FIELD SAMPLE PLAN ADDENDUM
SURFACE WATER AND SEDIMENT SAMPLING
SILVERNALE, R2A, AND R2B RETENTION PONDS AND DRAINAGES
SANTA SUSANA FIELD LABORATORY SITE

TO:	Craig Cooper, EPA Region 9 RPM
FROM:	T. Stewart Williford, HGL Geologist
THROUGH:	L. Steven Vaughn, HGL Project Manager
CC:	Andrew Bain, EPA Region 9 RPM
	Mary Aycock, EPA Region 9 RPM
	Gregg Dempsey, Technical Advisor
DATE:	August 18, 2011
SUBJECT:	FSP Addendum for Surface Water and Sediment in Area II and Area III
CONTRACT NO:	EP-S7-05-05
TASK ORDER NO:	0038, Area IV Radiological Study

1.0 INTRODUCTION

HydroGeoLogic, Inc. (HGL) has been tasked by the U.S. Environmental Protection Agency (USEPA) to conduct a radiological characterization study at Area IV and the Northern Buffer Zone of the Santa Susana Field Laboratory (SSFL) located in Ventura County, California. This work is being executed under EPA Region 7 Architect and Engineering Services Contract EP-S7-05-05, Task Order 0038. The technical lead on the project is USEPA Region 9.

This document supports the field implementation of the surface water and sediment sampling program and is an addendum to the Final Phase I Field Sampling Plan (FSP) for Groundwater, Surface Water, and Sediment (HGL, 2010a). A description of the overall project goals, data quality objectives, sampling strategy, laboratory analytical suites, data quality control, and data evaluation are described in the FSP. All quality measures and documentation requirements detailed in the Phase I FSP apply to this field effort.

This FSP Addendum documents the surface water and sediment sampling activities that will be conducted at the Silvernale retention pond and associated drainages in Area III, and at the R2A/R2B retention ponds and associated upgradient drainages in Area II and III (Figure 1).

2.0 SAMPLING PROGRAM

As part of the Area IV Radiological Study, sediment samples were collected during December 2010, and surface water samples were collected during March 2011. A total of 40 sediment samples and 33 surface water samples were collected from drainage ways within Area IV and

the Northern Buffer Zone. Figures 2 and 3 present sediment and surface water sampling locations, respectively.

Surface water run-off from portions of Area IV also drains south into the Silvernale and R2 ponds. Because surface water flows from known radiological use and release areas in Area IV, surface water may have transported radiological contamination to these drainage ways and ponds in Area II and Area III. The objective of this FSP is to investigate the current nature and extent of such potential radiological contamination.

Figure 1 presents the location of the Silvernale and the R2 retention ponds and their associated inflow drainage ways.

2.1 SEDIMENT SAMPLING

Figure 4 presents the potential sediment sampling locations that will be sampled as part of this FSP Addendum.

Sample locations were selected after historical aerial photographs were evaluated and a site walk was conducted in order to identify past stream flow locations, past ponding/sediment accumulation locations, historic discharge points to each pond, and elevation of each discharge point.

Drainage Ways

Sample locations may be adjusted in the field based on field observations. Sediment sample locations will be targeted in portions of the drainage features where sediment has been accumulating and/or is currently accumulating. Target locations include the low-velocity zones inside of drainage meanders and over bank deposits where finer-grained materials are present.

Two sediment samples will be collected within Area III from drainage ways flowing into the Silvernale pond. A total of 9 sediment samples will be collected within Area II and Area III from drainage ways flowing into the R2 ponds (Figure 4).

The sediment samples will be collected from 0 to 6 inches below ground surface using a stainless steel trowel in accordance with the Phase I Groundwater, Surface Water and Sediment FSP (HGL, 2010a).

Retention Ponds

Five sediment samples will be collected from the Silvernale pond and a total of three sediment samples will be collected from the R2 ponds (Figure 4).

Sediment samples will be collected in the late summer or early fall of 2011 when the ponds are either dry or have very little water in them. An attempt will be made to collect the samples at the sediment/native soil interface. The sediment will be logged by a qualified Geologist in accordance with the Phase I Groundwater, Surface Water and Sediment FSP (HGL, 2010a).

