



**Addendum 1 to Camp Bonneville  
Sampling and Quality Assurance  
Plan**

**Vancouver, Washington**

**Technical Direction Document Number: 11-02-0010**

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**ADDENDUM 1 TO SAMPLING AND QUALITY ASSURANCE PLAN FOR:**

Camp Bonneville  
Vancouver, Washington

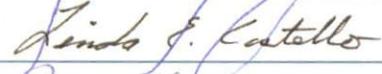
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# 1

## Project Management

Only sections, subsection, figures, and tables which have changed or are directly related to locations for methodologies of collecting samples from the previous submittal (May 2011) are included in this addendum to the Sampling and Quality Assurance Plan (SQAP). This addendum addresses only those activities planned for Phase II of the Expanded Site Inspection (ESI) for the Camp Bonneville Site (the Site).

There are no changes to this section.

# 2

## Measurement/Data Acquisition

### 2.1 Sampling Process Design (Experimental Design)

During Phase II activities for the Camp Bonneville ESI, samples will be collected from locations or features considered potential contamination sources, from selected potential hazardous substance migration pathways, and from potential targets in those pathways. The locations or features to be sampled have been determined based on information derived from a review of background data, interviews with site representatives and regulatory agencies, site visits, and the May 2011 Phase I sampling event conducted by EPA. Table 2-1 provides information regarding the sampling design rationale and whether the measurement is considered critical or noncritical.

#### 2.1.1 Sample Locations

Sample locations will be selected to achieve the objectives discussed in subsection 1.3.1 of the SQAP. Table 2-3 presents the types of samples, analytical methods, specific requirements for sample container size and type, sample preservation and holding times, special handling requirements for samples, and the number of QA/QC samples expected to be collected at the Site.

A summary of sampling locations and rationale is provided below:

#### Phase II Sampling Event - Potential Sources:

- **Pop-up Pond and Pop-up Targets:** A “pop-up” pond is present west of the Central Impact Target Area (CITA). Although this source has been previously sampled, the samples were not analyzed for all constituents of concern with regard to the Site. A total of 10 sediment samples will be collected from the perimeter of the pond. A field portable x-ray fluorescence (XRF) instrument will be used to field screen the surface soils in the area of the pop-up targets. There are two target areas: west of the pop-up pond and east of the pond. A total of 40 locations will be screened using the XRF in the west area and 15 locations in the east area. The 10 locations west of the pond and 8 locations east of the pond exhibiting the greatest area of lead, antimony, and arsenic contamination XRF results will be submitted for off-site fixed laboratory analysis. The surface soil and sediment samples will be submitted for off-site fixed laboratory analysis of perchlorate (EPA Method SW-846 6860 or 332), nitroaromatics and nitroamines (EPA Method SW-846 8330B), and metals (EPA Method SW-846 6010).
- **OB/OD Areas:** There are two Open Burn/Open Detonation (OB/OD) areas at the Site. It is possible that residual contamination is present at these areas. A total of 10 grab surface soil samples will be collected (five samples from each



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OB/OD area). The samples will be analyzed for nitroaromatics and nitroamines (EPA SW-846 8330B), perchlorate (EPA SW-846 6860), and metals (EPA SW-846 6010).

