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Anthony R. Brown
Project Manager, Mining

May 1, 2017

Lynda Deschambault
Remedial Project Manager, Superfund Division
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street, 10th Floor (SFD 7-1)
San Francisco, California 94105

Subject: On-Property Focused Remedial Investigation Work Plan Amendment No. 12 Supplement No. 1 – Task Sampling and Analysis Plan for Camp Isbell Hydrocarbon Investigation
Leviathan Mine Site
Alpine County, California

Dear Ms. Deschambault:

Atlantic Richfield Company (AR) submits this *On-Property Focused Remedial Investigation Work Plan Amendment No. 12 Supplement No. 1 – Task Sampling and Analysis Plan for Camp Isbell Hydrocarbon Investigation (*Supplement No. 1) for the Leviathan Mine Site in Alpine County, California (site). We have prepared Supplement No. 1 in response to the U.S. Environmental Protection Agency's (U.S. EPA's) comment letter dated March 19, 2017.[1] Supplement No. 1 describes the hydrocarbon investigation to be performed near four former buildings in the former Camp Isbell area of the site to the east of the Aspen Seep Bioreactor (Figure 1). In addition, we are providing responses to the U.S. EPA's March 19, 2017 comments (Table 1). The On-Property Focused Remedial Investigation Work Plan is being implemented in partial fulfillment of the requirements of the Statement of Work attached to the *Administrative Order for Remedial Investigation and Feasibility Study, Comprehensive Environmental Response, Compensation, and Liability Act Docket No. 2008-18* issued by the U.S. EPA on June 23, 2008.

Atlantic Richfield reviewed historical photographs provided by the U.S. EPA and the Lahontan Regional Water Quality Control Board (LRWQCB) (Attachment A) that show four buildings in the Camp Isbell area to the east of the Aspen Seep Bioreactor. In addition, we reviewed historical aerial photographs for evidence of the approximate locations of these buildings, and buildings have been located to the extent possible. For this investigation, the buildings have been assigned identification as Buildings A through D going from south to north. As an example, the approximate building locations are shown on a 1954 aerial photograph (Figure 2). The approximate building locations are also shown superimposed on a current aerial photograph (Figure 3). Prior to starting work in the Camp Isbell area, reconnaissance will be performed in an

[1] *EPA Comments on Atlantic Richfield's Draft Final Focused Remedial Investigation Work Plan Amendment No. 12 – Task Sampling and Analysis Plan for Hydrocarbon Investigation, Leviathan Mine Site, Alpine County, California, dated June 1, 2016*

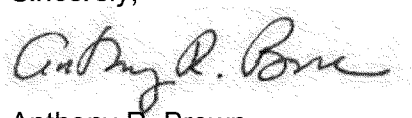
attempt to identify foundations or landmarks such as trees that are observed in the historical photos. The sampling locations may be revised based on these findings.

Eight soil boreholes are proposed to be located within the footprints of and around the former buildings (Figure 4). Step out boreholes will be advanced as needed based on field screening results. The investigation will be conducted in accordance with On-Property Focused Remedial Investigation Work Plan Amendment No. 12 as approved by the U.S. EPA on April 29, 2016, and as supplemented by the attached tables, figures, and data quality objectives (DQOs).

As noted in the response to Previous Comment 6 (Table 1), Atlantic Richfield will use a flame ionization (FID) detector field-screening-threshold-value of 25 parts per million (ppm). This value represents five times the project laboratory's reporting limit of 5 mg/kg for total petroleum hydrocarbon (TPH) as diesel range organics and was selected using professional judgement and precision units in the Quality Assurance Project Plan for analysis of duplicate field samples. We will use a laboratory-threshold value of 500 milligrams per kilogram (mg/kg or ppm) for TPH as diesel range organics and TPH as oil range organics. This was the closure criterion used by the LRWQCB following the 2007 diesel release and cleanup at the Aspen Seep Bioreactor. For samples that exceed these threshold values, additional characterization will be considered. These threshold values have been added to the DQOs (Attachment B).

If you have any questions or comments, please contact me at (657) 529-4537 or anthony.brown@bp.com.

Sincerely,



Anthony R. Brown
Project Manager, Mining

Attachments:

Table 1 - Response to U.S. EPA Comments Dated April 19, 2017
Table 2 – Camp Isbell Area Investigation Sampling Plan Summary
Table 3 – Camp Isbell Area Investigation Sampling Requirements
Figure 1 – Site Map
Figure 2 – 1954 Aerial Photograph
Figure 3 – Camp Isbell Location Map
Figure 4 – Proposed Hydrocarbon Borehole Locations
Attachment A – Historical Photographs
Attachment B – On-Property Study Area Data Quality Objectives Petroleum Hydrocarbons in Soil – Revised May 1, 2017

cc: Gary Riley, U.S. Environmental Protection Agency, Region 9 – via electronic copy
John Hillenbrand, U.S. Environmental Protection Agency, Region 9 – via electronic copy
Douglas Carey, Lahontan Regional Water Quality Control Board – via electronic copy

