

REMEDIAL ACTION CONTRACT
FOR REMEDIAL, ENFORCEMENT OVERSIGHT, AND NON-TIME
CRITICAL REMOVAL ACTIVITIES AT SITES OF RELEASE OR
THREATENED RELEASE OF HAZARDOUS SUBSTANCES
IN EPA REGION VIII

U.S. EPA CONTRACT NO. EP-W-05-049

FINAL QUALITY ASSURANCE PROJECT PLAN
WEST SIDE SOILS OPERABLE UNIT REMEDIAL INVESTIGATION SAMPLING
ADDENDUM 2 – RESIDENTIAL GROUNDWATER SAMPLING

SILVER BOW CREEK/BUTTE AREA SUPERFUND SITE
SILVER BOW COUNTY, MONTANA

WORK ASSIGNMENT NO. 363-RICO-0822

February 19, 2020

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U.S. EPA CONTRACT NO. EP-W-05-049

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February 19, 2020

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Addendum 2

Residential Well Sampling

This document is an addendum to the *Quality Assurance Project Plan (QAPP), West Side Soils Operable Unit (WSSOU) Remedial Investigation (RI) Sampling* (CDM Federal Programs Corporation [CDM Smith] 2019). The purpose of this document is to describe the residential well sampling selection and analysis procedures. The addendum describes the section-specific additions and changes to the original QAPP (see the notes in *red italics* for specifics on how the original QAPP sections are to be modified). Unless otherwise specified, the information in the original QAPP remains unchanged.

A.5 Problem Definition and Background

A5.1 Decisions, Actions, and Expected Outcomes

[A new bullet will be added to this section.]

The information gathered during RI sampling will be used to:

- Determine the nature and extent of contaminated groundwater within the WSSOU study area¹. Surface water spring sampling data will be collected to understand potential groundwater impacts near mine areas. Existing residential, agricultural, and/or monitoring wells are typically located away from abandoned mine areas, but existing available data will be evaluated from these wells and additional sampling will be conducted to evaluate if there are potential impacts to groundwater in the area.

A.7 Data Quality Objectives and Criteria

A7.1 Step 1: State the Problem

[A new subheading will be added to this section.]

Residential Groundwater Sampling

Residential groundwater data is not available or is outdated for most residences in the study area. In addition, other monitoring or agricultural wells have very little to no available data. The groundwater wells that have existing data were sampled as part of monitoring for Yankee Doodle Tailings Impoundment at the Continental Mine collected by others, and part of ongoing sampling conducted by the Montana Bureau of Mines and Geology (MBMG). Current data are needed to confirm the previous results, assess current water quality conditions, and identify and sample previously unsampled residential wells.

A7.2 Step 2: Identify the Goal of the Study

[The following information will replace existing text in this section.]

¹ The WSSOU mine study area has not yet been delineated, but a study area has been established to guide the RI studies. For the purposes of this addendum, any mention of the WSSOU is referring to this study area.

Mine Study Area Groundwater

6. *What is the nature and extent of groundwater contamination associated with abandoned mine and mineral exploration areas based on surface expression of springs, other discharge from mine openings, and existing groundwater wells in the area?*

Samples from surface expressions of groundwater (springs, adit discharges, or other discharges from mine openings), along with flow measurements (or visual estimates), will be used to determine metal concentrations and loads. The data will be used to evaluate potential sources of contaminants and risks to receptors, and representative data may be evidence of groundwater contamination as a result of abandoned mine areas. In addition, samples from existing monitoring, residential, and/or agricultural wells will be collected from within the WSSOU study area. Where existing data is available collected by others from groundwater wells, these data will be reviewed, and if acceptable as screening quality data for the remedial investigation, further sampling of those wells may not be conducted under the current phase of work. Results of these samples may provide input regarding whether further characterization of groundwater in the area is necessary, such as installation of groundwater monitoring wells.

7. *Do existing residential and/or agricultural wells contain groundwater that poses risks to human health and the environment?*

Water quality data for some existing residential and/or agricultural wells in the WSSOU mine study area are available through MBMG. To the extent available, these results will be compared to Montana Department of Environmental Quality groundwater human health standards used to evaluate if groundwater concentrations may pose risks to human receptors. As an initial screening, any agricultural uses will be identified and well results compared to surface water standards to determine if risks could occur to surface water receptors. Results from stock wells will be compared to the Wyoming livestock-recommended criteria where available. In addition, residential and/or agricultural wells that are not sampled by others (e.g., Montana Resources, MBMG) will be sampled as an initial screening. The data will also be used in conjunction with additional information obtained during the RI to determine if further groundwater investigation is warranted, such as further sampling or monitoring well installation.

To address this study question, residential groundwater samples for metals are needed. Samples should be taken from as many residential wells available in the study area. The data from these samples will be used to inform risk managers as to the health risks for people with wells in this study area.

A7.3 Step 3: Identify Information Inputs

[The following information will be added to this section.]

Mine Study Surface Water, Groundwater (Springs), and Sediments

For existing groundwater wells, existing data from the Montana's Ground Water Information Center (GWIC) database and from others (MR data) will be the initial information input, along with water quality standards used for the Site. These data and locations will be reviewed to determine which wells in the WSSOU study area already have data collected, and whether that data is sufficient for use in the RI in accordance with the secondary data QAPP (CDM Smith 2019). The focus of the existing data review and further groundwater well sampling will be on determining current water quality where available. Samples will usually be collected from the

kitchen tap or tap nearest to groundwater source. The analysis will be for total and dissolved metals and metalloids, general water chemistry, and field-measured parameters. The data collected will be comparable to those collected in prior sampling events.

The results obtained will be compared to the federal MCLs and State of Montana human health groundwater standards.

A7.4 Step 4: Define the Boundaries of the Study

[The following information will be added to this section.]

The spatial extent of the groundwater sampling should be at residences within the WSSOU mine study area (shown on **Addendum Figure 1**). This figure shows all known or assumed residential, agricultural, and/or monitoring wells in the WSSOU Study Area. The wells located within the WSSOU mine study area. It assumed that monitoring wells, where present, have data collected by others and so no further samples will be collected under this QAPP. Wells were located using the GWIC database. It is uncertain as to whether these are accurate or complete. During our initial phone calls a better understanding of the number of wells will be determined. In addition, some residential wells are already sampled by others on a regular basis and so there may not be additional sampling conducted at those properties under this QAPP. The WSSOU study area encompasses more than 10 square miles and more than 400 mine claims. Residences are located mostly around the perimeter of the WSSOU mine study area, to the north of and along Oro Fino Gulch.

A7.5 Step 5: Develop the Analytic Approach

[The following information will be added to this section.]