- **Central Impact Target Area:** The CITA is a known source of deposited munitions, some of which may be unexploded. A total of 10 surface soil samples will be collected from the CITA at locations where overland flow from the CITA is anticipated to enter the East Fork Lacamas Creek and David Creek. The samples will be analyzed for nitroaromatics and nitroamines (EPA SW-846 8330B), perchlorate (EPA SW-846 6860), and metals (EPA SW-846 6010).
- **Firing Ranges:** There are 31 firing ranges and/or points that are awaiting remediation. Seven of these firing ranges/target areas have been selected for sampling. These seven were selected based on their proximity to Lacamas Creek and the potential for overland flow to Lacamas Creek. Additionally, the three firing points associated with the North Machine Gun Range, the South Machine Gun Range, and the 25 millimeter Gun Range, have been identified for sampling because they have only previously been sampled for lead. A total of 71 grab surface soil samples will be collected from these firing points and ranges with up to 8 samples per range depending on the size (e.g., the larger ranges will have more samples collected) and up to 5 samples per firing point. The samples will be analyzed for nitroaromatics and nitroamines (EPA SW-846 8330B), perchlorate (EPA SW-846 6860), and metals (EPA SW-846 6010). The ranges that have been selected for sampling include:
  - Artillery Position 7;
  - Artillery Position 6;
  - Former Artillery Position 1/Stokes Mortar Target Area;
  - Artillery Position 5;
  - M203 HE Grenade Range Target;
  - 1,000 inch Range; and
  - 1,000 yard Range.

### Potential Targets:

- **Lacamas Creek and Tributaries:** North Fork Lacamas Creek flows adjacent to Landfill 4 for approximately 1 mile to its confluence with East Fork Lacamas Creek. At the point where these two forks converge is the origin of Lacamas Creek which flows through the Site for approximately 4 miles. David Creek and Buck Creek converge with Lacamas Creek in the northern portion of the Site. It is possible that contamination from site sources is flowing overland and impacting Lacamas Creek and its tributaries. Wetlands are present on both riverbanks along the entire length of Lacamas Creek and North Fork Lacamas Creek within the boundaries of the Site. Sampling activities will begin at the most downstream location, working upstream towards the landfill. Three sediment samples will be collected from one mile increments downstream from the site boundary on Lacamas Creek. These samples will be collected from depositional areas that are publicly accessible. Co-located surface water/sediment sample sets will be collected from approximately every mile on Lacamas Creek within the boundaries of the Site

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(a total of 4 sample sets); in addition, sediment samples will be collected every  $\frac{1}{4}$  mile within the boundaries of the Site (a total of 8 samples). One PPE sample for each of the 10 sampled firing point/range will be collected. The remaining samples will be placed within the creek in areas where no other sampling was conducted. It is possible that sources of contamination are impacting Lacamas Creek from David Creek, Buck Creek, East Fork Lacamas Creek, and North Fork Lacamas Creek. Sediment samples will be collected on these creeks immediately upstream of the confluence with Lacamas Creek and from Lacamas Creek both immediately upstream and immediately downstream of the confluence with these creeks and Lacamas Creek (total of 12 sediment samples). Co-located surface water/sediment sample sets will be collected from North Fork Lacamas Creek near Landfill 4 to the convergence with Lacamas Creek (5 sample sets). Both East Fork Lacamas Creek and David Creek flow through the CITA. It is possible that contamination may be migrating from the CITA and impacting East Fork Lacamas Creek and David Creek. A maximum of three additional sediment samples will be collected from each creek within the CITA (total of 6 sediment samples). If wetlands are noted on these streams, then up to two of the co-located surface water samples may also be collected (total of 4 surface water samples). The water samples will be collected at least 0.10 mile apart within the wetlands. The samples collected from North Fork Lacamas Creek will be analyzed for perchlorate (EPA Method SW-846 6860 or 332), nitroaromatics and nitroamines (EPA Method SW-846 8330B), SVOCs (EPA Method SW-8270), VOCs (EPA Method SW-8260), and metals (EPA Method SW-846 6010), total organic carbon ((EPA SW-846 9060), and grain size (ASTM D-422). All remaining sediment samples will be analyzed for perchlorate (EPA Method SW-846 6860 or 332), nitroaromatics and nitroamines (EPA Method SW-846 8330B), metals (EPA Method SW-846 6010), total organic carbon ((EPA SW-846 9060), and grain size (ASTM D-422). Additionally, the surface water samples will be analyzed for dissolved metals in order to compare results to surface water benchmarks. Based on the EPA CLP Samplers Guide (EPA 2009a) each individual inorganic water sample may be analyzed for total metals or dissolved metals, but not both. Therefore, water samples collected for total metal and dissolved metal analyses from the same sampling location must be assigned separate (unique) CLP Sample Numbers.