Nathan Block, Esq., BP – via electronic copy
Adam Cohen, Esq., Davis Graham & Stubbs, LLP – via electronic copy
Sandy Riese, EnSci, Inc. – via electronic copy
Marc Lombardi, Amec Foster Wheeler – via electronic copy
Grant Ohland, Ohland HydroGeo, LLC – via electronic copy
Dave McCarthy, Copper Environmental Consulting – via electronic copy
Cory Koger, U.S. Army Corps of Engineers – via electronic copy
Greg Reller, Burleson Consulting – via electronic copy
Ken Maas, U.S. Forest Service, Humboldt-Toiyabe National Forest – via electronic copy and hard copy
Michelle Hochrein, Washoe Tribe of California and Nevada – via electronic and hard copy
Fred Kirschner, AESE, Inc. – via electronic and hard copy

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TABLES

TABLE 1
RESPONSE TO U.S. EPA COMMENTS DATED MARCH 19, 2017
Leviathan Mine Site
Alpine County, California

Previous Comment Number	Comment	Response
2	**EPA previous Comment 2: Section 6.4:** EPA requested that ARC expand the study area to include sites RWQCB has identified as previous maintenance or storage areas. **ARC's Response:** ARC stated that there is no documentation or evidence that petroleum products were used in these areas and it is not reasonable or necessary to collect and analyze samples for TPH. ARC noted that if evidence of suspected petroleum release become evident during field activities, "the US EPA will be notified, and the need for additional investigation can be determined at that time." **ARC's response fails to address EPA's concern.** Lack of documentation does not suggest that petroleum or other products were not used at the site. Historical photographs (i.e. See attached photo 1) clearly document stacked drums along the side of the access road between Leviathan Mine Road and the current Aspen Seep entrance. As previously requested on April 29, 2016, and during our March 17, 2017 phone call, ARC shall investigate for the presence of TPH in this area with known historical maintenance activities. Please provide a sampling plan with a limited number of samples sufficient to investigate this area (ARC suggested approximately 20 samples). This work shall be completed during the 2017 field season.	As stated in previous correspondence, Atlantic Richfield disagrees with U.S. EPA's rationale for requiring additional petroleum hydrocarbon investigations. Hydrocarbons were not identified as potential constituents of concern in the Statement of Work (SOW) attached to the Unilateral Administrative Order, hydrocarbon constituents have not otherwise been observed during extensive site characterization work, the Conceptual Site Model does not address hydrocarbon releases, and historical records do not suggest that petroleum-related hazardous substances were released during mining operations. Despite this, Atlantic Richfield will perform the requested sampling in the "maintenance and storage areas" identified by the U.S. EPA. Sampling will be conducted in accordance with Supplement No. 1 to On-Property FRI Work Plan Amendment No. 12. We are referring to the area of investigation as Camp Isbell. Sampling locations were selected based upon historical aerial photographs and the historical photographs provided by the U.S. EPA with its April 19, 2017 comment letter. This documentation appears to show that four buildings were located in this area. Atlantic Richfield is proposing eight initial sampling locations (three depths each) in the vicinity of the buildings, with additional step-out locations as needed based on field screening results.
	Failure to notify EPA: ARC procedures stated that "the US EPA will be notified, and the need for additional investigation can be determined at that time." ARC failed to alert EPA when suspected petroleum product in soil was encountered during Revegetation Feasibility Study activities. EPA was not included on a November 4, 2016 email from Mr. Marc Lombardi of AMEC to Mr. Douglas Carey of the Regional Board. On November 30, 2016, EPA requested additional information. ARC email on December 3, 2016, stated that they contaminated soil was investigated with a flame ionization detector (FID) and a photoionization detector (PID) with readings below 0.1 ppm and 1.4 ppm respectively, and "did not appear to warrant further investigation." EPA requests ARC ensure notification procedures are revised to ensure proper and timely reporting of field identified or suspected hydrocarbon-contaminated materials. Please provide a list of any other materials identified in the field, and recommend any additional field investigation to be added or the reasoning as to why additional field investigations are not needed. In addition, please provide a figure clearly showing the location of the encountered suspicious soil that was sampled.	As stated in previous correspondence, Atlantic Richfield notified the Lahontan Regional Water Quality Control Board (LRWQCB) of these observations because the State of California owns this portion of the site. Atlantic Richfield did not immediately contact the U.S. EPA because these soils were not encountered during U.S. EPA-directed hydrocarbons investigations, and initial field-screening did not suggest that further investigation was warranted under the RI/FS. The LRWQCB promptly passed the information on to U.S. EPA in any event. Figure 1 shows the location where the "suspicious" soils were observed while implementing the revegetation TSAP. No other anomalous materials were found. Supplement No. 1 to On-Property FRI Work Plan Amendment No. 12 describes the additional field investigations that will be performed. Atlantic Richfield will notify U.S.EPA if hydrocarbon-contaminated soils are encountered during the proposed sampling. Further explanation of proposed field and laboratory screening levels for soils potentially containing petroleum hydrocarbons is provided in the response to Comment No. 6 below.
5	**EPA Previous Comment 5: Appendix A DQO Summary Problem Statement:** EPA requested that ARC expand the problem statement to include areas that were former equipment maintenance facilities, specifically the facility east of the Aspen Seep Bioreactor. **ARC's Response:** ARC directs EPA to its response to Comment 2. **EPA Comment:** ARC's response is not adequate. See EPA's response above.	Atlantic Richfield has added a second problem statement to the DQO summary to include the area of the Camp Isbell investigation as shown on maps provided in Supplement No. 1 to On-Property FRI Work Plan Amendment No. 12.
6	**EPA Previous Comment 6: Appendix A DQO Summary Step 6 Specify Acceptance Criteria:** EPA requested acceptance criteria such as spatial trends, exposure concentrations, etc. to inform professional judgment. **ARC's Response:** ARC has revised the DQOs to include acceptance criteria. The criteria outlined discusses the use of visual and olfactory examination of the soil along with FID scanning results. However, there is no threshold value for FID to identify what will merit additional investigation. **EPA Comment:** EPA finds that the methodology for developing the acceptance criteria is sufficient, and directs ARC to provide a threshold value over which additional investigation of TPH presence is required. In addition, EPA requests ARC identify a threshold value for laboratory results.	Atlantic Richfield will use an FID-field-screening-threshold-value of 25 ppm. This value is five times the project laboratory's reporting limit of 5 mg/kg for total TPH as DRO and was selected using professional judgement and precision limits in the QAPP for analysis of duplicate field samples. We will use a laboratory-threshold-value of 500 mg/kg (or ppm) for TPH as both DRO and ORO. This was the closure criterion used by the LRWQCB following the 2007 diesel release and cleanup at the Aspen Seep Bioreactor. For samples that exceed these threshold values, additional characterization will be considered. These threshold values have been added to the DQO Summary Table, which is provided in the attached Supplement No. 1 to On-Property FRI Work Plan Amendment No. 12. These DQOs supersede all previous versions.