Mine Area Surface Water, Groundwater (Springs), and Sediments

Groundwater samples will be collected in existing wells for metals and other anions in WSSOU where property access is granted as shown in **Table A-1**. Data collected will help to determine the extent of groundwater contamination within the WSSOU mine study area. The following field and laboratory parameters will be analyzed to provide data for the remedial investigation.

Exhibit A-2. Field and Laboratory Parameters

Matrix	Measurement Endpoint	Field/Laboratory
Groundwater	Total recoverable and dissolved target analyte list (TAL) metals/metalloids: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn	Laboratory
	Common ions and other parameters: hardness, total dissolved solids (TDS), sulfate, chloride, fluoride, phosphorous, nitrate/nitrite, ammonia, bicarbonate alkalinity, carbonate alkalinity, total alkalinity, acidity	Laboratory
	Temperature, turbidity, oxidation reduction potential, pH specific conductivity, dissolved oxygen	Field

There is likely to be a diversity of conveyance systems throughout the residences in this area. Some residents within the Site have installed water softeners and /or their own filtration systems, and other residents have appurtenances such as pressure tanks and cisterns installed.

Given the diversity of wells within the Site, EPA has established a sampling protocol to obtain the most useful data and information. Generally, these protocols are (1) collect a sample as close to the source as possible (i.e., prior to the water passing through a pressure tank, softener, or filter); if this is not possible (2) collect a sample at the kitchen tap.

The measurement and analytical methods utilized during this investigation are discussed in detail in Section B, Data Generation and Acquisition.

B2. Sampling Methods

B2.3 Residential Water Sampling

[The following is a new subsection (Section B2.3.8) to be added to the end of Section B2.3.]

B2.3.8 Residential Groundwater Sampling

The goals of the residential water sampling are to evaluate current (2020) residential water quality at the WSSOU, to determine characterization of current groundwater, provide area residents with information regarding water quality in the WSSOU mine study area, and help assess further actions that may be necessary with respect to groundwater quality in the WSSOU mine study area. The primary goal is to assess the impact of mining on the residential groundwater at the Site and/or natural occurrences of minerals that could elevate metals in area groundwater. TAL metals and metalloids and general chemistry parameters are the critical data drivers for the project. This work will consist of collecting water from residential wells and taps, documenting the sample locations and other specifics, and collecting and documenting field parameters.

Field Procedures

Residential groundwater sampling includes residential and agricultural wells. All samples will be collected with a modified version of SOP 1-9, Tap Water Sampling (**Appendix C**). At least 1 week prior to sampling CDM Smith will call and notify the resident of the upcoming sampling date to ensure that the sampling point is available and to arrange a sampling time. On the day before sampling, call the resident to reconfirm.

The procedure for sampling of residential groundwater wells is:

- Make phone calls to gain an understanding of how many wells are on the property, where they are located, and whether they are used for the primary source of water. Discussion should be held with the resident to determine if a water softening system has been installed or any other appurtenances.
- Identify the sampling location closest to the well that isn't impacted by a water softener or filtering system. In most cases, this is expected to be a frostless hydrant between the wells and house or other point of use.
- Turn on the tap and begin running the water for 10 minutes. After 10 minutes begin measuring field parameters with a YSI meter (or equivalent) every 3 to 5 minutes. The YSI will be placed in a plastic cup with continuous water flowing. The sample will be collected after the stabilization of field parameters. This will be when three consecutive readings are within the performance criteria listed in **Table B-5**. If the field parameters are not stabilized, the field team leader will decide if a sample will be collected.

Field work will be documented in field logbooks in accordance with CDM Smith Technical Standard Operating Procedure (TSOP) 4-1, Field Logbook Content and Control (**Appendix C**). Photographic documentation of sampling locations will be conducted in accordance with CDM Smith TSOP 4-2, Photographic Documentation of Field Activities (**Appendix C**).

Field Equipment

For the residential well sampling, the following field equipment is needed:

- Approved WSSOU RI QAPP (CDM Smith 2019) and Addendum 2 (including all pertinent TSOPs), field logbook, pens, camera, batteries
- Maps of proposed sampling locations, residential contact information, signed and blank access forms, and Global Positioning Satellite (GPS) unit
- Sample coolers, ice, tape
- Sample bottles, zip top bags, and nitric acid preservation
- YSI meter (or equivalent), Y-split hose adapter, hose, 5-gallon bucket, plastic cups.
- Paper towels, deionized water, alconox
- Health and safety gear (portable eye-wash station, sunglasses, work gloves, flashlight, potable water, safety glasses, sunscreen, safety vests, work boots, insect repellent, and first aid kit)

Sample Handling, Shipment, and Analysis

All samples will be handled as described in Section B2.2.2. The estimated number of samples, including quality control (QC) samples, is listed in **Table B-3**. Analytical methods, container requirements, preservatives, holding times, and reporting limits are listed in **Table B-4**. Field measurement performance criteria are listed in **Table B-6**.

B3. Sample Handling and Custody

The sample nomenclature for the WSSOU RI will be updated in **Table B-2** to include residential groundwater sampling.

Table B-2. Sample Nomenclature for the WSSOU RI

Location Within Area	Sample Type and Media	Sample Date
Samples names will start with the following, denoting the year and site name: “20WS-“		
The characters below will follow, separated by hyphens:		
5 characters	1 character	6 characters
Consists of two letters and three digits for the media and unique, sequential sample number: GW : Groundwater Sampling Example: GW001	Sample Type: N : Normal D : Duplicate R : Rinsate	Six-digit sample date. Example: 030120 (March 1, 2020)

B.4 Analytical Methods

B4.2 Methods

B4.2.3 Residential Groundwater Analyses

[A new subheading will be added to this section.]

The same methods will be used for groundwater as presented in Section B4.2.2 for surface water, with the exception that total suspended solids will not be analyzed.

E References

[The following references will be added to Section E.]

CDM Smith. 2019. *Quality Assurance Project Plan, West Side Soils Operable Unit Remedial Investigation Sampling*. Prepared for the U.S. Environmental Protection Agency, Region VIII, Montana Office.

CDM Smith. 2019. *Quality Assurance Project Plan for the Use of Existing Data*. Prepared by CDM Smith for EPA. March 2019.

[Table B-3 in the QAPP will be modified to append the information below.]