If groundwater is not encountered an attempt will be made to install a 2 inch diameter polyvinyl chloride (PVC) pipe in order to conduct a downhole gamma scanning survey in accordance with Section 5.4 of the Field Sampling Plan for Soil Sampling (HGL, 2010c). If a gamma anomaly is detected a sample will be collected from the anomaly interval. If no anomaly is detected or a PVC pipe cannot be installed, a sample will be collected from the 5 foot interval of sediment on top of the native soil. A stainless steel hand auger will be used to collect the retention pond sediment samples.

2.2 SURFACE WATER SAMPLES

Figure 4 presents the potential surface water sampling locations that will be sampled as part of the R2A, R2B, and Silvernale surface water investigation.

Retention Ponds

Four surface water samples will be collected from the R2A and R2B retention ponds and two surface water samples will be collected from the Silvernale pond (Figure 4). Because surface water samples have already been collected from locations within Area IV, just prior to flowing into Area II and Area III, no surface water samples will be collected from drainage ways under this FSP Addendum.

Surface water samples will be collected from the retention ponds using two methods. A surface water sample will be collected from the surface of the pond using the direct dip method as described in Section 4.3.1 of the Phase I FSP (HGL, 2010a). A second sample will be collected from a depth of 1 foot above the bottom of the pond using a Van Dorn sampler (Attachment 3). Surface water samples will be collected when there is sufficient water volume to collect the discrete depth samples.

2.3 LABORATORY ANALYSIS

Sediment samples will be tested for the radionuclides as presented in Table 1. In addition to the default suite of radionuclides, all sediment samples will be tested for a full range of additional site-specific analyses (i.e. Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147). These analyses were added based on the operational history of facilities located within surface water drainage pathways from Area IV (Figure 1). For example, the Silvernale Pond and associated drainages received runoff from the Sodium Reactor Experiment Pond, the Old Conservation Yard and the New Conservation Yard. Surface water samples will be tested for the radionuclides presented in Table 2.

Table 3 provides the location identification number for each sediment sample that will be collected in the drainage ways and ponds and the technical rationale for the selection of each sample location. Also summarized in this table is the suite of radiological analyses that will be performed on each sample, as well as other field-pertinent information including sample type, and general proximity to radiological facilities.

3.0 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

All quality measures and documentation requirements detailed in the Phase I FSP apply to this field effort. Quality Assurance (QA)/Quality Control (QC) samples will include field duplicates, laboratory duplicates, matrix spike, and equipment rinsate blanks. QA/QC samples will be collected in accordance with the Quality Assurance Project Plan for Groundwater, Surface Water, and Sediment (HGL, 2010b).

Sediment Samples

Field duplicates for the sediment samples will be collected at a frequency of one sample per every 10 samples taken.

Surface Water

Field duplicate samples will be collected at a frequency of one sample per every 10 samples taken. Matrix spike samples and laboratory duplicate samples will be collected a frequency of one sample per every 20 samples taken.

Equipment Rinsate Blank

One equipment (rinse) blank will be collected each day by each field team, where applicable. Equipment blanks will consist of decontamination water poured over or through a freshly decontaminated piece of equipment used by that team during that day's sampling activities.

4.0 REFERENCES

HydroGeoLogic, Inc., 2010a. Final Phase I Field Sampling Plan for Groundwater, Surface Water, and Sediment, Area IV Radiological Study, Santa Susana Field Laboratory, Ventura County, California. July 28, 2010.

HydroGeoLogic, Inc., 2010b. Quality Assurance Project Plan for Groundwater, Surface Water, and Sediment, Area IV Radiological Study Santa Susanna Field Laboratory Ventura County, California. August 11, 2011.

HydroGeoLogic, Inc., 2010c. Field Sampling Plan for Soil Sampling, Area IV Radiological Study, Santa Susana Field Laboratory Ventura County, California. October 4, 2010.