Abbreviations on next page.

TABLE 1
RESPONSE TO U.S. EPA COMMENTS DATED MARCH 19, 2017
Leviathan Mine Site
Alpine County, California

Abbreviation(s)
Atlantic Richfield or ARC = Atlantic Richfield Company
DQO = Data Quality Objective
DRO = Diesel Range Organics
FID = Field ionization detector
FRI = Focused Remedial Investigation Work Plan
LRWQCB = Lahontan Regional Water Quality Control Board
ORO = Oil Range Organics
PID = Photoionization detector
ppm = parts per million
QAPP = Quality Assurance Project Plan
RI/FS = Remedial Investigation/Feasibility Study
SOW = Statement of Work
TPH = Total petroleum hydrocarbons
TSAP = Task Sampling and Analysis Plan
U.S. EPA or EPA = U.S. Environmental Protection Agency

TABLE 2
CAMP ISBELL AREA INVESTIGATION SAMPLING PLAN SUMMARY
Leviathan Mine Site
Alpine County, California

Boreholes	Sampling Locations[1]	Location Description	Sample Depth (bgs)	Sampling Method	Rationale	Sample Testing
Initial Step-out	B-95 through B-97 B-98 through B-100	Camp Isbell Building A	0 -1 ft 1 - 2 ft 2 - 3 ft	Grab samples obtained from hand auger to desired depth following SOP 14.0	Evaluate nature and extent of potential hydrocarbon impacts around buildings in former Camp Isbell area.	Diesel-range organics Oil-range organics
Initial Step-out	B-101 B-102	Camp Isbell Building B	0 -1 ft 1 - 2 ft 2 - 3 ft	Grab samples obtained from hand auger to desired depth following SOP 14.0	Evaluate nature and extent of potential hydrocarbon impacts around buildings in former Camp Isbell area.	Diesel-range organics Oil-range organics
Initial Step-out	B-103 and B-104 B-105 and B-106	Camp Isbell Building C	0 -1 ft 1 - 2 ft 2 - 3 ft	Grab samples obtained from hand auger to desired depth following SOP 14.0	Evaluate nature and extent of potential hydrocarbon impacts around buildings in former Camp Isbell area.	Diesel-range organics Oil-range organics
Initial Step-out	B-107 and B-108 B-109 and B-110	Camp Isbell Building D	0 -1 ft 1 - 2 ft 2 - 3 ft	Grab samples obtained from hand auger to desired depth following SOP 14.0	Evaluate nature and extent of potential hydrocarbon impacts around buildings in former Camp Isbell area.	Diesel-range organics Oil-range organics

Note(s)

1. If visual, olfactory, or FID scan greater than threshold indicate the possible presence of hydrocarbons, additional stepouts will be sampled farther out in the same direction.

Abbreviation(s)

bgs = below ground surface

ft = feet

SOP = standard operating procedure

TABLE 3
CAMP ISBELL AREA NVESTIGATION SAMPLING REQUIREMENTS
Leviathan Mine Site
Alpine County, California