Table B-3. Estimated Numbers and Types of Samples for Laboratory Analysis

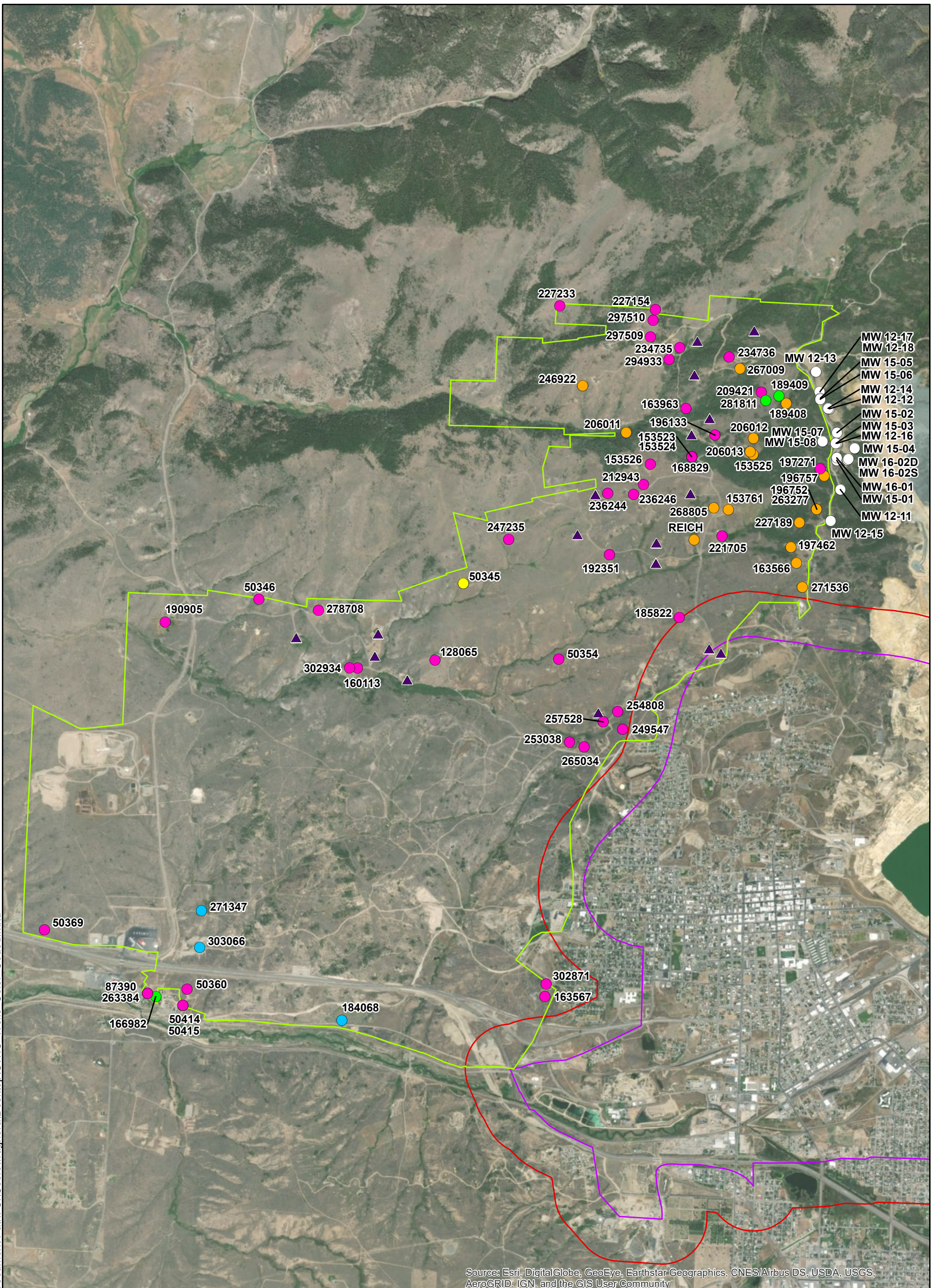
Task	Media	Comment	Measurement or Analysis	Natural Samples (estimate)	Field Duplicates	Equipment Rinsate Blanks	MS/MSD	Total Sample Sets
Residential Groundwater Sampling	Groundwater	Groundwater samples from residential and agricultural wells	Total and dissolved metals, TDS, alkalinity, anions, acidity and ammonia	60-70	3-4 ^a	0 ^b	0 ^b	60-74

MS/MSD = matrix spike/matrix spike duplicate

^a Duplicates will be submitted at a rate of 1 per 20 natural samples.

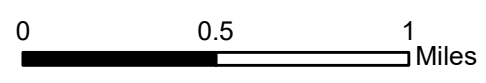
^b Blanks and spikes will be evaluated by the analytical laboratory as part of the residential groundwater analysis; no additional samples need to be submitted to support these QC analyses.

Figures



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- DOMESTIC
- ▲ DOMESTIC ESTIMATED
- DOMESTIC MR MONITORING
- IRRIGATION
- MONITORING
- MR MONITORING WELL
- STOCKWATER
- WSSOU Mine Study Area
- Butte Alluvial and Bedrock Controlled Groundwater Area
- BABCGA 0.25 mi buffer



Datum
NAD 83
Coordinate System
State Plane Montana FIPS 2500 (ft)



Figure 1
Estimated Residential Well Locations
West Side Soils Operable Unit
Silver Bow Creek/Butte Area Superfund Site



Appendix Addendum 2

TSOP

Tap Water Sampling

SOP 1-9

Revision: 7

Date: February 2015

Approved:



Signature

Technical Review:

David Sembrot

1.0 Objective

The objective of this technical standard operating procedure (SOP) is to define the requirements for collecting tap water samples for the purpose of assessing water quality. General guidelines for purging the water supply system before sample collection are also provided. Depending on the objective of the sampling event as defined in the site-specific sampling plan, the water source may be from a private or public potable water supply, such as a groundwater well or a surface water reservoir.

2.0 Background**2.1 Definitions**

Holding Tank - An in-house water reservoir that provides a limited reserve water supply and equalizes water pressure throughout the plumbing system. Most domestic well holding tanks have a storage capacity of approximately 30 gallons.

Onsite Water Supply - A source of potable water located on the property to be sampled. The water source could be a groundwater aquifer (i.e., a residential groundwater well) or a surface water body (i.e., a water intake from a lake).

Potable Water - Water considered safe for human consumption.

Tap Water Samples - Samples of water collected from a faucet or spigot at a residence, business, or industrial plant. Usually, samples are collected from the tap(s) nearest the water supply source or area of interest along the distribution system.

Water Filter - A device used to remove suspended particulate matter and/or various compounds from the water source. One type of common filter is a water softener that uses a calcium-salt filter to remove calcium and magnesium ions from potable water to reduce the hardness.

