

**California Department of Toxic Substances Control
Relative Bioavailability Arsenic Study**

SUMMARY OF FIELD ACTIVITIES FOR SAMPLING EVENT 1

Sampling activities were conducted from Monday September 21, 2009 through Wednesday September 23, 2009 in support of the Department of Toxic Substances Control (DTSC) Relative Bioavailability Arsenic Study. Weather for all three days was warm and clear with high temperatures in the mid 90's°, Fahrenheit. A tailgate safety meeting was held at the site each day before sampling activities began. Level D personal protective equipment was worn by all personnel during sampling activities. DTSC staff was present onsite by 7 am each day and sampling activities ceased before 6 pm each afternoon. After sampling at Empire Mine State Historic Park (EMSHP) was completed, four additional locations were sampled at a nearby property to provide information on background concentrations of metals in area soils. The EMSHP is an 880 acre historic park located in Nevada County, California that was created by combining nine separate mines into one property. The park is named after the largest of the mines, the Empire Mine, whose structures still stand and are open to the public for touring.

The approved Health and Safety Plan (HASP), included as an appendix in the Quality Assurance Project Plan (QAPP), had a sliding scale of action levels for dust depending on the concentration of arsenic in the soil. X-Ray Fluorescence analysis completed prior to sampling activities provided screening information on arsenic concentrations at each sampling location. Air monitoring was used to measure the effectiveness of dust suppression methods. A 500-gallon water tender equipped with a gasoline powered pump that was towed behind a standard four wheel drive pickup truck was used for dust suppression in addition to plastic covering over sample containers. Dust suppression measures kept dust levels below the point where respirators were required.

A mini-excavator with rubber tracks and a four wheel drive mini-backhoe with rubber tires were voluntarily supplied and operated by personnel from Holdrege and Kull, a local environmental consulting firm, for all three days of sampling. Where this equipment was used, soil was removed from each trench and deposited on a steel screen with ~3/4" openings. Soil was then shoveled into a number 4 screen placed on top of a 5-gallon container, covered with a plastic bag and sieved into the container. Each container was labeled with a sample number following the naming convention in the field sampling plan.

A cultural and a biological monitor employed by the Department of Parks and Recreation (DPR) were present during all activities conducted at the EMSHP. In addition to the monitors, DPR maintenance staff assisted the sampling team with transportation of equipment and personnel, traffic control and other miscellaneous duties not directly involving sampling.

Team Members and their responsibilities:

DTSC

Perry Myers, Hazardous Substances Engineer – Sample collection and project manager

Rick Fears, Engineering Geologist – Sample collection

Randy Adams, Senior Engineering Geologist – Trench logging, field notes

Sam Martinez, Hazardous Substances Engineer – Sample collection

Thomas Olson, Hazardous Substances Scientist – Sample collection

Brad Parsons, Senior Hazardous Substances Scientist – XRF field analysis, sample QA/QC

Valerie Mitchell, Associate Toxicologist– Lead Toxicologist, QAPP related questions and photographs (day one only)

USGS

Charles Alpers, Ph.D. – Technical advisor, sample collection

Tamsen Burlak, Graduate Student – Sample collection under the direction of Dr. Alpers

DPR

Dan Shaw, Environmental Scientist – Biological monitor

Steve Hilton, Associate State Archeologist – Cultural monitor

Holdredge and Kull

Chuck Kull, Principal Engineer/Owner – Heavy equipment operator

Jason Muir, Senior Engineer – Heavy equipment spotter

Sampling Activities at EMSHP

Day 1 (9/21/09)

Staging occurred in the dirt area adjacent to the paved parking lot associated with the Red Dirt Pile (RDP). Trenches one through three were completed in the large mine waste dump associated with the Empire Mine main shaft and trench four was completed in the sand dam area using the mini-excavator.

Trench 1 excavated to a maximum depth of 4'.

Samples EM-01-0-1.3, EM-02-1.3-4

Trench 2 excavated to a maximum depth of 4'.

Samples EM-03-0-1.3, EM-04-1.3-4

Trench 3 excavated to a maximum depth of 4'.

Samples EM-05-0-1, EM-06-1-2.5, EM-07-2.5-4

Trench 4 excavated to a maximum depth of 4'.

Samples EM-08-0-.2, EM-09-.2-4

Trenches 1-3 were left open at the end of day 1 and were backfilled on day 2 using the four wheeled backhoe. Signage was placed at each open trench to warn of the hazard. The area where these trenches are located is closed to the public. Trench 4 was

backfilled after sampling was completed. Samples collected throughout the day were stored in a locked facility at the EMSHP maintenance yard under chain of custody.