			Total Petroleum		QC Samples[1]		
			DRO	ORO	Equipment Blanks	Field Duplicates	MS/MSD
Method			EPA SW 8015Mod. (w/silica gel cleanup)		Same as Primary Sample	Same as Primary Sample	Same as Primary Sample
Containers			1 x 4 oz WMG		1 x 1L AG		
Minimum Volume			50 g		1 L		
Preservative[2]			None		None		
Holding Time[3]			14 d		7 d		
Laboratory			TAIC				
Study Area	Location ID[4]	Depth (feet bgs)					
Samples Near Building A							
ACSA	B-95	0 - 1	X	X	X		
		1 - 2	X	X			
		2 - 3	X	X			
	B-96	0 - 1	X	X			
		1 - 2	X	X		X	
		2 - 3	X	X			
	B-97	0 - 1	X	X			
		1 - 2	X	X			
		2 - 3	X	X			X
	B-98	0 - 1	X	X			
		1 - 2	X	X			
		2 - 3	X	X			
	B-99	0 - 1	X	X	X		
		1 - 2	X	X			
		2 - 3	X	X			
	B-100	0 - 1	X	X		X	
		1 - 2	X	X			
		2 - 3	X	X			
Samples Near Building B							
ACSA	B-101	0 - 1	X	X			
		1 - 2	X	X	X		
		2 - 3	X	X			
	B-102	0 - 1	X	X			
		1 - 2	X	X			
		2 - 3	X	X		X	
Samples Near Building C							
ACSA	B-103	0 - 1	X	X		X	
		1 - 2	X	X			
		2 - 3	X	X			
	B-104	0 - 1	X	X			
		1 - 2	X	X			
		2 - 3	X	X	X		
	B-105	0 - 1	X	X			
		1 - 2	X	X			X
		2 - 3	X	X			
	B-106	0 - 1	X	X			
		1 - 2	X	X			
		2 - 3	X	X			
Samples Near Building D							
ACSA	B-107	0 - 1	X	X			X
		1 - 2	X	X			
		2 - 3	X	X			
	B-108	0 - 1	X	X			
		1 - 2	X	X			
		2 - 3	X	X		X	
	B-109	0 - 1	X	X			
		1 - 2	X	X	X		
		2 - 3	X	X			
	B-110	0 - 1	X	X			
		1 - 2	X	X			
		2 - 3	X	X			
Estimated Soil Samples			48	48	5	5	3

Notes:

1. The number and locations for designated QC samples may be changed to meet the required frequency of 10% field equipment blanks, 10% field duplicates, and 5% MS/MSD samples based on the actual number of primary samples collected.
2. All samples shipped or stored to be cooled to a temperature of 0° - 6°C.
3. Based on method holding times for sample preparation; analysis holding times are longer pursuant to the analytical method.
4. Initial locations shown on Figures 2, 3, and 4. Additional locations may be added during step-out phases of soil sampling.

Sample IDs:
SBAMMDDYYXX (Use for all samples collected from soil borings in the ACSA, consecutively, for a given date)

Abbreviations:

^{0}C = degrees Celsius
AG = amber glass
bgs = below ground surface
DRO = diesel-range organics
d = days
EPA = U.S. Environmental Protection Agency
feet bgs = feet below ground surface
g = grams
ID = identification
L = liter
ACSA = Leviathan Creek Study Area
MS/MSD = matrix spike/matrix spike duplicate
ORO = oil-range organics
QC = quality control
TAIC = TestAmerica Laboratories, Irvine, California
WMG = wide-mouth glass

FIGURES

Explanation:

- Hydrocarbon Location
- Revegetation Location

N

0 500 1,000 Feet

SITE MAP
Leviathan Mine Site
Alpine County, California

amec foster wheeler

Date: 04/26/2017 | Project No. 13091

Figure 1

P:\Project\13000s\13091 Leviathan\14000 Database_CAD\CAD\DrawingFiles\Hydrocarbon\1_HydrocarbonLoc.mxd