2.2 Associated Procedures

- SOP 1-2, *Sample Custody*
- SOP 2-1, *Packaging and Shipping Environmental Samples*
- SOP 4-1, *Field Logbook Content and Control*
- SOP 4-3, *Well Development and Purging*
- SOP 4-5, *Field Equipment Decontamination at Nonradioactive Sites*

2.3 Discussion

Tap water sampling may be conducted in residential, commercial, or industrial areas. Consequently, sampling personnel will interface with the general public (i.e., homeowners, business owners, or concerned citizens) and must present themselves in the utmost professional manner. Permission to access the property must be obtained before conducting the tap water sampling event; the client shall be consulted as to the proper notification procedures. At the time of the sampling, it is recommended that a letter of introduction be presented to the property owner or representative, explaining the purpose of the tap water sampling and indicating the name of the person and phone number to contact if the property owner has questions. At no time shall the sampling team enter a home or business without the approval of the property owner; the property owner or representative must be present to enter a building.

Generally, water supply sources and distribution systems can be categorized into two types:

- Onsite water supplies such as private, groundwater wells or surface water intakes for single residences, businesses, or industrial plants with limited distribution systems

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- Large distribution systems from public or municipal groundwater or surface water supplies with extensive distribution systems for multiple users

The site-specific sampling plan shall describe the source of the potable water supply, the water distribution system, and other site-specific factors that may affect the water quality (well construction details, local hydrogeology, the presence of filters or holding tanks within the distribution system, pipe age, and composition, etc.). It is preferable to collect the samples from a tap located prior to a filtering device or a holding tank so that contaminants will be less likely to have been removed or allowed to settle out. The sampling objectives and sampling requirements, including analytical parameters, preservatives, and sample handling procedures must also be specified. Depending on the water source and distribution system, the site-specific sampling plan shall describe the requirements for purging the system before collecting the tap water sample and for disposing of the purged water.

The procedures described in this SOP provide guidelines to obtain representative tap water samples from water supplies/distribution systems ranging from small onsite water supplies to large multiuser distribution systems.

3.0 General Responsibilities

Field Team Leader - The field team leader is responsible for ensuring that sampling efforts are conducted in accordance with this procedure and any associated SOPs.

Sampling Personnel - Field team members are responsible for conducting tap water sampling events in accordance with this procedure, all associated SOPs, and requirements as described in the site-specific plans.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site/quality assurance project plan (QAPP).

4.0 Required Equipment

All or part of the equipment listed may be required at any specific site, depending on the plan(s) for that site.

- Site-specific plans including letter(s) of introduction
- Field logbook and indelible black ink pens and markers
- Forms and other documentation for sample shipment
- Sample containers, labels, and preservatives, as required
- Insulated cooler and waterproof sealing tape
- Ice bags or "blue ice"
- Plastic zip-top bags
- 5-gallon bucket and stopwatch
- Temperature, conductivity, pH, dissolved oxygen, and turbidity meters (with clean beakers or other appropriate containers), as required by the site-specific plans
- Photoionization detector (PID) and/or other monitoring/screening instruments as required by the site-specific health and safety plan or sampling plan
- Decontamination supplies, as required by SOP 4-5
- Personal protective equipment (PPE), as required by the site-specific health and safety plan
- Latex or appropriate gloves

5.0 Procedures

- Obtain the name(s) of the resident(s) or water supply owner/operator, the exact mailing address, and telephone numbers. This information is required to obtain access to the property to be sampled and to submit a letter of introduction to the owner/representative.

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2. Determine the location of the tap to be sampled based on its proximity to the water source. It is preferable that the tap being sampled be prior to any holding or pressure tanks, filters, water softeners, or other treatment devices that may be present.
3. If the sample must be collected at a point in the water line beyond a pressurization or holding tank, a sufficient volume of water shall be purged to provide a complete exchange of fresh water into the tank and at the location where the sample is collected. If the sample is collected from a tap or spigot located just before a storage tank, spigots located inside the building or structure shall be turned on to prevent any backflow from the storage tank to the sample tap or spigot. It is generally advisable to open as many taps as possible during the purge, to ensure a rapid and complete exchange of water in the tanks.
4. Samples collected to determine if system related variables (e.g., transmission pipes, water coolers/heaters, holding/ pressurization tanks) are contributing to the quality of potable water shall be collected after a specific time interval (e.g., weekend, holiday). Sample collection shall consist of an initial flush, a sample after several minutes, and another sample after the system has been purged.
5. Devices such as hoses, filters, or aerators attached to the tap may harbor a bacterial population and therefore shall be removed before sampling.
6. Potable water samples which have been chlorinated must be treated with sodium thiosulfate to dechlorinate the sample prior to other preservation and shipping for analysis.
7. Sample containers shall not be rinsed before use when sampling for bacterial content, and precautions shall be taken to avoid splashing drops of water from the ground or sink into either the bottle or cap.
8. Samples of the raw water supply and the treated water after chlorination shall be collected when sampling at a water treatment plant.
9. In the logbook, record the location and describe the general condition of the tap selected for sampling. The rationale used in selecting the tap sampling location, including any discussions with the property owner, shall also be recorded. Provide a sketch of the water supply/distribution system noting the location of any filters or holding tanks and the water supply source (i.e., an onsite groundwater well or surface water intake or a water service line from a public water main). If an onsite water supply is present, observe and record the surrounding site features that may provide potential sources of contamination to the water supply.
10. Don the appropriate personal protective clothing as dictated by the site-specific health and safety plan. Latex gloves shall be changed between sampling locations to avoid possible cross contamination of the tap water samples.
11. Before sample collection, the supply system shall be purged by turning the cold water tap on. The following general guidelines shall be followed to determine when the system is adequately purged (refer to the site-specific sampling plans for any other requirements):
 - **Onsite Water Supply.** A minimum of three standing volumes of water (i.e., the static volume of water in the well and holding tank, if present) shall be purged. Obtain water temperature, conductivity, and pH measurements after each volume of water is purged. If the standing volume of water in the supply system is unknown, the tap shall be allowed to run for a minimum of 15 minutes and temperature, conductivity, and pH measurements, or other parameters as specified by the project plan, shall be collected at approximately 3- to 5-minute intervals. (In general, well construction details and holding tank volumes shall be obtained before conducting the sampling event to estimate the standing volume of the water supply system.) The system is considered adequately purged when the temperature, conductivity, and pH stabilize within 10 percent for three consecutive readings. If these parameters do not stabilize within 15 minutes, then purging shall be discontinued and tap water samples may be collected as discussed in Section 6.0.

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- **Large Distribution Systems.** Because it is impractical to purge the entire volume of standing water in a large distribution network, a tap shall be run for a minimum of 5 minutes, which shall be adequate to purge the water service line. Obtain temperature, conductivity, and pH measurements at approximately 1-minute intervals. The system is considered adequately purged when the temperature, conductivity, and pH readings, or other parameters as specified by the project plan, stabilize within 10 percent for three consecutive readings. If these parameters do not stabilize within 5 minutes, then purging shall be discontinued and tap water samples may be collected as discussed in Section 6.0.

