

**REMOVAL REPORT
ANACONDA REMOVAL 2010**

**FORMER ANACONDA COPPER MINE
YERINGTON, LYON COUNTY, NEVADA 92274**

**TDD No.: TO-02 09-10-03-0003
Job No.: 002693.2080.01RP**

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Prepared for:

**U.S. ENVIRONMENTAL PROTECTION AGENCY
Region IX**

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List of Abbreviations and Acronyms

ACM	asbestos containing materials
E & E	Ecology and Environment
ERRS	Emergency and Rapid Response Services
FOSC	Federal On-Scene Coordinator
f/cc	fibers per cubic centimeter
NAAQS	National Ambient Air Quality Standard
NIOSH	National Institute of Occupational Safety and Health
PCM	phase contrast microscopy
PM-10	particulate material with a diameter less than 10 micrometers
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter
QASP	Quality Assurance Sampling Plan
RCRA	Resource Conservation and Recovery Act
REPA	RCRA Enforcement Permitting Assistance
SAP	Sampling and Analysis Plan
START	Superfund Technical Assessment and Response Team
TWA	time weighted average
U.S. EPA	United States Environmental Protection Agency

1 Introduction

In February 2010, United States Environmental Protection Agency (U.S. EPA) Federal On-Scene Coordinator (FOSC) Tom Dunkelman tasked the Ecology and Environment, Inc. (E & E) Superfund Technical Assessment and Response Team (START) to support U.S. EPA-funded removal activities at the Anaconda Mine site in Yerington, Nevada. The removal activities were being performed by Environmental Quality Management Inc. which operates under the U.S. EPA's Emergency and Rapid Response Services (ERRS) contract. The START support effort was divided into three principal tasks:

- 1) Conduct air sampling and submit samples for laboratory analysis to support the ERRS asbestos abatement and structure demolition activities of the Anaconda Mine office.
- 2) Conduct on-site radiological screening of tires that were proposed for off-site disposal.
- 3) Conduct air monitoring for particulate material with diameter less than 10 micrometers (PM-10) during the excavation and backfill of the construction debris disposal pit.

While in the field supporting the removal activities, the START was additionally tasked to assist with the sampling of an evaporation pond, which is part of evaporation pilot test being conducted by the U.S. EPA. This report summarizes the START planning activities, field activities between May 11th and May 29th, 2010 and presents analytical data for the sampling conducted by START. The report also presents plans, reports and analytical data generated by other contractors supporting the removal activities. All figures and tables referenced in this document are located in Appendices A and B, respectively. A photographic record of site activities is located in Appendix C.

Radiological screening of tires was performed under the supervision of Tetra Tech Inc's on-site health physicist. The radiological screening plan and final radiological screening report, generated by Tetra Tech, Inc. working under the Resource Conservation and Recovery Act (RCRA) Enforcement Permitting Assistance (REPA) contract, are located in Appendix D.

The laboratory reports for analysis of asbestos in air are located in Appendix E. An asbestos abatement clearance report, generated by Lisa Monroe & Associates under subcontract to ERRS contractor, is presented in Appendix F. The laboratory report for the analysis of samples from the U.S. EPA evaporation pond is located in Appendix G. The START sampling plans are presented in Appendix H.

2 Background

2.1 Site Location and Description

The former Anaconda Mine is located at 102 Burch Drive, Yerington, Lyon County, Nevada (Figure 1). The geographic coordinates for the site are 38 degrees, 59 minutes and 38 seconds north latitude and 119 degrees, 11 minutes and 52 seconds west longitude. The mine site is bordered to the north by agricultural land, to the east by Highway 95, to the west and southwest by the Singatse mountain range and the town of Weed Heights, and to the south by United States Bureau of Land Management land. The site comprises an area of more than 3,400 acres and includes an open-pit copper mine with ore processing areas, ore stockpiles, tailing stockpiles, and evaporation ponds throughout the site. Mining operations at this site began in approximately 1918 and ceased in 2000.