ATTACHMENTS

Attachment 1 Tables
Attachment 2 Figures
Attachment 3 Appendix

ATTACHMENT 1

TABLES

Table 1
Default and Site Specific Analytical Suites for Sediment Samples

Method	Radionuclides	Site Specific Locations
	Default Suite	
Gamma Spec I	Ac-227, Ac-228, Ag-108, Ag-108m, Ba-133, Ba-137m, Bi-212, Bi-214, Cd-113m, Cf-249, Co-60, Cs-134, Cs-137, Eu-152, Eu-154, Eu-155, Ho-166m, K-40, Na-22, Nb-94, Np-236, Np-239, Pa-231, Pb-212, Pb-214, Rn-220, Rn-222, Sb-125, Sn-126, Te-125m, Th-234, Tl-208, and Tm-171	All Locations
LCS 3	Sr-90/Y-90	All Locations
Alpha Spec 2	Am-241, Cm-243,Cm-244, Cm-245, Cm-246	All Locations
Alpha Spec 3	U-233, U-234, U-235, U-236, U-238	All Locations
Alpha Spec 4	Th-228, Th-230, Th-232, Th-229	All Locations
Alpha Spec 7	Pu-236, Pu-238, Pu-239, Pu-240, Pu-244	All Locations
	Site Specific Suite	
GPC 3	H-3	Sodium Reactor Experiment (SRE), Buildings:4010, 4059, 4028, 4024 and at the site of the tritium groundwater plume.
LCS 8	C-14	SRE, reactor areas which used graphite, and some percentage of random sampling due to potential drift from C-14 which may have been used in rocket fuels.
LCS 6	Ni-63, Ni-59	Reactors, the Hot Lab, the burn pit, and here co-60 is observed aboce background.
LCS 5	Tc-99	Reactor buildings, the Hot Lab, and the burn pit. Add a small percentage to random samples.
LCS 4	I-129	Hot Lab only.
LCS 1	Pm-147	Hot Lab only.
Alpha Spec 1	Am-243	Only where accelerators where used.

Table 2
Priority 1 Radionuclides for Analysis for Surface Water

Symbol	Radionuclide	Half-Life	Units	Priority 1 Groundwater Analytes*
Ac-227	actinium-227	21.772	Years	●
Ac-228	actinium-228	6.15	Hours	●
Ag-108	silver-108	2.37	Minutes	●
Ag-108m	silver 108m	418	Years	●
Ba-133	barium-133	10.5	Years	●
Ba-137m	barium-137m	2.552	Minutes	●
Bi-212	bismuth-212	60.55	Minutes	●
Bi-214	bismuth-214	19.9	Minutes	●
Cd-113m	cadmium-113m	14.1	Years	●
Cf-249	californium-249	351	Years	●
Co-60	cobalt-60	5.275	Years	●
Cs-134	cesium-134	2.0652	Years	●
Cs-137	cesium-137	30.08	Years	●
Eu-152	europium-152	13.537	Years	●
Eu-154	europium-154	8.593	Years	●
Eu-155	europium-155	4.753	Years	●
H-3	tritium (hydrogen-3), organic	12.32	Years	●
Ho-166m	holmium-166m	1,230	Years	●
K-40	potassium-40	1.25E+09	Years	●
Na-22	sodium-22	2.6027	Years	●
Nb-94	niobium-94	2.03E+04	Years	●
Np-236a	neptunium-236a	1.53E+05	Years	●
Np-239	neptunium-239	2.356	Days	●
Pa-231	protactinium-231	32,760	Years	●
Pb-212	lead-212	10.64	Days	●
Pb-214	lead-214	26.8	Minutes	●
Sb-125	antimony-125	2.7586	Years	●
Sn-126	tin-126	2.30E+05	Years	●
Sr-90	strontium-90	28.8	Years	●
Te-125m	tellurium-125m	57.4	Days	●
Th-231	thorium-231	25.52	Hours	●
Th-234	thorium-234	24.1	Days	●
Tl-208	thallium-208	3.053	Minutes	●
Tm-171	thulium-171	1.92	Years	●
U-233	uranium-233	1.59E+05	Years	●
U-234	uranium-234	245,500	Years	●
U-235	uranium-235	7.04E+08	Years	●
U-236	uranium-236	2.34E+07	Years	●
U-238	uranium-238	4.47E+09	Years	●
Gross Alpha Radiation	N/A	N/A	N/A	●
Gross Beta Radiation	N/A	N/A	N/A	●

Notes:

* Suite may change. See Section 2.2 of the Field Sampling Plan for a discussion.