### **Background:**

- **Surface Water/Sediment:** A total of four co-located surface water/sediment sample sets will be collected; one from North Fork Lacamas Creek upgradient of Landfill 4, one from David Creek upgradient of the CITA, one from East Fork Lacamas Creek upgradient of the CITA, and one from Buck Creek. The samples will be analyzed for the same constituents as their corresponding downstream samples.
- **Surface Soil:** One surface soil sample will be collected from an area outside the influence of site sources. The location of the sample will be determined in the field.



**QA/QC Samples:**

- **Trip Blanks:** One sample per VOC cooler will be collected. The samples will consist of deionized water. The samples will be analyzed for VOCs. It is estimated that seven trip blank samples will be collected during both Phase I and Phase II.

**2.2.1 Sampling Methodologies**

The START-3 PM and EPA TM will be responsible for ensuring that appropriate sample collection procedures are followed and will take appropriate actions to correct any deficiencies. All samples collected will be maintained under chain-of-custody and will be stored and shipped in iced coolers. Samplers will follow the MEC precautions and guidance as provided by the EPA-contracted UXO technicians. A general letter of guidance regarding these practices is provided in Appendix B of the SQAP.

- **Surface Water Sampling.** UXO avoidance will be conducted by the EPA-contracted UXO technician at each sampling location prior to sample collection. Samples will only be collected at locations approved by the EPA-contract UXO technician. Surface water samples will be collected either by hand-dipping the sample container into the water, if possible, or by creating a funnel with a dedicated 1-liter polyethylene sample bottle with the bottom of the bottle removed. Samples will be preserved as required upon sample collection completion. The perchlorate aliquot will be filtered using a 0.2- $\mu\text{m}$  PTFE filter. Headspace will be left in the sample containers in order to prevent anoxic reduction after filtration. For the dissolved metals samples, the sample is filtered through a 0.45- $\mu\text{m}$  filter at the time of collection and preserved with nitric acid.
- **Sediment Sampling.** UXO avoidance will be conducted by the EPA-contracted UXO technician at each sampling location prior to sample collection. Samples will only be collected at locations approved by the EPA-contract UXO technician. Sediment samples (0 to 6 inches bgs) will be collected using dedicated stainless steel spoons. Collected material will be homogenized thoroughly in dedicated stainless steel bowls and placed into pre-labeled containers. Sediment samples co-located with surface water samples will be collected after their corresponding surface water sample in order to avoid cross-contamination of water samples from agitated sediment.

**Surface Soil Sampling.** UXO avoidance will be conducted by the EPA-contracted UXO technician at each sampling location prior to sample collection. Samples will only be collected at locations approved by the EPA-contract UXO technician. Surface soil (0 to 6 inches bgs) samples will be collected using dedicated stainless steel spoons. Collected material will be placed in a dedicated stainless steel bowl, thoroughly homogenized, and placed into pre-labeled containers.

# 3

## Assessment/Oversight

There are no changes to this section.

# 4

## Data Validation and Usability

There are no changes to this section.

# 5

## References

There are no changes to this section.

# Figures

There are no changes to the figures from the original SQAP.