2.2 Previous U.S. EPA Investigation and Activities

The former Anaconda Mine site is the focus of ongoing U.S. EPA assessment, remedial, and removal activities. There have been four U.S. EPA removal actions at the site since February 2006. An initial removal action was conducted at the site in February 2006. This removal action involved the removal of approximately 120 PCB-containing transformers and placing a soil cap over approximately 75 acres of exposed sulfide tailings. The second removal action in October 2006 addressed fluids management problems and involved the construction of a 4-acre evaporation pond, construction of a 1,100 foot French drain system and relining of an existing evaporation pond. The third removal action in October 2007 involved the repair and improvement of an existing evaporation pond. The fourth removal action in September 2008 included closure of several historic ponds, bioremediation of petroleum hydrocarbon contaminated soil, and repair and improvement to several existing evaporation ponds. EPA also implemented measures to reduce bird mortalities associated with the various on-site ponds, including installation of propane bird-scare cannons.

In September 2009, following a building survey for asbestos, Lisa Monroe & Associates, Inc. and Environmental Quality Management submitted a report to the U.S. EPA outlining asbestos containing materials (ACM) found in the Anaconda Mine office building. The report indicated the presence of regulated friable and category II non-friable ACM within the interior and exterior of the building that must be removed by a certified asbestos abatement contractor prior to the demolition of the structure. The location and types of material included is presented in Table 1 in Appendix B.

A tire pile with approximately 300 large heavy haul tires was located on site within the former Anaconda Mine process area. It was not known whether the tires were used in radiological impacted areas on site. However, since the tire pile posed a potential fire hazard the U.S. EPA decided to dispose of the tires. It was necessary to establish whether the tires presented a radioactive hazard in order for ERRS to determine the appropriate tire disposal (on-site or off-site) and recycling options. As a result, it was decided that a quantitative radiological evaluation of the tires was needed.



2.3 Current Activities

From May 11, 2010 to June 7, 2010 the U.S. EPA conducted a removal action at the Yerington Mine site to mitigate threats to human health and the environment posed by the presence of ACM in the mine office building and the threat of fire and resulting release of hazardous substances associated with a tire pile. The U.S. EPA is also conducting an ongoing evaporation pilot test at the U.S. EPA Evaporation Pond.

3 START Activities

3.1 Planning

Prior to mobilization, START developed a site-specific Health and Safety Plan and initiated a site-specific Sampling and Analysis Plan (SAP) for air sampling and particulate matter monitoring during the abatement, demolition, excavation and burial activities. This SAP described the technical approach and methodology for conducting air sampling for asbestos and air monitoring for particulate matter (Appendix H).

A site-specific Field Survey Plan (FSP) for tire screening was developed by Tetra Tech. Inc. (Appendix D). This FSP describes the technical approach and methodology for conducting radiological surveys to determine if residual radioactive material resulting from past operations at the site was present in concentrations detectable above natural background levels on approximately 300 large heavy haul tires found outside of impacted areas at the site.

The work area locations within the site are shown in Figure 1B in Appendix A.

3.2 Building Demolition and Air Sampling for Asbestos

START air sampling was conducted in accordance with the SAP with the deviations described in section 3.6 of this report. START arrived on site on May 11, 2010 and began preparation for air sampling activities. START collected 12 background samples from around the perimeter of the Anaconda Mine office building on May 11 and May 12, 2010. The sampling activities included:

- Deploying a meteorological station,
- Calibrating and deploying up to six air samplers with sampling media,
- Operation of samplers for six to ten hours,
- Monitoring wind direction and wind speed,
- End of day calibration checks, and
- Sample media handling.

The ERRS asbestos abatement activities began on May 13, 2010 and continued until May 26, 2010. START conducted air sampling intermittently throughout the asbestos abatement. START required a 24-hour analysis turn-around for samples collected on the first six days of sampling to insure that engineered controls used by the abatement contractor were adequate. During asbestos abatement activities START collected samples on eight days from five to six sampler locations, for a total of 46 samples, with an additional six co-located duplicate samples. Samples collected during the asbestos abatement and background samples were sent to EMS laboratories for asbestos by phase contrast microscopy (PCM) by National Institute of Occupational Safety and Health (NIOSH) method 7400. The air sampling data for asbestos for background samples and

samples collected during the asbestos abatement activities are presented in Table 2 in Appendix B. The sampler locations are presented in Figure 2 in Appendix A.