N/A - not applicable

Table 3
Summary of Sediment and Surface Water Sample Locations at Silvernale and the R2A/R2B Retention Ponds

Location ID	Sample Type	Pond	Location Description	Technical Justification	Analytes
1	Sediment	Silvernale	Northeast portion of Area III, north of Silvernale pond.	Receives surface water runoff from the southeastern portion of Area IV Subarea 6.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
2	Sediment	Silvernale	Northeast portion of Area III, north of Silvernale pond.	Receives surface water runoff from the southeastern portion of Area IV Subarea 6.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
3	Sediment	Silvernale	East portion of Silvernale pond.	Receives surface water runoff from the southeastern portion of Area IV Subarea 6.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
4	Sediment	Silvernale	East portion of Silvernale pond.	Receives surface water runoff from the southeastern portion of Area IV Subarea 6.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
5	Sediment	Silvernale	East portion of Silvernale pond.	Receives surface water runoff from the southeastern portion of Area IV Subarea 6.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
6	Sediment	Silvernale	Center portion of Silvernale pond.	Receives surface water runoff from the southeastern portion of Area IV Subarea 6.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
7	Surface Water	Silvernale	Center portion of Silvernale pond. Surface of the pond.	Receives surface water runoff from the southeastern portion of Area IV Subarea 6.	Priority 1 Suite Analytes
7	Surface Water	Silvernale	Center portion of Silvernale pond. Approximately 1 ft from the bottom.	Receives surface water runoff from the southeastern portion of Area IV Subarea 6.	Priority 1 Suite Analytes
8	Sediment	R2A/R2B	Central portion of Area III. Northwest of Silvernale pond. Drainageway exiting the south central portion of Subarea 5A	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
9	Sediment	R2A/R2B	Central portion of Area III. Southwest and downgradient of Silvernale pond.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
10	Sediment	R2A/R2B	West central portion of Area III. Drainageway exiting the south central portion of Subarea 5B.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020. Part of the 17th Street Drainage.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
11	Sediment	R2A/R2B	West central portion of Area III. Drainageway exiting the south central portion of Subarea 5B. Part of the 17th Street Drainage.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020. Part of the 17th Street Drainage.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
12	Sediment	R2A/R2B	West portion of Area III. Drainageway exiting the southeast portion of Subarea 5C.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
13	Sediment	R2A/R2B	West portion of Area III. Drainageway exiting the southeast portion of Subarea 5C.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
14	Sediment	R2A/R2B	South central portion of Area III. Drainageway exiting the southeast portion of Subarea 5A.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
15	Sediment	R2B	Western portion of Area II. Northern portion of the R2B pond.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
16	Sediment	R2B	Western portion of Area II. Southern portion of the R2B pond.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
17	Sediment	R2A	West central portion of R2A pond.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
18	Sediment	R2A	East central portion of R2A pond.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147
19	Surface Water	R2A	Center portion of R2A pond. Surface of the pond.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Priority 1 Suite Analytes
19	Surface Water	R2A	Center portion of R2A pond. Approximately 1 ft from the bottom.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Priority 1 Suite Analytes
20	Surface Water	R2B	Center portion of R2B pond. Surface of the pond.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Priority 1 Suite Analytes
20	Surface Water	R2B	Center portion of R2B pond. Approximately 1 ft from the bottom.	Receives surface water runoff from Area IV Subareas 5A, 5B, 5C, 5D and the Silvernale pond, as well as, the vicinity of Building 4009 and former Building 4020.	Priority 1 Suite Analytes
21	Sediment	R2A/R2B	Southwestern portion of Area III.	Receives surface water runoff from Area IV Subareas 5D.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-148
22	Sediment	Silvernale	Western portion of the Silvernale pond.	Receives surface water runoff from the southeastern portion of Area IV Subarea 6.	Default, Am-243, C-14, H-3, I-129, Ni-59, Ni-63, Tc-99, and Pm-147