N

Source: EDR

Not To Scale

1954 AERIAL PHOTOGRAPHY
Leviathan Mine Site
Alpine County, California

Date: 04/26/2017

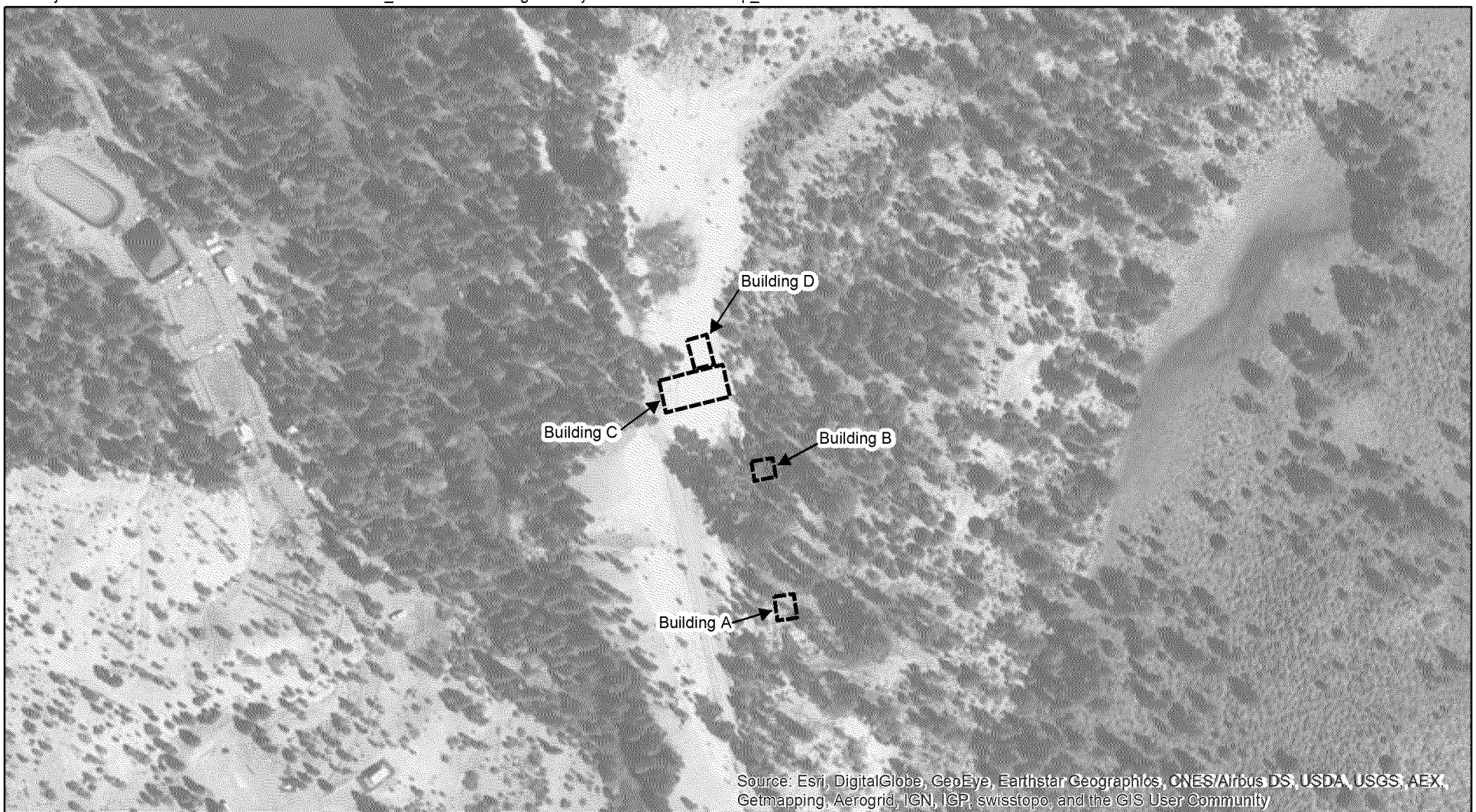
Project No. 13091

amec foster wheeler

Figure
2

P:\Project\13000s\13091 Leviathan\14000 Database_CAD\CAD\DrawingFiles\Hydrocarbon\2_1954Photo.mxd

P:\Project\13000s\13091 Leviathan\14000 Database_CAD\CAD\DrawingFiles\Hydrocarbon\SiteLocMap_BLDGS.mxd



Explanation:

Approximate Locations of Buildings at Camp Isbell

N

0 200 Feet

CAMP ISBELL LOCATION MAP
Leviathan Mine Site
Alpine County, California

By: DPV
Date: 04/26/2017

Project No. 13091

amec foster wheeler

Figure 3

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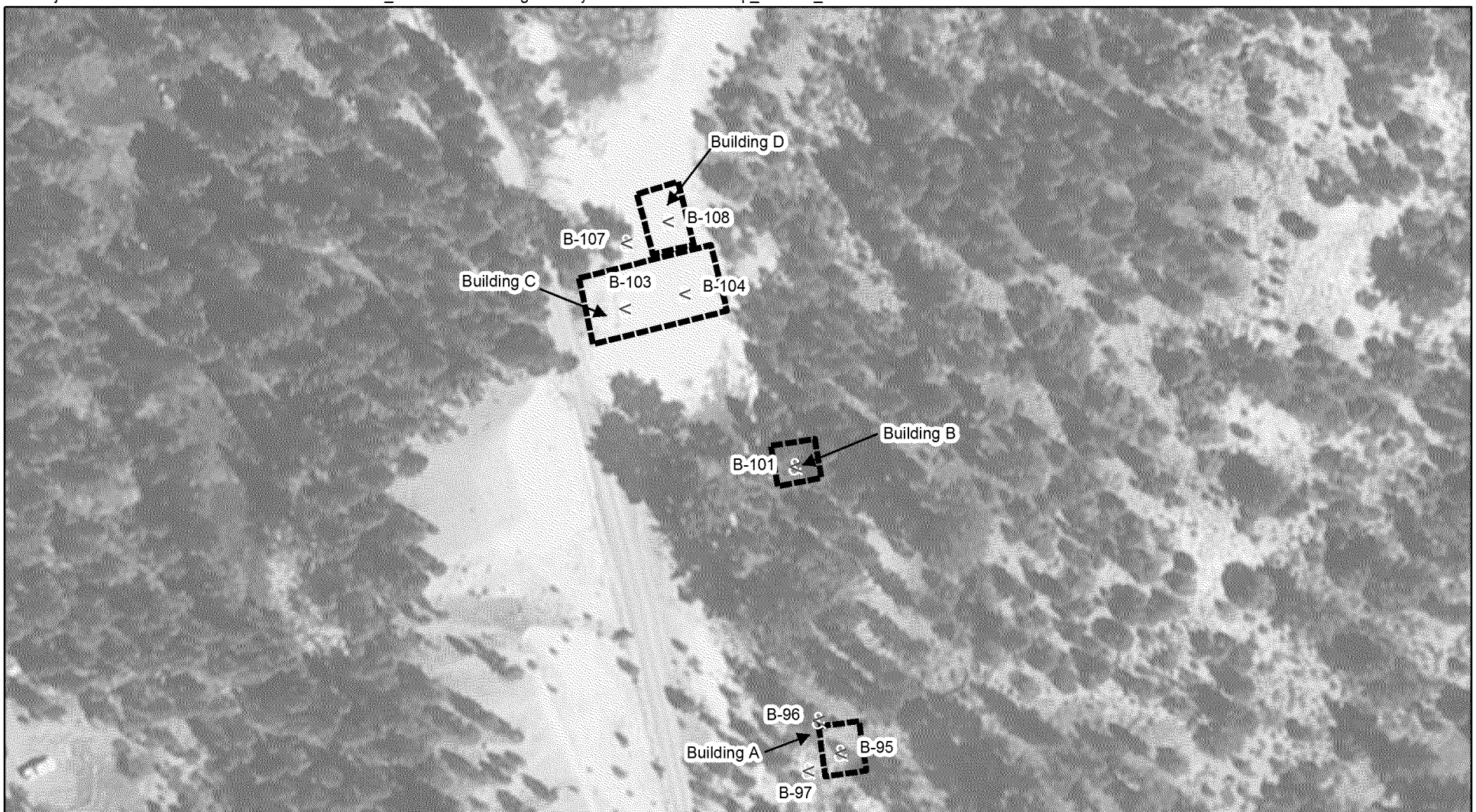