During purging, a 5-gallon bucket and stopwatch may be used to estimate the flow rate if required by the site-specific plans. Dispose of the purged water according to the site-specific plans. Record the temperature/conductivity/pH readings, or other parameters as specified by the project plan, the volume of water purged, the flow rate if measured, and the method of disposal in the field logbook.
12. After purging the supply system, collect the samples directly from the tap (i.e., if a hose was used for purging, the hose shall be disconnected before sampling). Any fittings on the end of the faucet that might introduce air into the sample (i.e., a fine mesh screen that is commonly screwed onto the faucet) shall be removed before sample collection also.
 13. Obtain a smooth-flowing water stream at moderate pressure with no splashing. Samples for volatile organic compound (VOC) analyses shall be collected using a reduced flow rate (see below). Hold the sample bottle in one hand and the cap in the other; do not touch the inside of the cap; do not allow the faucet to touch the inside of the bottle; do not allow splashing water from the ground or sink to enter the bottle or cap. VOC samples shall be filled first, followed by other organic analyses, inorganic analyses, and then other water quality parameters. Refer to the site-specific plans for the required sample parameters, preservatives, and sample handling procedures. The following general guidelines shall be followed when collecting samples:
 - **VOC.** Reduce the flow rate to a minimum to reduce aeration of the VOC sample. Use a pre-preserved "test" vial to determine the appropriate amount of hydrochloric acid (HCl) needed to reduce the pH of the sample to less than 2. Dispose of this test vial after the appropriate amount of HCl is determined. Add the required amount of HCl to the sample vials and then fill the vials with the sample water. Quickly replace the cap and check for air bubbles. If air bubbles are present, the vial will be discarded and a new vial will be filled as detailed above.
 - **Semivolatile Organic Compounds (SVOCs), Pesticides, and Polychlorinated Biphenyls (PCBs).** Generally, aqueous samples for SVOCs and pesticides/PCBs require no preservative. Sample containers may be filled directly from the tap.
 - **Total (unfiltered) Metals.** Generally, tap water samples are not collected for filtered (dissolved) metals because risk assessment data needs require total metals analyses (check the site-specific plans to determine filtering requirements). The sample container for total metals may be filled directly from the tap. Nitric acid (HNO₃) shall then be added to the filled container to preserve the sample to a pH less than 2.
 - **Other Sample Parameters.** Other water quality parameters, such as cyanide dissolved oxygen, hardness, nitrate/nitrite, etc., shall be collected and preserved as required by the site-specific sampling plans.
 14. Label all sample containers as required and place them in a cooler with ice. Record all appropriate data in the field logbook and on the chain-of-custody forms.

6.0 Restrictions/Limitations

To protect the sample from contamination on the exterior of a tap, a tap shall not be chosen for sampling if any of the following conditions exist:

- A leaky tap allowing water to flow out from around the stem of the valve handle and down the outside of the faucet.
- A tap located too close to the bottom of the sink or the ground surface.
- A tap that allows water to run up on the outside of the lip.

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- A tap that does not deliver a steady stream of water. A temporary fluctuation in line pressure may cause sheets of microbial growth, lodged in some pipe sections or faucet connections, to break loose.

Careful sampling for VOC analysis, or for any other compound(s) that may be degraded by aeration, is necessary to minimize sample disturbance and, hence, analyte loss.

7.0 References

U. S. Environmental Protection Agency. 2013. Region 4. The Field Branches Quality System and Technical Procedures, Potable Water Sampling. SESDPROC-305-R3. May.

EPA REGION 8 QA DOCUMENT REVIEW CROSSWALK

QAPP/FSP/SAP for: <i>(check appropriate box)</i>		Entity (<i>grantee, contract, EPA AO, EPA Program, Other</i>) EPA Region 8, Montana Office	Regulatory Authority and/or Funding Mechanism	___ 2 CFR 1500 for Grantee/Cooperative Agreements ___ 48 CFR 46 for Contracts ___ Interagency Agreement (FFA, USGS) ___ EPA/Court Order ___ EPA Program Funding ___ EPA Program Regulation ___ EPA CIO 2105																				
<input type="checkbox"/> GRANTEE																								
<input type="checkbox"/> CONTRACTOR																								
<input checked="" type="checkbox"/> EPA																								
<input type="checkbox"/> Other																								
Document Title <i>[Note: Title will be repeated in Header]</i>		Quality Assurance Project Plan, West Side Soils Operable Unit Remedial Investigation Sampling – Addendum 2: Residential Groundwater Sampling																						
QAPP/FSP/SAP Preparer		CDM Smith-Helena																						
Period of Performance <i>(of QAPP/FSP/SAP)</i>		2019–2020		Date Submitted for Review																				
EPA Project Officer EPA Project Manager		Nikia Greene		PO Phone # PM Phone #																				
QA Program Reviewer or Approving Official		Nikia Greene		Date of Review																				
Documents Submitted for QAPP Review (QA Reviewer must complete): 1. QA Document(s) submitted for review:		Notes for Document Submittals:																						
<table border="1"> <thead> <tr> <th>QA Document</th> <th>Document Date</th> <th>Document Stand-alone</th> <th>Document with QAPP</th> </tr> </thead> <tbody> <tr> <td>QAPP Addendum</td> <td>2/18/2020</td> <td>Yes / <input type="checkbox"/> No</td> <td><input checked="" type="checkbox"/> Yes / No</td> </tr> <tr> <td>FSP</td> <td></td> <td>Yes / No</td> <td>Yes / No</td> </tr> <tr> <td>SAP</td> <td></td> <td>Yes / No</td> <td>Yes / No</td> </tr> <tr> <td>SOP(s)</td> <td></td> <td></td> <td>Yes / No</td> </tr> </tbody> </table>		QA Document	Document Date	Document Stand-alone	Document with QAPP	QAPP Addendum	2/18/2020	Yes / <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes / No	FSP		Yes / No	Yes / No	SAP		Yes / No	Yes / No	SOP(s)			Yes / No	<ol style="list-style-type: none"> A QAPP written by a Grantee, EPA, or Federal Partner <u>must include</u> for review: Work Plan(WP) / Statement of Work (SOW) / Program Plan (PP) / Research Proposal (RP) and funding mechanism A QAPP written by Contractor <u>must include</u> for review: <ol style="list-style-type: none"> Copy of Task Order Work Assignment/SOW Reference to a hard or electronic copy of the contractor’s approved QMP Copy of Contract SOW if no QMP has been approved Copy of EPA/Court Order, if applicable The QA Review must determine (with the EPA CO or PO) if a QARF was completed for the environmental data activity described in the QAPP. <ol style="list-style-type: none"> Field Sampling Plan (FSP) and/or Sampling & Analyses Plan (SAP) must include the Project QAPP <u>or</u> <u>must</u> be a stand-alone QA document that <u>contain all QAPP required elements</u> (Project Management, Data Generation/Acquisition, Assessment and Oversight, and Data Validation and Usability). SOPs must be submitted with a QA document that <u>contains all QAPP required elements</u>. 		
QA Document	Document Date	Document Stand-alone	Document with QAPP																					
QAPP Addendum	2/18/2020	Yes / <input type="checkbox"/> No	<input checked="" type="checkbox"/> Yes / No																					
FSP		Yes / No	Yes / No																					
SAP		Yes / No	Yes / No																					
SOP(s)			Yes / No																					
2. WP/SOW/TO/PP/RP Date <u>11/5/2018</u> WP/SOW/TO/RP Performance Period <u>9/27/20</u>																								
3. QA document consistent with the: WP/SOW/PP for grants? <u>Yes / No</u> SOW/TO for contracts? <u>Yes / No</u>																								
4. QARF signed by R8 QAM <u>Yes / No / NA</u> Funding Mechanism <u>IA / contract / grant / NA</u> Amount _____																								
Summary of Comments (<i>highlight significant concerns/issues</i>): Follow CDC guidance when doing any field work during the Covid-19 pandemic.																								