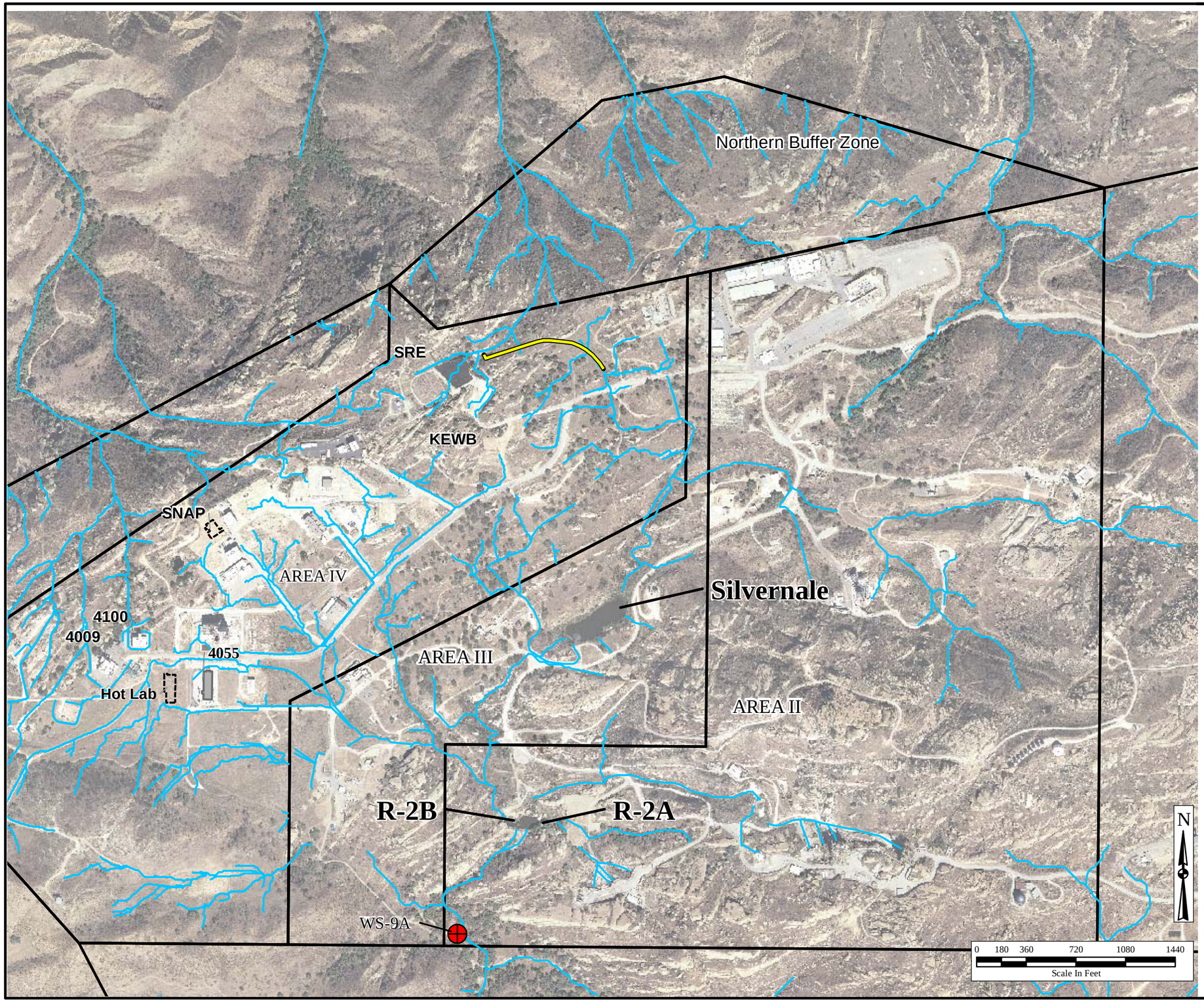
ATTACHMENT 2

FIGURES

HGL— Surface Water & Sediment Sampling at Silvernale & R2 Ponds Addendum, SSFL —Ventura County, California