# Tables

- 2-3      Sample Analysis Summary and Quality Assurance/Quality Control Analytical and Fixed Laboratory Methods – Phase II**

| Matrix/<br>Location <sup>a</sup>  | Proposed<br>Laboratory   | Analytical<br>Parameters/Methods/Description and<br>Detection Limits   | Precision<br>and<br>Accuracy            | Technical Holding<br>Times <sup>b</sup>         | Sample<br>Preservation<br>(all 4°C + 2°C)                                  | Sample Containers/MS/MSD<br>Sample Containers                 | Number of<br>Field<br>Samples                 | Number of<br>MS/MSD<br>Samples | Total Number of<br>Sample<br>Containers |
|---|--|--|---|---|--|---|---|--------------------------------|---|
| Soil/Sediment<br>173 Samples  | CLP/MEL  | Nitroaromatics/Nitroamines<br>SW-846-8330B/ 1 mg/kg  | ± 35%<br>50% - 150%                     | 14 days to extraction 40<br>days to analysis    | N/A  | 1 – 8 ounce clear glass/<br>1 – 8 ounce clear glass           | 173   | 9                              | 173                                     |
| 10 – Pop-up Pond SD<br>18 – Pop-up Pond Target SS<br>10 – CITA SS<br>10 – OB/OD SS<br>71 – Target/Firing Range SS     |  | TAL Metals (plus Li, Sr, and Sn)/<br>EPA CLP SOW ISM01.2 or EPA SW-846<br>6000/7000 Series/ ICP-AES/CRQL           | ± 35%<br>75% - 125%                     | 6 months  | N/A  | 1 – 8 ounce clear glass/<br>1 – 8 ounce clear glass           | 173   | 9                              | 173                                     |
| 5 – North Fork Lacamas Creek SD<br>28 – Lacamas Creek SD  |  | Total Organic Carbon/<br>PSEP-TOC-M/ Pyrolytic/500 mg/kg   | N/A                                     | 28 days   | N/A  | 1 – 8 ounce clear glass/<br>N/A                               | 53  | N/A                            | 53                                      |
| 4 – East Fork Lacamas Creek SD<br>10 – David Creek SD   |  | SVOCs<br>EPA SW-846 8270/ GC-MS/CRQL   | ± 35%<br>50% - 150%                     | 14 days to extraction 40<br>days to analysis    | N/A  | 1 – 8 ounce clear glass/<br>1 – 8 ounce clear glass           | 5   | 1                              | 5                                       |
| 1 – Buck Creek SD<br>1 – Background SS<br>5 – Background SD   |  | VOCs/<br>EPA CLP SOW SOM01.2 or<br>EPA SW-846 8260/ GC-MS/CRQL   | ± 35%<br>50% - 150%                     | At lab within 48hrs:<br>14 days from collection | N/A  | 3xCore-N-One & 1x2 oz. glass/<br>9xCore-N-One & 1x2 oz. glass | 5   | 1                              | 26                                      |
|   |  | Subcontract<br>Laboratory  | Perchlorate/<br>EPA SW-846 6860/ 1µg/kg | ± 35%<br>75% - 125%                             | 28 days  | N/A   | 1 – 4 oz amber glass/<br>1 – 4 oz amber glass | 173                            | 8                                       |
|   | Grain Size/<br>ASTM D-422/ Sieve and hydrometer/<br>0.05 millimeters |  | N/A                                     | N/A   | N/A  | 2 – 8 ounce clear glass/<br>N/A                               | 54  | N/A                            | 108                                     |
| Water<br>17 Samples   | CLP/MEL  | Nitroaromatics / Nitroamines/<br>SW-846 8330B/ 0.5 mg/L  | ± 20%<br>60% - 140%                     | 7 days to extraction 40<br>days to analysis     | N/A  | 2 – 32 ounce glass amber/<br>6 – 32 ounce glass amber         | 17  | 1                              | 38                                      |
| 5 – North Fork Lacamas Creek<br>4 – Lacamas Creek<br>2 – East Fork Lacamas Creek<br>2 – David Creek<br>4 – Background |  | TAL Metals (plus Li, Sr, and Sn)/<br>EPA CLP SOW ISM01.2 or EPA SW-846<br>6000/7000 Series/ ICP-AES/CRQL           | ± 20%<br>75% - 125%                     | 6 months  | pH < 2 with<br>HNO <sub>3</sub>  | 1 – 1-Liter polyethylene/<br>2 – 1-Liter polyethylene         | 17  | 1                              | 18                                      |
|   |  | Dissolved TAL Metals (plus Li, Sr, and Sn)/<br>EPA CLP SOW ISM01.2 or EPA SW-846<br>6000/7000 Series/ ICP-AES/CRQL | ± 20%<br>75% - 125%                     | 6 months  | Filter with 0.45<br>µm PTFE<br>membrane<br>pH < 2 with<br>HNO <sub>3</sub> | 1 – 1-Liter polyethylene/<br>2 – 1-Liter polyethylene         | 17  | 1                              | 18                                      |
|   |  | SVOCs/<br>EPA CLP SOW SOM01.2 or EPA SW-846<br>8270/ GC-MS/CRQL  | ± 20%<br>60% - 140%                     | 7 days to extraction 40<br>days to analysis     | N/A  | 2 – 32 ounce glass amber/<br>6 – 32 ounce glass amber         | 5   | 1                              | 14                                      |
|   |  | VOCs/<br>EPA CLP SOW SOM01.2 or EPA SW-846<br>8260/ GC-MS/CRQL   | ± 20%<br>60% - 140%                     | 7 days unpreserved<br>14 days preserved         | pH ≤ 2 with HCl  | 3 – 40 milliliter glass/<br>9 – 40 milliliter glass           | 5   | 1                              | 21                                      |
|   | Subcontract<br>Laboratory  | Perchlorate/<br>EPA SW-846 6860/0.1 µg/L   | ± 20%<br>75% - 125%                     | 28 days   | Filter with 0.45<br>µm PTFE<br>membrane                                    | 1 – 250 mL polyethylene/<br>2 – 250 mL polyethylene           | 17  | 1                              | 18                                      |
| QA/QC<br>5 Samples<br>(5 – Trip Blanks)   | CLP/MEL  | VOCs/<br>EPA CLP SOW SOM01.2 or EPA SW-846<br>8260/ GC-MS/CRQL   | ± 20%<br>60% - 140%                     | 7 days unpreserved<br>14 days preserved         | pH ≤ 2 with HCl  | 2 – 40 milliliter glass/<br>N/A                               | 5   | N/A                            | 10                                      |