Explanation:

Approximate Locations of Buildings

Approximate Locations of Soil Borings

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

0 100 Feet

PROPOSED HYDROCARBON BOREHOLE LOCATIONS
Camp Isbell
Leviathan Mine Site
Alpine County, California

By: DPV
Date: 04/26/2017

Project No. 13091

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Figure 4

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ATTACHMENT A

Historical Photographs

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Building D
Building C

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ATTACHMENT B

On-Property Study Area Data Quality Objectives Petroleum Hydrocarbons in Soil – Revised May 1, 2017

ON-PROPERTY STUDY AREA DATA QUALITY OBJECTIVES
PETROLEUM HYDROCARBONS IN SOIL – Revised May 1, 2017
Leviathan Mine Site
Alpine County, California

Step 1 – State the Problem	Step 2 – Identify the Goals of the Study	Step-3 – Identify Information Inputs	Step 4 – Define the Boundaries of the Study	Step 5 – Develop Analytic Approach	Step 6 – Specify Performance or Acceptance Criteria	Step 7 – Develop the Plan for Obtaining Data
Give a concise description of the problem that necessitates the study.	*Identify principal study questions, consider alternative outcomes, develop decision statements, and organize multiple decisions.*	*Identify types and sources of information needed to answer study questions, identify the basis of information, and select appropriate sampling and analysis methods for generating the information.*	*Specify the target population, determine spatial and temporal limits, identify practical constraints, and define the scale of inference.*	*Define the parameter of interest, specify the type of inference, and develop the logic for drawing conclusions from the findings.*	*Specify the decision rule as a statistical hypothesis test, examine consequences of making incorrect decisions from the test, and place acceptable limits on the likelihood of making decision errors.*	*Select the resource-effective sampling and analysis plan that meets the performance or acceptance criteria.*
Supporting Work Plans/Sampling & Analysis Plans ☐ **On-Property FRI Work Plan Addendum No. 12, Task Sampling and Analysis Plan for Hydrocarbon Investigation (June 1, 2016)** ☐ **On-Property FRI Work Plan Addendum No. 12 Supplement No. 1 – Task Sampling and Analysis Plan for Camp Isbell Hydrocarbon Investigation (May 1, 2017)**						
Problem Statement#1 During sampling of mine waste, a limited number of samples appeared to contain petroleum hydrocarbons based on visual and olfactory inspection. Petroleum hydrocarbon distribution and chemical composition of the petroleum hydrocarbons in soil are not sufficiently characterized to determine if or how these observations may affect the evaluation of possible response actions.	**Study Question #1** Are the distribution and chemical composition of the petroleum hydrocarbons at specific locations in the On-Property Study Area sufficiently characterized to determine if or how these observations may affect the evaluation of possible response actions? **Alternative outcomes** 1. The distribution and chemical composition of the petroleum hydrocarbons in the On-Property Study Area are sufficiently characterized to determine if or how these observations may affect the evaluation of possible response actions. 2. The distribution and chemical composition of the petroleum hydrocarbons in the On-Property Study Area are not sufficiently characterized to determine if or how these observations may affect the evaluation of possible response actions. **Decision Statement #1** Determine whether the distribution and chemical composition of the petroleum hydrocarbons in the On-Property Study Area are sufficiently	**Information Inputs** Field Inspection ☐ Characterize petroleum hydrocarbons at target locations. o Field verification using visual, olfactory means, and field screening of soil samples with a portable FID device. **Sampling and Analysis** ☐ TPH as DRO ☐ TPH as ORO	**Extent of Hydrocarbons** **Target Population** Shallow soil in the On-Property Study Area near the former crusher and access roads. **Spatial Limits** The investigation area will consist of the areas near the former crusher and adjacent to Pond 1 where possible petroleum hydrocarbon contaminated soil was previously observed during mine waste characterization. **Temporal Limits** Data will be collected during the 2016 and 2017 field seasons. **Practical Constraints** Refusal may occur during sampling activities thus requiring the adjustment of sampling locations. Access roads may require adjustment of sampling locations. Property access may also be limited by administrative and legal constraints.	**Field Inspection** ☐ Parameters: Visual, olfactory inspection and screening of samples with a portable FID device. ☐ Inference: Vertical and lateral extent of petroleum hydrocarbon impacts **Chemistry** ☐ Parameters: TPH as DRO, TPH as ORO Inference: Define general characteristics of petroleum hydrocarbons.	Professional judgment will be used to evaluate potential vertical and lateral extent of petroleum hydrocarbons using a multiple lines of evidence approach. Lines of evidence that will be considered will include but are not limited to the following: ☐ Visual examination of soil ☐ Olfactory examination of soil ☐ Scans of soil samples with an FID. The FID threshold value will be 25 ppm. If visual and olfactory examination or FID scans suggest the *absence* of petroleum hydrocarbons, then further sampling will be considered unnecessary and will be discontinued.. If visual and olfactory examination or FID scans suggest the *presence* of petroleum hydrocarbons, then locate four primary step-out boreholes (as applicable) in the cardinal directions approximately 5 feet from the initial borehole. If visual and olfactory examination or FID scans of soil samples from the primary step-out boreholes suggest the *absence* of petroleum hydrocarbons, then further sampling	**Sampling Plan** 1. Locate initial boreholes adjacent to the previous test boreholes where petroleum hydrocarbons were suspected (i.e., WP-003, WP-050, and WP-066) in three investigation areas. 2. Collect and log soil samples at one-foot intervals (approximately 0 to 1, 1 to 2, and 2 to 3 feet below ground surface in all boreholes. Samples from greater depth will be collected (if needed) to delineate the maximum depth of possible petroleum hydrocarbons at that location. 3. Examine all soil samples using visual and olfactory means looking for signs of the presence of petroleum hydrocarbons. Also scan each soil sample with a FID. Submit all samples for laboratory