The PCM data from samples collected during the asbestos abatement activities were reviewed and validated as specified in the SAP and found to be acceptable for data use objectives indicated in the SAP with no additional qualification. No asbestos was documented above the project action level of 0.01 fibers per cubic centimeter (f/cc) in ambient air around the perimeter of the main office during abatement activities. The laboratory data report for asbestos analysis is included in Appendix E.

After abatement activities were completed, the interior of the building was inspected and sampled by a certified asbestos consultant (Lisa Monroe & Associates, Inc.) and certified to be asbestos free. The clearance report from Lisa Monroe & Associates is presented in Appendix F.

The building demolition started on May 27, 2010. START conducted air sampling during building demolition activities from May 27, 2010 through May 29, 2010. During building demolition activities START collected samples on three days from five sampler locations, for a total of 15 samples, with an additional co-located duplicate samples. Samples were sent to EMS laboratories for asbestos by PCM by (NIOSH) method 7400. The PCM data from samples collected during the demolition activities were reviewed and validated as specified in the SAP and found to be acceptable for data use objectives indicated in the SAP with no additional qualification.

The air sampling data generated during the building demolition are presented in Table 3 in Appendix B. No asbestos was documented above the project action level in ambient air around the perimeter of the main office during demolition activities.

The building demolition was completed on May 31, 2010. All debris from the demolition of the main office building was deposited on site in a newly constructed burial pit. Debris from an ACM-free guard shack, which was demolished on May 26, 2010, was deposited in an existing debris pit located on site. The locations of both pits are shown in Figure 3 in Appendix A.

3.3 Burial Pit Construction and Air Monitoring for PM-10

On May 26, 2010 excavation of a burial pit in the Sulfide Tailing Area was initiated by ERRS (Figure 3). The burial pit was unlined and had dimensions of approximately 100 feet wide and 150 feet long. The burial pit was excavated to an average depth of 8 feet below ground surface with sloping sides. The sulfide tailing material was stockpiled next to the burial pit. Approximately 1,320 cubic yards of ASM-free debris from the building demolition was placed into the pit between May 27 and May 31, 2010. The debris in the burial pit was crushed and compacted as it was deposited. Once all the ASM-free debris from the demolition was in the burial pit, between 4 and 5 feet of the stockpiled sulfide tailings material and approximately 2,220 cubic yards of borrow (vat leach tailings) material was placed over the buried debris. The final raised capped area was 150 feet wide by 200 feet long.

START conducted air monitoring for respirable particulate matter (10 microns or less in diameter [PM-10]) downwind of excavation and debris burial activities from May 26 through May 29, 2010. START used a Thermo DataRAM 4000™ Aerosol Monitor instrument to conduct air monitoring. The monitoring data generated during the excavation and burial are presented in Table 4 in Appendix B. All particulate concentrations in air during the operations were at concentration below the project specific construction zone action level of 500 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for 15 minute averages and the National Ambient Air Quality Standard (NAAQS) time weighted average (TWA) of $150 \mu\text{g}/\text{m}^3$. START PM-10 monitoring was conducted in accordance with the SAP with the deviations described in section 3.6 of this report.

3.4 Pond Sampling

On May 19, 2010 START, FOSS Tom Dunkelman and ERRS personnel sampled leachate and sediment accumulated in the U.S. EPA evaporation pond (Figure 4 in Appendix A). This sampling was performed under an Emergency Response and Time Critical Quality Assurance Sampling Plan (QASP) with the purpose of documenting the pH and metal concentrations in the leachate and sediment (QASP is presented in Appendix H). The liquid and sediment depths at the sampling locations were measured during sampling. The measurement of the southwest side of the pond where samples EP-S-01 and EP-S-02 were collected indicated that 1.2 feet of clear heap leach fluid (liquid) was above approximately 2.1 feet of a suspended solid crystalline material (sediment). A sample from the liquid layer (EP-S-1) and a sample from the sediment under the liquid layer (EP-S-02) were collected on the southwest side of the pond. Measurements at the northeast end of the pond measurement indicated 1.5 feet of liquid above 4.7 feet of sediment. A sample from the liquid layer (EP-D-1) and a sample from the sediment under the liquid layer (EP-D-1) were also collected on the northeast side of the pond. Sampling was conducted in accordance with the QASP without exceptions.