Note:

a = The number of samples presented is an estimate. The actual number of samples to be collected will be determined in the field.

b = Technical holding times have been established only for water matrices. Water technical holding times were applied to sediment, soil, and product samples where applicable; in some cases, recommended sediment/soil holding times are not listed.

Detection Limits: Lithium, water 3.0 µg/L, soil/sediment 0.30 mg/kg, strontium water 6.0 µg/L soil/sediment 0.60 mg/kg, and Tin water 25 µg/L 2.5 mg/kg soil/sediment

Key:

µg/kg = micrograms per kilogram

°C = Degrees Celsius.

µg/L = Micrograms per liter

AA = Atomic Absorption

AES = Atomic Emission Spectrometer

ASTM = American Society for Testing and Materials

CITA = Central Impact Target Area

CLP = Contract Laboratory Program.

CRQL = Contract Required Quantitation Limit

CVAA = Cold Vapor Atomic Absorption

EPA = United States Environmental Protection Agency

GC = Gas Chromatograph

HCl = Hydrochloric acid

HNO<sub>3</sub> = Nitric acid

ICP = Inductively coupled argon plasma

Li = Lithium

MEL = Manchester Environmental Laboratory

mg/kg = milligrams per kilogram.

mg/L = milligrams per liter

MS = Mass spectrometric detection

N/A = Not applicable

OB/OD = Open Burn/Open Detonation

PTFE = Polytetrafluoroethylene

QA = Quality Assurance

QC = Quality Control

SD = Sediment

Sn = Tin

SOW = Statement of Work

Sr = Strontium

SS = Surface Soil

SVOCs = Semivolatile Organic Compounds

TAL = Target Analyte List

VOCs = Volatile Organic Compounds