Element	Acceptable Yes/No/NA	Page/ Section	Comments
A. Project Management			
A1. Title and Approval Sheet			
a. Contains project title		i	CDM Smith: The page/section numbers listed herein are from the original QAPP for West Side Soils Operable Unit Remedial Investigation Sampling. Addendum 2 updates to the original QAPP are indicated in comments, with Addendum 2 page numbers provided. If no comment is provided, the original QAPP remains unchanged. Updates to Section E of the original QAPP (References) are provided on Addendum 2 page A-7. EPA: no comment from original QAPP including Addendum 1
b. Date and revision number line (for when needed)		i	EPA: no comment from original QAPP including Addendum 1
c. Indicates organization’s name		i	EPA: no comment from original QAPP including Addendum 1
d. Date and signature line for organization’s project manager		ii	EPA: no comment from original QAPP including Addendum 1
e. Date and signature line for organization’s QA manager		ii	EPA: no comment from original QAPP including Addendum 1
f. Other date and signatures lines, as needed		ii	EPA: no comment from original QAPP including Addendum 1
A2. Table of Contents			
a. Lists QA Project Plan information sections		i–iii	EPA: no comment from original QAPP including Addendum 1
b. Document control information indicated		vi	EPA: no comment from original QAPP including Addendum 1
A3. Distribution List			
Includes all individuals who are to receive a copy of the QA Project Plan and identifies their organization		A-1	EPA: no comment from original QAPP including Addendum 1
A4. Project/Task Organization			
a. Identifies key individuals involved in all major aspects of the project, including contractors		A-2	EPA: no comment from original QAPP including Addendum 1
b. Discusses their responsibilities		A-3	EPA: no comment from original QAPP including Addendum 1
c. Project QA Manager position indicates independence from unit generating data		A-4	EPA: no comment from original QAPP including Addendum 1
d. Identifies individual responsible for maintaining the official, approved QA Project Plan		A-4	EPA: no comment from original QAPP including Addendum 1
e. Organizational chart shows lines of authority and reporting responsibilities		A-1	EPA: no comment from original QAPP including Addendum 1
A5. Problem Definition/Background			

Quality Assurance Project Plan, West Side Soils Operable Unit Remedial Investigation Sampling – Addendum 2: Residential Groundwater Sampling

a. States decision(s) to be made, actions to be taken, or outcomes expected from the information to be obtained		A-5	CDM Smith: A new bullet will be added to Section A5.1 describing an additional round of sampling to determine the contamination of mining metals in residential groundwater wells within the WSSOU study area. See Addendum 2 page A-1. EPA: new bullet included no further comment
b. Clearly explains the reason (site background or historical context) for initiating this project		A-6	EPA: no comment from original QAPP including Addendum 1
c. Identifies regulatory information, applicable criteria, action limits, etc. necessary to the project		A-7	EPA: no comment from original QAPP including Addendum 1
A6. Project/Task Description			
a. Summarizes work to be performed, for example, measurements to be made, data files to be obtained, etc., that support the project=s goals		A-7	EPA: no comment from original QAPP including Addendum 1
b. Provides work schedule indicating critical project points, e.g., start and completion dates for activities such as sampling, analysis, data or file reviews, and assessments		A-8	EPA: no comment from original QAPP including Addendum 1
c. Details geographical locations to be studied, including maps where possible		A-8	EPA: no comment from original QAPP including Addendum 1
d. Discusses resource and time constraints, if applicable		A-8	EPA: no comment from original QAPP including Addendum 1
A7. Quality Objectives and Criteria			
a. Identifies - performance/measurement criteria for all information to be collected and acceptance criteria for information obtained from previous studies, - including project action limits and laboratory detection limits and - range of anticipated concentrations of each parameter of interest		A-9	CDM Smith: A new section (Residential Groundwater Sampling) will be added to A7.1 Step 1: State the Problem. In the following sections, the residential groundwater sampling information will be added to the Mine Study Area Groundwater information: A7.2 Step 2: Identify the Goal of the Study, A7.3 Step 3: Identify Information Inputs, A7.4 Step 4: Define the Boundaries of the Study, A7.5 Step 5: Develop the Analytical Approach, and A7.6 Step 6: Specify Performance or Acceptance Criteria. See Addendum 2 pages A-1 through A-4. EPA: new sections included no further comment
b. Discusses precision		A-24	EPA: no comment from original QAPP including Addendum 1
c. Addresses bias		A-24	EPA: no comment from original QAPP including Addendum 1
d. Discusses representativeness		A-24	EPA: no comment from original QAPP including Addendum 1
e. Identifies the need for completeness		A-25	EPA: no comment from original QAPP including Addendum 1
f. Describes the need for comparability		A-25	EPA: no comment from original QAPP including Addendum 1
g. Discusses desired method sensitivity		A-25	EPA: no comment from original QAPP including Addendum 1
A8. Special Training/Certifications			