Figure 1
Drainage Ways and Retention Pond Locations Area II & III

U.S. EPA Region 9



Legend

Drainage Pathways

SSFL Area Division

Y:\Santa_Susana\EP9038\GW_SW_Sediment_FSP\AreaIIAreaIIISampling\(1)AreaII_SedimentSampling_20110811.mxd
8/18/2011 pbillock
Source:HGL 2010, CIRGIS 2007

HGL— Surface Water & Sediment Sampling
at Silvernale & R2 Ponds Addendum, SSFL
—Ventura County, California

Figure 2
Sediment Samples Collected
Area IV Radiological Study

U.S. EPA Region 9

EPASED01
EPASED02
EPASED03
EPASED04
EPASED05
EPASED06
EPASED07
EPASED08
EPASED09
EPASED10
EPASED11
EPASED12
EPASED13
EPASED14
EPASED15
EPASED16
EPASED17
EPASED18
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EPASED26
EPASED27
EPASED28
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EPASED30
EPASED31
EPASED32
EPASED33
EPASED34
EPASED35
EPASED36
EPASED37
EPASED38
EPASED39
EPASED40

Silvernale
AREA II
AREA III
R--2A
R--2B

Legend

- Sediment Samples
- Drainage Pathways
- Intermittent Stream
- Permanent Stream
- SRE Transfer Pipe Line
- Area IV and NBZ

N

0 250 500 1000
Scale In Feet

Y:\Santa_Susana\EP9038\GW_SW_Sediment_FSP\AreaIIAreaIIISampling\
(2)_Sed_Drainage_11x17_20110811.mxd
Project: EP9038
Source: Boeing 2009, CIRGIS 2007, HGL 2010
8/18/2011 pbillock

HGL— Surface Water & Sediment Sampling
at Silvernale & R2 Ponds Addendum, SSFL
—Ventura County, California

Figure 3
Surface Water Samples Collected
Area IV Radiological Study

U.S. EPA Region 9

Legend

- Surface Water Samples
- Drainage Pathways
- Intermittent Stream
- Permanent Stream
- SRE Transfer Pipe Line
- Area IV and NBZ

EPASW10
EPASW18
EPASW19
EPASW17
EPASW16
EPASW09
EPASW39
EPASW13
EPASW35
EPASW14
EPASW08
EPASW21
EPASW15
EPASW07
EPASW06
EPASW22
EPASW38
EPASW30
EPASW12
EPASW29
EPASW20
EPASW28
EPASW31
EPASW05
EPASW11
EPASW40
EPASW27
EPASW32
EPASW26
EPASW25
EPASW24
EPASW34
EPASW23
Silvernale
AREA III
AREA II
R--2A
R--2B
N
0 250 500 1000
Scale In Feet

Y:\Santa_Susana\EP9038\GW_SW_Sediment_FSP\AreaIIAreaIIISampling\
(3)_SW_Seeps_Drainage_11x17_20110811.mxd
Project: EP9038
Source: Boeing 2009, CIRGIS 2007, HGL 2010
8/18/2011 pbillock

HGL HydroGeoLogic, Inc

HGL— Surface Water & Sediment Sampling at Silvernale & R2 Ponds Addendum, SSFL —Ventura County, California

Figure 4
Potential Sediment and Surface Water Sampling Locations Area II and III

U.S. EPA Region 9

AREA IV

AREA III

AREA II

Silvernale

R-2B

R-2A

WS-9A

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

N

0 180 360 720
Scale In Feet

Legend

- Sediment Sample Locations
- Surface Water Sample Locations
- Drainage Pathways
- SSFL Area Division

