 10.	Potential radiological contamination from surface water flow associated with Outfall 10.	Primary/Secondary - Alcohols/Glycols
79	Drainage Subsurface	NBZ East - Approximately 1,000 feet down gradient of the Outfall 10.	Potential radiological contamination from surface water flow associated with Outfall 10.	Primary/Secondary - Alcohols/Glycols
80	Drainage	NBZ East - Approximately 1,000 feet northwest of the electrical substation.	Potential radiological contamination from surface water flow associated with debris pile noted during geophysical survey.	Primary/Secondary - Alcohols/Glycols
80	Drainage Subsurface	NBZ East - Approximately 1,000 feet northwest of the electrical substation.	Potential radiological contamination from surface water flow associated with debris pile noted during geophysical survey.	Primary/Secondary - Alcohols/Glycols
81	Drainage	NBZ West - Drainage leading to the northeast from the side road off of the Arness fire road.	Potential radiological contamination from surface water flow associated with possible open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
82	Drainage	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 5.	Drainage may have received surface water flow from the FSDF and Outfall 5.	Primary/Secondary - Alcohols/Glycols
82	Drainage Subsurface	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 5.	Drainage may have received surface water flow from the FSDF and Outfall 5.	Primary/Secondary - Alcohols/Glycols
83	Drainage	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 5.	Drainage may have received surface water flow from the FSDF and Outfall 5.	Primary/Secondary - Alcohols/Glycols
83	Drainage Subsurface	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 5.	Drainage may have received surface water flow from the FSDF and Outfall 5.	Primary/Secondary - Alcohols/Glycols

Table 1
Summary of Soil Sampling Targeted Locations and Chemical Suites

Location ID	Sample Type	EPA Location Description	EPA Technical Justification	Analytical Suite ¹
84	Drainage	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 5.	Drainage may have received surface water flow from the FSDF and Outfall 5.	Primary/Secondary - Alcohols/Glycols
84	Drainage Subsurface	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 5.	Drainage may have received surface water flow from the FSDF and Outfall 5.	Primary/Secondary - Alcohols/Glycols
85	Drainage	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 6.	Drainage may have received surface water flow from the FSDF and Outfall 6.	Primary/Secondary - Alcohols/Glycols
85	Drainage Subsurface	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 6.	NBZ West - In drainage that flows to the northeast from the FSDF and Outfall 6.	Primary/Secondary - Alcohols/Glycols
86	Drainage	NBZ West - In drainage that flows to the northeast from the FSDF, Outfall 5, and Outfall 6.	NBZ West - In drainage that flows to the northeast from the FSDF, Outfall 5, and Outfall 6.	Primary/Secondary - Alcohols/Glycols
86	Drainage Subsurface	NBZ West - In drainage that flows to the northeast from the FSDF, Outfall 5, and Outfall 6.	NBZ West - In drainage that flows to the northeast from the FSDF, Outfall 5, and Outfall 6.	Primary/Secondary - Alcohols/Glycols
87	Drainage	NBZ West - In drainage that flows to the northeast from the FSDF, Outfall 5, and Outfall 6.	NBZ West - In drainage that flows to the northeast from the FSDF, Outfall 5, and Outfall 6.	Primary/Secondary - Alcohols/Glycols
87	Drainage Subsurface	NBZ West - In drainage that flows to the northeast from the FSDF, Outfall 5, and Outfall 6.	NBZ West - In drainage that flows to the northeast from the FSDF, Outfall 5, and Outfall 6.	Primary/Secondary - Alcohols/Glycols
88	Drainage	NBZ West - In drainage leading north from Outfall 7. Approximately 985 feet north of the Building 4100.	Potential radiological contamination from surface water flow from activities associated with Building 4100.	Primary/Secondary - Alcohols/Glycols
88	Drainage Subsurface	NBZ West - In drainage leading north from Outfall 7. Approximately 985 feet north of the Building 4100.	Potential radiological contamination from surface water flow from activities associated with Building 4100.	Primary/Secondary - Alcohols/Glycols
89	Drainage	NBZ West - Approximately 400 feet north of the Building 4019.	Down gradient of area that may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
89	Drainage Subsurface	NBZ West - Approximately 400 feet north of the Building 4019.	Down gradient of area that may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
90	Drainage	NBZ West - Approximately 400 feet north of the Building 4019.	Down gradient of area that may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
90	Drainage Subsurface	NBZ West - Approximately 400 feet north of the Building 4019.	Down gradient of area that may have been used as open storage in the past based on access via dirt road.	Primary/Secondary - Alcohols/Glycols
91	Drainage	Approximately 350 feet northeast of the SRE Pond. In drainage that flows into the NBZ.	Down gradient of the SRE Pond and location of Phase I sediment sample that showed concentrations of Cs-137 (0.208 pCi/g) that exceeded the RTL (0.207 pCi/g).	Primary/Secondary - Alcohols/Glycols
91	Drainage Subsurface	Approximately 350 feet northeast of the SRE Pond. In drainage that flows into the NBZ.	Down gradient of the SRE Pond and location of Phase I sediment sample that showed concentrations of Cs-137 (0.208 pCi/g) that exceeded the RTL (0.207 pCi/g).	Primary/Secondary - Alcohols/Glycols
92	Drainage	Approximately 350 feet northeast of the SRE Pond. In drainage that flows into the NBZ.	Down gradient of the SRE Pond and location of Phase I sediment sample that showed concentrations of Cs-137 (0.208 pCi/g) that exceeded the RTL (0.207 pCi/g).	Primary/Secondary - Alcohols/Glycols
92	Drainage Subsurface	Approximately 350 feet northeast of the SRE Pond. In drainage that flows into the NBZ.	Down gradient of the SRE Pond and location of Phase I sediment sample that showed concentrations of Cs-137 (0.208 pCi/g) that exceeded the RTL (0.207 pCi/g).	Primary/Secondary - Alcohols/Glycols
93	Drainage	NBZ East - Approximately 1,000 feet northwest of the electrical substation.	Potential radiological contamination from surface water flow associated with debris pile noted during geophysical survey.	Primary/Secondary - Alcohols/Glycols
93	Drainage Subsurface	NBZ East - Approximately 1,000 feet northwest of the electrical substation.	Potential radiological contamination from surface water flow associated with debris pile noted during geophysical survey.	Primary/Secondary - Alcohols/Glycols