	characterized to determine if or how these observations may affect the evaluation of possible response actions. If the distribution and chemical composition of the petroleum hydrocarbon contamination in the On-Property Study Area are sufficiently characterized, then determine if or how these observations may affect the evaluation of possible response actions. If the distribution and chemical composition of the petroleum hydrocarbon contamination in the On-Property Study Area are not sufficiently characterized, then further assess the distribution and collect additional chemical data to fill data gaps.				will be considered unnecessary and will be discontinued. If visual and olfactory examination or FID scan results for the primary step-out boreholes suggest the *presence* of petroleum hydrocarbons in a given cardinal direction, then locate an additional step-out borehole in that direction. Continue locating step-out boreholes in an iterative manner along a cardinal direction until, for each cardinal direction, visual and olfactory examination or FID scan results indicate that petroleum hydrocarbons are absent at the borehole farthest from the initial borehole. Similarly, at each borehole, extend sampling to a depth such that visual and olfactory examination or FID scan results indicate that petroleum hydrocarbons are absent at the deepest sample. Laboratory analysis of TPH as DRO and TPH as ORO will supplement field screening results and will provide quantitative results. Measurement errors in analytical data will be controlled by using the appropriate sampling and analytical methods, and having data review to verify laboratory processes. Data will be reviewed relative to precision, accuracy, representativeness, completeness, comparability parameters and reporting limits to limit uncertainty in obtained environmental data. The threshold value for laboratory results will be 500 milligram per kilogram (mg/kg) for both TPH as DRO and ORO. If samples exceed this threshold value, additional characterization will be considered.	analysis of TPH as DRO and TPH as ORO. 4. As necessary, collect and log soil samples from each primary step-out borehole in a similar manner to the initial borehole. Examine and scan each soil sample using visual and olfactory means and with FID scans. Submit samples for laboratory analysis of TPH as DRO and TPH as ORO as necessary. 5. As necessary, collect and log soil samples from secondary step-out boreholes in a similar manner to the initial borehole. Submit samples for laboratory analysis of TPH as DRO and TPH as ORO based on visual, olfactory, or FID indications that petroleum hydrocarbons may be present. 6. If boreholes are extended deeper than 2-3 feet because of indications of possible petroleum hydrocarbons, then collect samples from depths where visual, olfactory, or FID data suggest that petroleum hydrocarbons may be present, and from the deepest sample in a borehole; the deepest sample is expected to