The four samples were shipped to the U.S. EPA Region 9 laboratory and analyzed for metals by U.S. EPA method 6010B and for pH by U.S. EPA method 9045C. The data is summarized in Table 5 in Appendix B. The laboratory data reports for sample analysis are presented in Appendix G. The analytical data from evaporation pond sampling indicated that the liquid phase samples had a pH of 2.2 and contained detectable concentrations of chromium, copper, cobalt, zinc, cadmium, lead, beryllium, selenium and thallium. Neither pH nor metal concentrations in the liquid would classify material a hazardous waste in Nevada. The sediment phase samples had pH values of 2.5 and 1.7, contained detectable concentrations of chromium, copper, cobalt, cadmium, beryllium, nickel and zinc. The concentrations of metals in sediment would not constitute a hazardous waste in Nevada. However, the sediment sample from the northeast end of the pond had pH of 1.7 which would indicate a characteristic hazardous waste in Nevada.

3.5 Radiological Screening Activity

Between May 26, 2010 and May 28, 2010 START assisted Amy Stanford, a health physicist with Tetra Tech, Inc., with radiological screening activities in accordance with the field survey plan (Appendix D). Specifically, START conducted gross alpha and beta particle screening of tire surfaces using either a Ludlum model 2360 instrument with a 43-93 Alpha/Beta scintillation detector or a Ludlum model 2241-2 instrument with a 44-9 Alpha/Beta pancake detector. The final report detailing radiological screening activities and findings from Tetra Tech, Inc. is presented in Appendix D.

3.6 Deviations from the START SAP

The following deviations from the SAP (E & E, 2010) resulted from changes made in response to field observations and conditions:

- The SAP indicated that indoor air sampling or sampling in the asbestos abatement work zone would be preformed, as an option, in order to obtain worst case asbestos in air data. Work zone sampling was not preformed during abatement activities. One indoor air sample was collected prior to abatement activities but not during abatement activities. Indoor air and work zone sampling was not done during abatement activities at the request of the FOOSC in order to minimize potential interference with abatement activities. The planned work zone sampling was not done since data was optional and was not needed to satisfy the data use objectives.
- The SAP indicated that upwind PM-10 monitoring would be performed daily. Due to multiple instrument failures which could not be repaired in the field on the first two day of PM-10 monitoring. START was left with only one usable instrument on each of the four days of monitoring. Since the project objective was to document downwind PM-10 concentrations, the operating unit was placed downwind. The FOOSC concurred with the deviation to only perform downwind monitoring.

4 Data Discussion and Conclusions

The START was tasked by FOSC Dunkelman to provide technical assistance at the Anaconda Mine site in Yerington, Nevada. START conducted perimeter air sampling for asbestos, conducted downwind particulate monitoring, supported radiation screening, and assisted with pond sampling. START performed perimeter air sampling during all phases of asbestos abatement and building demolition. The air sampling and analysis data for airborne asbestos documented that asbestos fibers were not detected in collected samples at concentration above the site action level, background levels, or the method detection limit. Based on this data, START concluded that asbestos fibers were not released during abatement or demolition.

The air monitoring conducted by START for particulate in ambient air downwind of operations at the excavation debris pit documented that particulates were not present at concentrations above the project work zone action level of $500 \mu\text{g}/\text{m}^3$ for 15 minute intervals or the NAAQS TWA of $150 \mu\text{g}/\text{m}^3$. Based on the monitoring data, START concluded that PM-10 particulate matter was not released at any significant concentration during excavation or debris burial.

The finding of the radiological screening survey of the tires indicated that there was no detectable alpha particle radiological activity above background. Based on the survey results, it was concluded by Tetra Tech, Inc., that no radionuclides resulting from previous mining operation at the site were present above release criteria on any of the tires surveyed. Based upon the survey, it was concluded that the 300 tires to be removed did not present a radiological hazard.