Notes:

¹Analytical Suites per Master Field Sampling and Analysis Plan

Primary Analyses

- Metals plus mercury and chromium 6
- Semivolatile Organic Compounds - Including NDMA
- Polycyclic Aromatic Hydrocarbons
- Polychlorinated Biphenyls
- Dioxins/Furans
- Fluoride

Locations with PID Readings, staining, evidence of waste

- VOCs
- Dioxane

Table 1
Summary of Soil Sampling Targeted Locations and Chemical Suites

Location ID	Sample Type	EPA Location Description	EPA Technical Justification	Analytical Suite ¹
	Perchlorate			
	pH			
	Secondary Analyses			
	Formaldehyde			
	Cyanide			
	Alcohols/Glycols			
	Terphenyls			
	TPH			
	Energetics			
	Nitrates			
	Surface Soil Samples Only			
	Pesticides			
	Herbicides			

Table 2
Summary of Soil Sampling Random Locations and Chemical Suites

Location ID	Sample Type	EPA Location Description	EPA Technical Justification	Analytical Suite ¹
94	Surface	NBZ West	Random Sample	Primary Only
95	Surface	NBZ West	Random Sample	Primary Only
96	Surface	NBZ West	Random Sample	Primary Only
97	Surface	NBZ West	Random Sample	Primary Only
98	Surface	NBZ West	Random Sample	Primary Only
99	Surface	NBZ West	Random Sample	Primary Only
100	Surface	NBZ West	Random Sample	Primary Only
101	Surface	NBZ West	Random Sample	Primary Only
102	Surface	NBZ West	Random Sample	Primary Only
103	Surface	NBZ West	Random Sample	Primary Only
104	Surface	NBZ West	Random Sample	Primary Only
105	Surface	NBZ West	Random Sample	Primary Only
106	Surface	NBZ West	Random Sample	Primary Only
107	Surface	NBZ West	Random Sample	Primary Only
108	Surface	NBZ West	Random Sample	Primary Only
109	Surface	NBZ West	Random Sample	Primary Only
110	Surface	NBZ West	Random Sample	Primary Only
111	Surface	NBZ West	Random Sample	Primary Only
112	Surface	NBZ West	Random Sample	Primary Only
113	Surface	NBZ West	Random Sample	Primary Only
114	Surface	NBZ West	Random Sample	Primary Only
115	Surface	NBZ West	Random Sample	Primary Only
116	Surface	NBZ West	Random Sample	Primary Only
117	Surface	NBZ West	Random Sample	Primary Only
118	Surface	NBZ West	Random Sample	Primary Only
119	Surface	NBZ West	Random Sample	Primary Only
120	Surface	NBZ West	Random Sample	Primary Only
121	Surface	NBZ West	Random Sample	Primary Only
122	Surface	NBZ West	Random Sample	Primary Only
123	Surface	NBZ West	Random Sample	Primary Only
124	Surface	NBZ West	Random Sample	Primary Only
125	Surface	NBZ West	Random Sample	Primary Only
126	Surface	NBZ West	Random Sample	Primary Only
127	Surface	NBZ West	Random Sample	Primary Only
128	Surface	NBZ West	Random Sample	Primary Only
129	Surface	NBZ West	Random Sample	Primary Only
130	Surface	NBZ West	Random Sample	Primary Only
131	Surface	NBZ West	Random Sample	Primary Only
132	Surface	NBZ West	Random Sample	Primary Only
133	Surface	NBZ West	Random Sample	Primary Only
134	Surface	NBZ West	Random Sample	Primary Only
135	Surface	NBZ West	Random Sample	Primary Only
136	Surface	NBZ West	Random Sample	Primary Only
137	Surface	NBZ West	Random Sample	Primary Only
138	Surface	NBZ West	Random Sample	Primary Only
139	Surface	NBZ West	Random Sample	Primary Only
140	Surface	NBZ West	Random Sample	Primary Only
141	Surface	NBZ West	Random Sample	Primary Only