Quality Assurance Project Plan, West Side Soils Operable Unit Remedial Investigation Sampling – Addendum 2: Residential Groundwater Sampling

a. Identifies any project personnel specialized training or certifications		A-25	EPA: no comment from original QAPP including Addendum 1
b. Discusses how this training will be provided		A-25	EPA: no comment from original QAPP including Addendum 1
c. Indicates personnel responsible for assuring training/certifications are satisfied		A-25	EPA: no comment from original QAPP including Addendum 1
d. identifies where this information is documented		A-25	EPA: no comment from original QAPP including Addendum 1
A9. Documentation and Records			
a. Identifies report format and summarizes all data report package information		A-26	EPA: no comment from original QAPP including Addendum 1
b. Lists all other project documents, records, and electronic files that will be produced		A-26	EPA: no comment from original QAPP including Addendum 1
c. Identifies where project information should be kept and for how long		A-26	EPA: no comment from original QAPP including Addendum 1
d. Discusses back up plans for records stored electronically		A-26	EPA: no comment from original QAPP including Addendum 1
e. States how individuals identified in A3 will receive the most current copy of the approved QA Project Plan, identifying the individual responsible for this		A-26	EPA: no comment from original QAPP including Addendum 1
B. Data Generation/Acquisition			
B1. Sampling Process Design (Experimental Design)			
a. Describes and justifies design strategy, indicating size of the area, volume, or time period to be represented by a sample		B-1	EPA: no comment from original QAPP including Addendum 1
b. Details the type and total number of sample types/matrix or test runs/trials expected and needed		B-1	EPA: no comment from original QAPP including Addendum 1
c. Indicates where samples should be taken, how sites will be identified/located		B-2	EPA: no comment from original QAPP including Addendum 1
d. Discusses what to do if sampling sites become inaccessible		B-2/ B.1.1	EPA: no comment from original QAPP including Addendum 1
e. Identifies project activity schedules such as each sampling event, times samples should be sent to the laboratory, etc.		B-1/ Table B-1	EPA: no comment from original QAPP including Addendum 1
f. Specifies what information is critical and what is for informational purposes only		B-1/B.1	EPA: no comment from original QAPP including Addendum 1
g. Identifies sources of variability and how this variability should be reconciled with project information		B-1/B.1	EPA: no comment from original QAPP including Addendum 1
B2. Sampling Methods			

Quality Assurance Project Plan, West Side Soils Operable Unit Remedial Investigation Sampling – Addendum 2: Residential Groundwater Sampling

a. Identifies all sampling SOPs by number, date, and regulatory citation, indicating sampling options or modifications to be taken		B-3/B2.1	EPA: no comment from original QAPP including Addendum 1
b. Indicates how each sample/matrix type should be collected		B-12/B2.3	CDM Smith: A new section (Section B2.3.8, Residential Groundwater Sampling) will be added to Section B2.3 to describe the sampling method for residential groundwater sampling. Information has been added to Table B-2 for the correct nomenclature of the new samples and Table B-3 estimating the total sample number. See Addendum 2 pages A-4 through A-5. EPA: new section and information included no further comment
c. If in situ monitoring, indicates how instruments should be deployed and operated to avoid contamination and ensure maintenance of proper data		B-21/B2.3.6	EPA: no comment from original QAPP including Addendum 1
d. If continuous monitoring, indicates averaging time and how instruments should store and maintain raw data, or data averages	N/A	N/A	N/A
e. Indicates how samples are to be homogenized, composited, split, or filtered, if needed		B-9/B2.2.2	EPA: no comment from original QAPP including Addendum 1
f. Indicates what sample containers and sample volumes should be used		B-3, B-10/ B2.2.2	EPA: no comment from original QAPP including Addendum 1
g. Identifies whether samples should be preserved and indicates methods that should be followed		B-9/B.2.2.2	EPA: no comment from original QAPP including Addendum 1
h. Indicates whether sampling equipment and samplers should be cleaned and/or decontaminated, identifying how this should be done and by-products disposed of		B-22/B2.4	EPA: no comment from original QAPP including Addendum 1
i. Identifies any equipment and support facilities needed		B-2/B1.1	EPA: no comment from original QAPP including Addendum 1
j. Addresses actions to be taken when problems occur, identifying individual(s) responsible for corrective action and how this should be documented		B-1	EPA: no comment from original QAPP including Addendum 1
B3. Sample Handling and Custody			
a. States maximum holding times allowed from sample collection to extraction and/or analysis for each sample type and, for in-situ or continuous monitoring, the maximum time before retrieval of information		B-23/B.3/Table B-4 and B-5	EPA: no comment from original QAPP including Addendum 1

Quality Assurance Project Plan, West Side Soils Operable Unit Remedial Investigation Sampling – Addendum 2: Residential Groundwater Sampling

b. Identifies how samples or information should be physically handled, transported, and then received and held in the laboratory or office (including temperature upon receipt)		B-24/B.3	EPA: no comment from original QAPP including Addendum 1
c. Indicates how sample or information handling and custody information should be documented, such as in field notebooks and forms, identifying individual responsible		B-24/B.3	EPA: no comment from original QAPP including Addendum 1
d. Discusses system for identifying samples, for example, numbering system, sample tags and labels, and attaches forms to the plan		B-24/B.3/ Table B-2	CDM Smith: Table B-2 will be updated to include residential groundwater sample nomenclature. See Addendum 2 page A-5. EPA: Table B-2 updated no further comment
e. Identifies chain-of-custody procedures and includes form to track custody		B-25	EPA: no comment from original QAPP including Addendum 1
B4. Analytical Methods			
a. Identifies all analytical SOPs (field, laboratory and/or office) that should be followed by number, date, and regulatory citation, indicating options or modifications to be taken, such as sub-sampling and extraction procedures		B-29/B4.2	CDM Smith: A new section (B4.2.3, Residential Groundwater Analyses) will be added to this section, detailing the requirements for residential groundwater sampling analysis. See Addendum 2 page A-6. EPA: new section included no further comment
b. Identifies equipment or instrumentation needed		B-29/B4.3	EPA: no comment from original QAPP including Addendum 1
c. Specifies any specific method performance criteria		Tables B-3 and B-4	CDM Smith: Table B-3 will be modified to include the estimated residential groundwater sample numbers, analyses, and types/quantities of field QC samples. See Addendum 2 page A-8. EPA: Table B-3 modified no further comment
d. Identifies procedures to follow when failures occur, identifying individual responsible for corrective action and appropriate documentation		B-29	EPA: no comment from original QAPP including Addendum 1
e. Identifies sample disposal procedures		B-29/B4.3	EPA: no comment from original QAPP including Addendum 1
f. Specifies laboratory turnaround times needed		B-25	EPA: no comment from original QAPP including Addendum 1
g. Provides method validation information and SOPs for nonstandard methods	N/A	N/A	N/A
B5. Quality Control			
a. For each type of sampling, analysis, or measurement technique, identifies QC activities which should be used, for example, blanks, spikes, duplicates, etc., and at what frequency		B-29/B5.1	EPA: no comment from original QAPP including Addendum 1