Mini-excavator starting a trench in the Empire waste dump (Mine waste rock)



Side wall of trench 4 located in the sand dam area (Mill tailings)

Day 2 (9/22/09)

Staging occurred just inside the EMSHP property line in a clear area located in the southern portion of the EMSHP accessed by Osborne Hill Road (near the Conlon mine). Sampling activities were completed in the order listed below. Each trench was backfilled before moving on to the next sampling location. Trenches 5-9 were excavated using the four wheel backhoe. Trenches 10 and 11 were hand dug to avoid damaging potential cultural and biological resources in the area.

Trench 5 located in the side of a waste pile associated with the Conlon Mine was excavated to a depth of 2.5'. The sides of the excavation tended to slough and cave into the excavation.

Sample EM-10-0-2

Trench 6 located on the western portion of the Powerline Trail was excavated to a maximum depth of 4'.

Sample EM-11-0-1, EM-12-2-3.5

Trench 7 located on the middle portion of the Powerline Trail near the local peak was excavated to a maximum depth of 3.5'.

Sample EM-13-0-2

Trench 8 located on the eastern portion of the Powerline Trail was excavated to a maximum depth of 1.5'.

Sample EM-14-0-1

Trench 9 located in the side of a waste pile associated with the Betsy Mine was excavated to a maximum depth of 1'. The sides of the excavation tended to slough and cave into the excavation.

Sample EM-15-0-1

Trench 10 located on top of a waste pile (to the south of the fenced off shaft) associated with the Woodbury Mine was excavated to a maximum depth of 2'.

Sample EM-16-0-2

Trench 11 located on top of a waste pile (to the north of the fenced off shaft) associated with the Woodbury Mine was excavated to a maximum depth of 1'.

Sample EM-17-0-1

Samples collected throughout the day were stored in a locked facility at the EMSHP maintenance yard under chain of custody.



Example of field sieving of samples to reduce volume

Day 3 (9/23/09)

Staging occurred at the same location as Day 1 (near the Red Dirt Pile). Sampling activities were completed in the order below using the four wheeled backhoe. Trenches were backfilled before moving on to the next sampling location.

Trench 12 located in the side of a waste pile associated with the Prescott Mine was excavated to a maximum depth of 2'. The sides of the excavation tended to slough and cave into the excavation.

Sample EM-18-0-2

Trench 13 located near the EMSHP eastern boundary in a flat area associated with the Sebastopol Mine was excavated to a maximum depth of 3'.

Sample EM-19-0-1

Trench 14 located near a fenced off shaft associated with the Prescott Mine was excavated to a maximum depth of 3'.

Sample EM-20-0-1, EM-21-1-3

Samples collected throughout the day were stored in a locked facility at the EMSHP maintenance yard under chain of custody. Sampling activities at the EMSHP were completed at approximately 12 noon.



Equipment used for sample collection, dust suppression, and decontamination

Additional sampling activities off site from EMSHP

The possibility of collecting additional soil samples from a property near the EMSHP was discussed by the sampling team on Day 1. This property has an identified mineralized zone and areas with mine waste that were previously sampled under the oversight of DTSC. During the study design phase, it was determined that collecting samples from an undisturbed mineralized zone would be beneficial to the goal of

advancing the science of characterizing arsenic at mine scarred lands by including a background site. Attempts were made during the reconnaissance sampling events to identify a mineralized zone at the EMSHP, but were unsuccessful. Upon learning of the opportunity to collect samples from a mineralized zone during this sampling event, the decision was made to collect samples from the nearby property if time and resources allowed. Permission was obtained from the property owner for the sampling team to enter the property and collect samples. The decision to go ahead and collect samples from this property was made on Day 3 after sampling activities at the EMSHP were completed. Trenches were excavated and samples collected at four locations that had been previously sampled. Global Positioning System coordinates for the trench locations were provided to DTSC at a later date. The trenches were designated RG-1 through RG-4. Sampling at this location was not proposed in the approved Quality Assurance Project Plan. Samples were collected and handled in the same manner as those collected at the EMSHP and will be processed per the requirements in the QAPP for possible inclusion in the study.

Day 3 (9/23/09)

Trench RG-1 was excavated using the four wheeled backhoe to a maximum depth of 2'.

Sample RG-01-1-2

Trench RG-2 was excavated using the four wheeled backhoe to a maximum depth of 2'.

Sample RG-02-1-2

Trench RG-3 was hand excavated to a maximum depth of 1'.

Sample RG-03-0-1

Trench RG-4 was hand excavated to a maximum depth of 1.5'.

Sample RG-04-0-1.5

Samples collected throughout the day were stored in a locked facility at the EMSHP maintenance yard under chain of custody.



Samples stored at OSU ready for processing