Y:\Santa_Susana\EP9038\GW_SW_Sediment_FSP\AreaIIAreaIIISampling\(4)AreaII_SedimentSampling_Fig4_20110811.mxd
8/18/2011 pbillock
Source:HGL 2010, CIRGIS 2007

HGL HydroGeoLogic, Inc

ATTACHMENT 3

APPENDIX

Appendix A Van Dorn Sampler Standard Operating Procedures

SOP 2.17
DISCRETE DEPTH SURFACE WATER SAMPLING PROCEDURES USING THE VAN DORN SAMPLER SANTA SUSANA FIELD LABORATORY VENTURA COUNTY, CALIFORNIA

1.0 PURPOSE

The purpose of this procedure is to describe the methods for collecting discrete depth surface water samples using a Van Dorn sampler. It describes the procedures and equipment to be used to obtain representative surface water samples that are capable of producing accurate quantification of water quality.

2.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) is applicable to the collection of representative surface water samples from streams, rivers, lakes, ponds, lagoons, embayments, springs and surface impoundments. This procedure provides guidance for routine field operations on environmental projects. Site-specific deviations from the methods presented herein must be approved by the HydroGeoLogic, Inc. (HGL) Project Manager and discussed in the approved project plans.

This SOP was reviewed for general consistency with the standard operating procedure listed in, "U.S.EPA Region 9 Laboratory, Richmond, California, Field Sampling Guidance Document #1225, Surface Water Sampling.

3.0 EQUIPMENT AND SUPPLIES

- Electroniic water-level meter capable of 0.01 foot accuracy, if rquired
- Interface probe, if required
- Decontamination supplies
- Personal protective equipment (PPE), Nitrile gloves, Tyvek, over boots, etc.
- Field Sampling Plan (location map, field data from last event, etc.)
- Field log book
- PID or FID instrument (if appropriate) to detect VOCs for health and safety purposes, and to provide qualitative field evaluations
- Field sampling data sheets
- Site specific Health and Safety Plan, the Groundwater Field Sampling Plan (FSP), and Site Reconnaissance Report (SRR).

4.0 PROCEDURES

When discrete samples are desired from a specific depth, and the parameters to be measured do not require a Teflon® coated sampler, a standard Van Dorn sampler may be used (Exhibit 17-1).

The Van Dorn sampler is plastic and is lowered in a horizontal position. A messenger is sent down a rope when the sampler is at the designated depth, to cause the stoppers to close the cylinder, which is then raised (Exhibit 17-2). Water is removed through a valve to fill respective sample containers. With a rubber tube attached to the valve, dissolved oxygen sample bottles can be properly filled by allowing an overflow of the water being collected. With multiple depth samples, care should be taken not to stir up the bottom sediment and thus bias the sample.

Instructions for sampling with a Van Dorn Bottle:

1. Using a properly decontaminated Van Dorn bottle, set the sampling device so that the sampling end pieces are pulled away from the sampling tube, allowing the water to be sampled to pass through this tube.

2. Lower the pre-set sampling device to the predetermined depth. Avoid bottom disturbance.

3. When the discrete sampler bottle is at the required depth, send down the messenger, closing the sampling device.

4. Retrieve the sampler and discharge the first 10 to 20 mL to clear any potential contamination on the valve. Transfer the sample to the appropriate sample container.

5. Be sure to use special attachments available on some discrete samplers to distribute small volumes at low flow rates; e.g., VOCs at 100 to 200 mL/ min.

Advantages:
- ability to sample at discrete depths
- ability to sample great depths

Disadvantages:
- open sampling tube is exposed while traveling down to sampling depth
- transfer of sample into sample bottle may be difficult

5.0 DECONTAMINATION

The Van Dorn sampler will be decontaminated using the decontamination procedures presented in SOP 2.01 of the Project Field Sampling Plan (HGL, 2010).

6.0 RECORDS

Record the sampling information in field log book and on the Sample Data Sheet provided in the Project Field Sampling Plan (HGL, 2010).

7.0 QUALITY CONTROL

The project quality assurance (QA)/quality control (QC) Officer is responsible for ensuring that all equipment is calibrated daily prior to use and recording the calibration results on the Calibration Log. The QA Coordinator is responsible for periodically reviewing these results.