Table 2
Summary of Soil Sampling Random Locations and Chemical Suites

Location ID	Sample Type	EPA Location Description	EPA Technical Justification	Analytical Suite ¹
142	Surface	NBZ West	Random Sample	Primary Only
143	Surface	NBZ West	Random Sample	Primary Only
144	Surface	NBZ East	Random Sample	Primary Only
145	Surface	NBZ East	Random Sample	Primary Only
146	Surface	NBZ East	Random Sample	Primary Only
147	Surface	NBZ East	Random Sample	Primary Only
148	Surface	NBZ East	Random Sample	Primary Only
149	Surface	NBZ East	Random Sample	Primary Only
150	Surface	NBZ East	Random Sample	Primary Only
151	Surface	NBZ East	Random Sample	Primary Only
152	Surface	NBZ East	Random Sample	Primary Only
153	Surface	NBZ East	Random Sample	Primary Only
154	Surface	NBZ East	Random Sample	Primary Only
155	Surface	NBZ East	Random Sample	Primary Only
156	Surface	NBZ East	Random Sample	Primary Only
157	Surface	NBZ East	Random Sample	Primary Only
158	Surface	NBZ East	Random Sample	Primary Only
159	Surface	NBZ East	Random Sample	Primary Only
160	Surface	NBZ East	Random Sample	Primary Only
161	Surface	NBZ East	Random Sample	Primary Only
162	Surface	NBZ East	Random Sample	Primary Only
163	Surface	NBZ East	Random Sample	Primary Only
164	Surface	NBZ East	Random Sample	Primary Only
165	Surface	NBZ East	Random Sample	Primary Only
166	Surface	NBZ East	Random Sample	Primary Only
167	Surface	NBZ East	Random Sample	Primary Only
168	Surface	NBZ East	Random Sample	Primary Only
169	Surface	NBZ East	Random Sample	Primary Only
170	Surface	NBZ East	Random Sample	Primary Only
171	Surface	NBZ East	Random Sample	Primary Only
172	Surface	NBZ East	Random Sample	Primary Only
173	Surface	NBZ East	Random Sample	Primary Only
174	Surface	NBZ East	Random Sample	Primary Only
175	Surface	NBZ East	Random Sample	Primary Only
176	Surface	NBZ East	Random Sample	Primary Only
177	Surface	NBZ East	Random Sample	Primary Only
178	Surface	NBZ East	Random Sample	Primary Only
179	Surface	NBZ East	Random Sample	Primary Only
180	Surface	NBZ East	Random Sample	Primary Only
181	Surface	NBZ East	Random Sample	Primary Only
182	Surface	NBZ East	Random Sample	Primary Only
183	Surface	NBZ East	Random Sample	Primary Only
184	Surface	NBZ East	Random Sample	Primary Only
185	Surface	NBZ East	Random Sample	Primary Only
186	Surface	NBZ East	Random Sample	Primary Only
187	Surface	NBZ East	Random Sample	Primary Only
188	Surface	NBZ East	Random Sample	Primary Only
189	Surface	NBZ East	Random Sample	Primary Only

Table 2
Summary of Soil Sampling Random Locations and Chemical Suites

Location ID	Sample Type	EPA Location Description	EPA Technical Justification	Analytical Suite ¹
190	Surface	NBZ East	Random Sample	Primary Only
191	Surface	NBZ East	Random Sample	Primary Only
192	Surface	NBZ East	Random Sample	Primary Only
193	Surface	NBZ East	Random Sample	Primary Only

Notes:

¹Analytical Suites per Master Field Sampling and Analysis Plan

Primary Analyses

- Metals plus mercury and chromium 6
- Semivolatile Organic Compounds - Including NDMA
- Polycyclic Aromatic Hydrocarbons
- Polychlorinated Biphenyls
- Dioxins/Furans
- Fluoride
- Perchlorate

Surface Soil Samples Only

- Pesticides
- Herbicides

Locations with PID Readings, staining, evidence of waste

- VOCs
- Dioxane