Quality Assurance Project Plan, West Side Soils Operable Unit Remedial Investigation Sampling – Addendum 2: Residential Groundwater Sampling

b. Details what should be done when control limits are exceeded, and how effectiveness of control actions will be determined and documented		B-30/B5.2	EPA: no comment from original QAPP including Addendum 1
c. Identifies procedures and formulas for calculating applicable QC statistics, for example, for precision, bias, outliers and missing data		B-30/B5.3	EPA: no comment from original QAPP including Addendum 1
B6. Instrument/Equipment Testing, Inspection, and Maintenance			
a. Identifies field and laboratory equipment needing periodic maintenance, and the schedule for this		B-31/B6	EPA: no comment from original QAPP including Addendum 1
b. Identifies testing criteria		B-31/B6	EPA: no comment from original QAPP including Addendum 1
c. Notes availability and location of spare parts		B-31/B6	EPA: no comment from original QAPP including Addendum 1
d. Indicates procedures in place for inspecting equipment before usage		B-31/B6	EPA: no comment from original QAPP including Addendum 1
e. Identifies individual(s) responsible for testing, inspection and maintenance		B-31/B6	EPA: no comment from original QAPP including Addendum 1
f. Indicates how deficiencies found should be resolved, re-inspections performed, and effectiveness of corrective action determined and documented		B-31/B6	EPA: no comment from original QAPP including Addendum 1
B7. Instrument/Equipment Calibration and Frequency			
a. Identifies equipment, tools, and instruments that should be calibrated and the frequency for this calibration		B-31/B7	EPA: no comment from original QAPP including Addendum 1
b. Describes how calibrations should be performed and documented, indicating test criteria and standards or certified equipment		B-31/B7	EPA: no comment from original QAPP including Addendum 1
c. Identifies how deficiencies should be resolved and documented		B-31/B7	EPA: no comment from original QAPP including Addendum 1
B8. Inspection/Acceptance for Supplies and Consumables			
a. Identifies critical supplies and consumables for field and laboratory, noting supply source, acceptance criteria, and procedures for tracking, storing and retrieving these materials		B-31/B8	EPA: no comment from original QAPP including Addendum 1
b. Identifies the individual(s) responsible for this		B-31/B8	EPA: no comment from original QAPP including Addendum 1
B9. Use of Existing Data (Non-direct Measurements)			
a. Identifies data sources, for example, computer databases or literature files, or models that should be accessed and used		B-32/B9	EPA: no comment from original QAPP including Addendum 1

Quality Assurance Project Plan, West Side Soils Operable Unit Remedial Investigation Sampling – Addendum 2: Residential Groundwater Sampling

b. Describes the intended use of this information and the rationale for their selection, i.e., its relevance to project		B-32/B9	EPA: no comment from original QAPP including Addendum 1
c. Indicates the acceptance criteria for these data sources and/or models		B-32/B9	EPA: no comment from original QAPP including Addendum 1
d. Identifies key resources/support facilities needed		B-32/B9	EPA: no comment from original QAPP including Addendum 1
e. Describes how limits to validity and operating conditions should be determined, for example, internal checks of the program and Beta testing		B-32/B9	EPA: no comment from original QAPP including Addendum 1
B10. Data Management			
a. Describes data management scheme from field to final use and storage		B-33/B10	EPA: no comment from original QAPP including Addendum 1
b. Discusses standard record-keeping and tracking practices, and the document control system or cites other written documentation such as SOPs		B-33/B10	EPA: no comment from original QAPP including Addendum 1
c. Identifies data handling equipment/procedures that should be used to process, compile, analyze, and transmit data reliably and accurately		B-33/B10	EPA: no comment from original QAPP including Addendum 1
d. Identifies individual(s) responsible for this		B-33/B10	EPA: no comment from original QAPP including Addendum 1
e. Describes the process for data archival and retrieval		B-33/B10	EPA: no comment from original QAPP including Addendum 1
f. Describes procedures to demonstrate acceptability of hardware and software configurations		B-33/B10	EPA: no comment from original QAPP including Addendum 1
g. Attaches checklists and forms that should be used		B-33/B10	EPA: no comment from original QAPP including Addendum 1
C. Assessment and Oversight			
C1. Assessments and Response Actions			
a. Lists the number, frequency, and type of assessment activities that should be conducted, with the approximate dates		C-1/C1	EPA: no comment from original QAPP including Addendum 1
b. Identifies individual(s) responsible for conducting assessments, indicating their authority to issue stop work orders, and any other possible participants in the assessment process		C-1/C1	EPA: no comment from original QAPP including Addendum 1
c. Describes how and to whom assessment information should be reported		C-1/C1	EPA: no comment from original QAPP including Addendum 1
d. Identifies how corrective actions should be addressed and by whom, and how they should be verified and documented		C-1/C1	EPA: no comment from original QAPP including Addendum 1
C2. Reports to Management			

Quality Assurance Project Plan, West Side Soils Operable Unit Remedial Investigation Sampling – Addendum 2: Residential Groundwater Sampling

a. Identifies what project QA status reports are needed and how frequently		C-1/C2	EPA: no comment from original QAPP including Addendum 1
b. Identifies who should write these reports and who should receive this information		C-1/C2	EPA: no comment from original QAPP including Addendum 1
D. Data Validation and Usability			
D1. Data Review, Verification, and Validation			
Describes criteria that should be used for accepting, rejecting, or qualifying project data		D-1/D1	EPA: no comment from original QAPP including Addendum 1
D2. Verification and Validation Methods			
a. Describes process for data verification and validation, providing SOPs and indicating what data validation software should be used, if any		D-2/D2.1	EPA: no comment from original QAPP including Addendum 1
b. Identifies who is responsible for verifying and validating different components of the project data/information, for example, chain-of-custody forms, receipt logs, calibration information, etc.		D-2/D2.1	EPA: no comment from original QAPP including Addendum 1
c. Identifies issue resolution process, and method and individual responsible for conveying these results to data users		D-3	EPA: no comment from original QAPP including Addendum 1
d. Attaches checklists, forms, and calculations		D-4	EPA: no comment from original QAPP including Addendum 1
D3. Reconciliation with User Requirements			
a. Describes procedures to evaluate the uncertainty of the validated data		D-1/D3	EPA: no comment from original QAPP including Addendum 1
b. Describes how limitations on data use should be reported to the data users		D-1/D3	EPA: no comment from original QAPP including Addendum 1