						be collected from below the bottom of possible petroleum hydrocarbons.
Problem Statement#2 Historical use of Camp Isbell may be for maintenance of equipment. Historical photographs show drums stacked next to a building. The presence of petroleum hydrocarbon in soil is not sufficiently characterized to determine if response actions are necessary.	**Study Question #2** Is the presence/absence of petroleum hydrocarbons at Camp Isbell in the On-Property Study Area sufficiently characterized to determine if response actions are necessary? **Alternative outcomes** 1. The presence of petroleum hydrocarbons at Camp Isbell in the On-Property Study Area is not confirmed. 2. The presence of petroleum hydrocarbons at Camp Isbell in the On-Property Study Area is confirmed and the distribution and chemical composition are sufficiently characterized to determine if response actions are necessary. 3. The presence of petroleum hydrocarbons at Camp Isbell in the On-Property Study Area is confirmed and the distribution and chemical composition are not sufficiently characterized to determine if response actions are necessary. **Decision Statement #2** Determine if hydrocarbons are present at Camp Isbell in the On-Property Study Area, and whether the distribution and chemical composition of the petroleum hydrocarbons in the On-Property Study Area are sufficiently characterized to determine if response actions are necessary.	**Information Inputs** Field Inspection - Characterize petroleum hydrocarbons at target locations. - Field verification using visual, olfactory means, and field screening of soil samples with a portable FID device. **Sampling and Analysis** - TPH as DRO - TPH as ORO	**Extent of Hydrocarbons** **Target Population** Shallow soil at Camp Isbell in the On-Property Study Area. **Spatial Limits** The investigation area will consist of the areas near the former buildings at Camp Isbell where drums were stored, maintenance may have occurred and a fuel truck was stored. **Temporal Limits** Data will be collected during the 2017 field season. **Practical Constraints** Refusal may occur during sampling activities thus requiring the adjustment of sampling locations. Access roads may require adjustment of sampling locations. Property access may also be limited by administrative and legal constraints.	**Field Inspection** - Parameters: Visual, olfactory inspection and screening of samples with a portable FID device. - Inference: Vertical and lateral extent of petroleum hydrocarbon impacts **Chemistry** - Parameters: TPH as DRO, TPH as ORO Inference: Define general characteristics of petroleum hydrocarbons.	Professional judgment will be used to evaluate potential vertical and lateral extent of potential petroleum hydrocarbons using a multiple lines of evidence approach. Lines of evidence that will be considered will include but are not limited to the following: - Visual examination of soil - Olfactory examination of soil - Scans of soil samples with an FID. The FID threshold value will be 25 ppm. If visual and olfactory examination or FID scans suggest the *absence* of petroleum hydrocarbons, then cease sampling activities. If visual and olfactory examination or FID scans suggest the *presence* of petroleum hydrocarbons, then locate four primary step-out boreholes (as applicable) in the cardinal directions approximately 5 feet from the initial borehole. If visual and olfactory examination or FID scans of soil samples from the primary step-out boreholes suggest the *absence* of petroleum hydrocarbons, then cease sampling activities. If visual and olfactory examination or FID scan results for the primary step-out boreholes suggest the *presence* of petroleum hydrocarbons in a given cardinal direction, then locate an additional step-out borehole in that direction. Continue locating step-out boreholes in an iterative manner	**Sampling Plan** 7. Locate initial boreholes adjacent to the approximate locations of buildings in the Camp Isbell area based upon historical aerial photographs and site photographs. 8. Collect and log soil samples at one-foot intervals (approximately 0 to 1, 1 to 2, and 2 to 3 feet below ground surface in all boreholes. Samples from greater depth will be collected (if needed) to delineate the maximum depth of possible petroleum hydrocarbons at that location. 9. Examine all soil samples using visual and olfactory means looking for signs of the presence of petroleum hydrocarbons. Also scan each soil sample with a FID. Submit all samples for laboratory analysis of TPH as DRO and TPH as ORO. 10. As necessary, collect and log soil samples from each step-out borehole in a similar manner to the initial

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	If the distribution and chemical composition of possible petroleum hydrocarbon contamination at Camp Isbell in the On-Property Study Area are sufficiently characterized, then determine if or how these observations may affect the evaluation of possible response actions. If the distribution and chemical composition of possible petroleum hydrocarbon contamination at Camp Isbell in the On-Property Study Area are not sufficiently characterized, then further assess the distribution and collect additional chemical data to fill data gaps.				along a cardinal direction until, for each cardinal direction, visual and olfactory examination or FID scan results indicate that petroleum hydrocarbons are absent at the borehole farthest from the initial borehole. Similarly, at each borehole, extend sampling to a depth such that visual and olfactory examination or FID scan results indicate that petroleum hydrocarbons are absent at the deepest sample. Laboratory analysis of TPH as DRO and TPH as ORO will supplement field screening results and will provide quantitative results. Measurement errors in analytical data will be controlled by using the appropriate sampling and analytical methods, and having data review to verify laboratory processes. Data will be reviewed relative to precision, accuracy, representativeness, completeness, comparability parameters and reporting limits to limit uncertainty in obtained environmental data. The threshold value for laboratory results will be 500 milligram per kilogram (mg/kg) for both TPH as DRO and ORO. If samples exceed the threshold value, additional characterization will be considered.	borehole. Examine and scan each soil sample using visual and olfactory means and with FID scans. Submit samples for laboratory analysis of TPH as DRO and TPH as ORO as necessary. 11. If boreholes are extended deeper than 2-3 feet because of indications of possible petroleum hydrocarbons, then collect samples from depths where visual, olfactory, or FID data suggest that petroleum hydrocarbons may be present, and from the deepest sample in a borehole; the deepest sample is expected to be collected from below the bottom of possible petroleum hydrocarbons.

Abbreviation(s)
DRO = diesel-range organics
FID = flame ionization detector
ppm = parts per million
ORO = oil-range organics
QAPP – Quality Assurance Project Plan
TPH = Total Petroleum Hydrocarbons