8.0 REFERENCES

HydroGeoLogic, 2010. Final Phase I Field Sampling Plan for Groundwater, Surface Water, and Sediment. July, 2010.

U.S. Environmental Protection Agency, 1999 U.S.EPA Region 9 Laboratory, Richmond, California, Field Sampling Guidance Document #1225, Surface Water Sampling. September 1999.

9.0 EXHIBIT

Exhibit 1 – Van Dorn Discrete Depth Sampler
Exhibit 2 – Diagram of Van Dorn Discrete Depth Sampler

EXHIBIT 17-1
Van Dorn Discrete Depth Sampler

Exhibit 17-2
Diagram of Van Dorn Discrete Depth Sampler

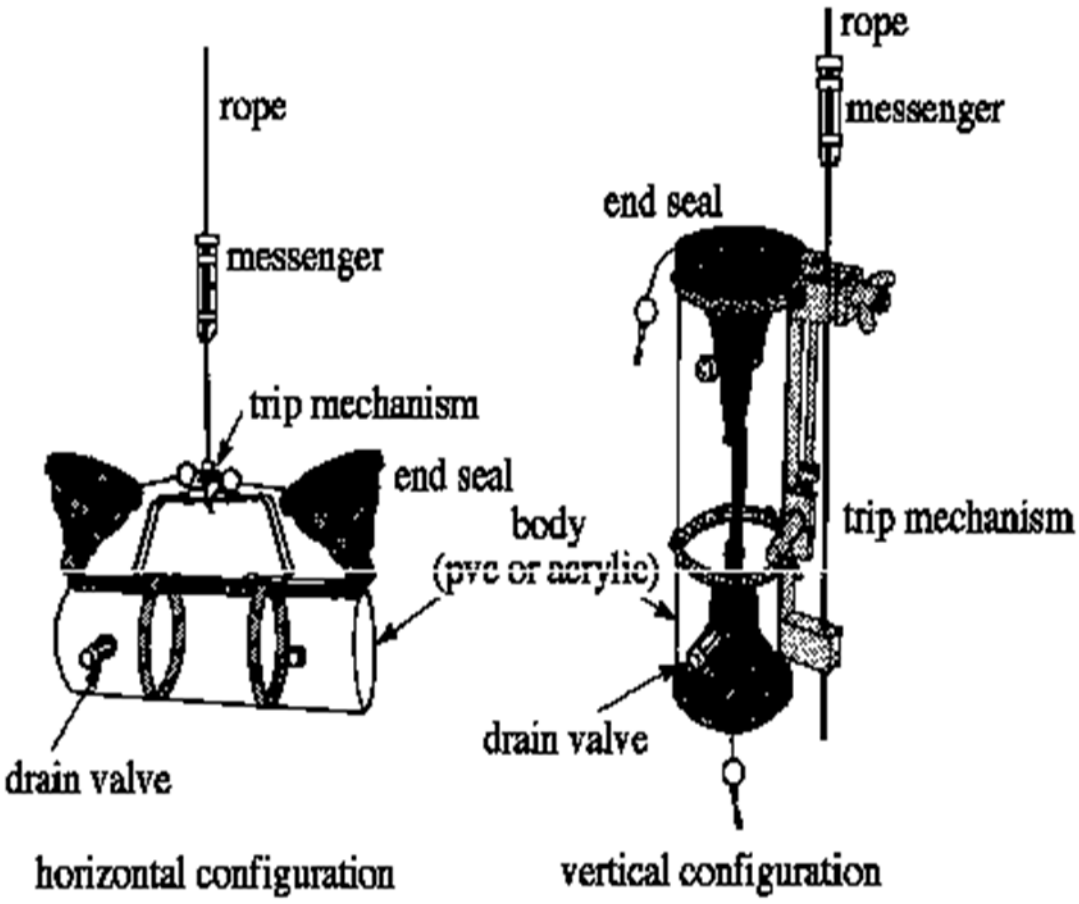

Figure 1. Van Dorn sampler