The analytical data from evaporation pond sampling of the liquid indicated that the waste would not constitute a characteristic hazardous waste in Nevada based upon pH or metal concentrations. The analytical data from the sampling of the sediment indicated a pH in one sample that indicated that it was a characteristic hazardous waste in Nevada.

Appendix A: Figures



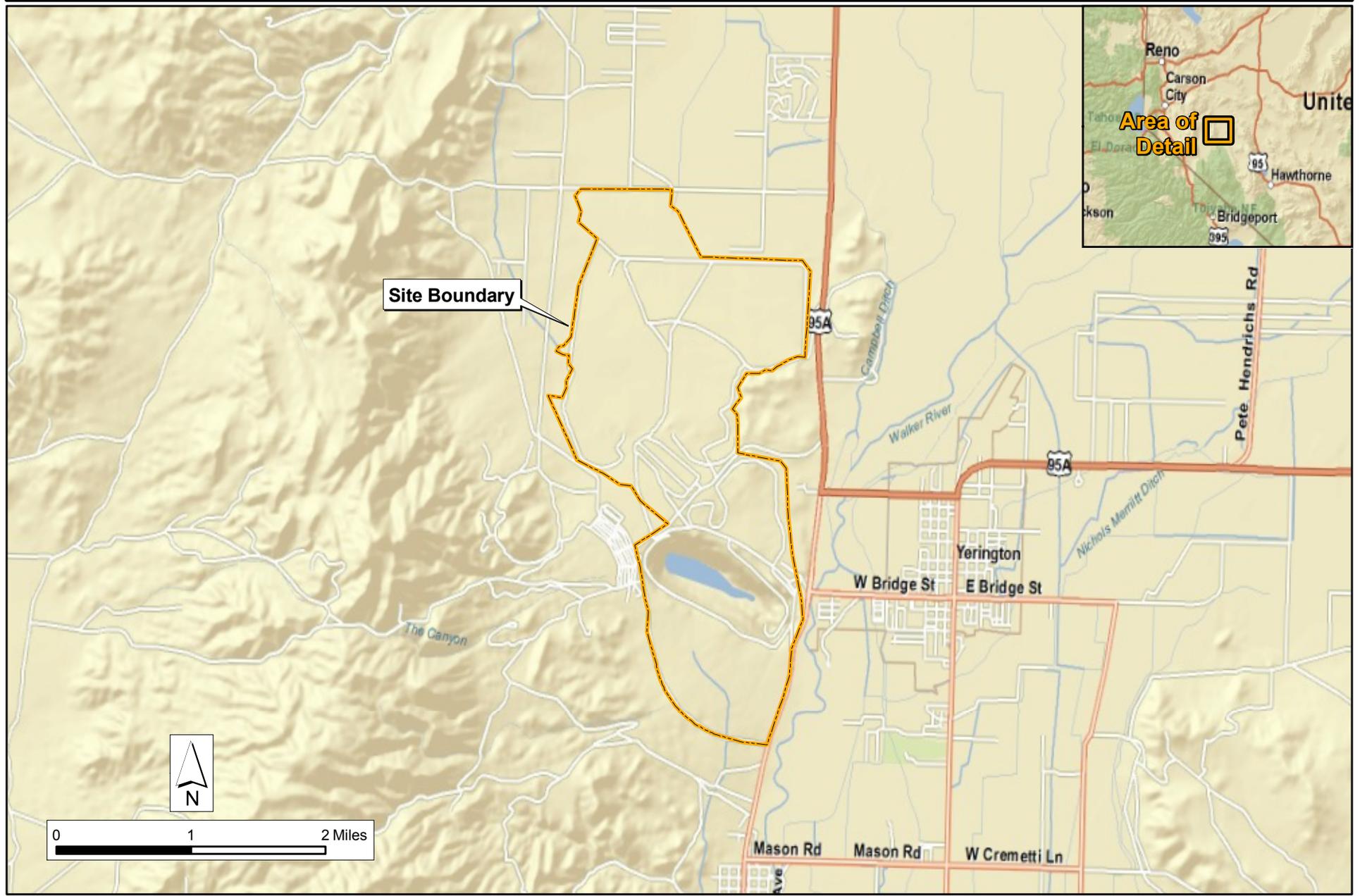
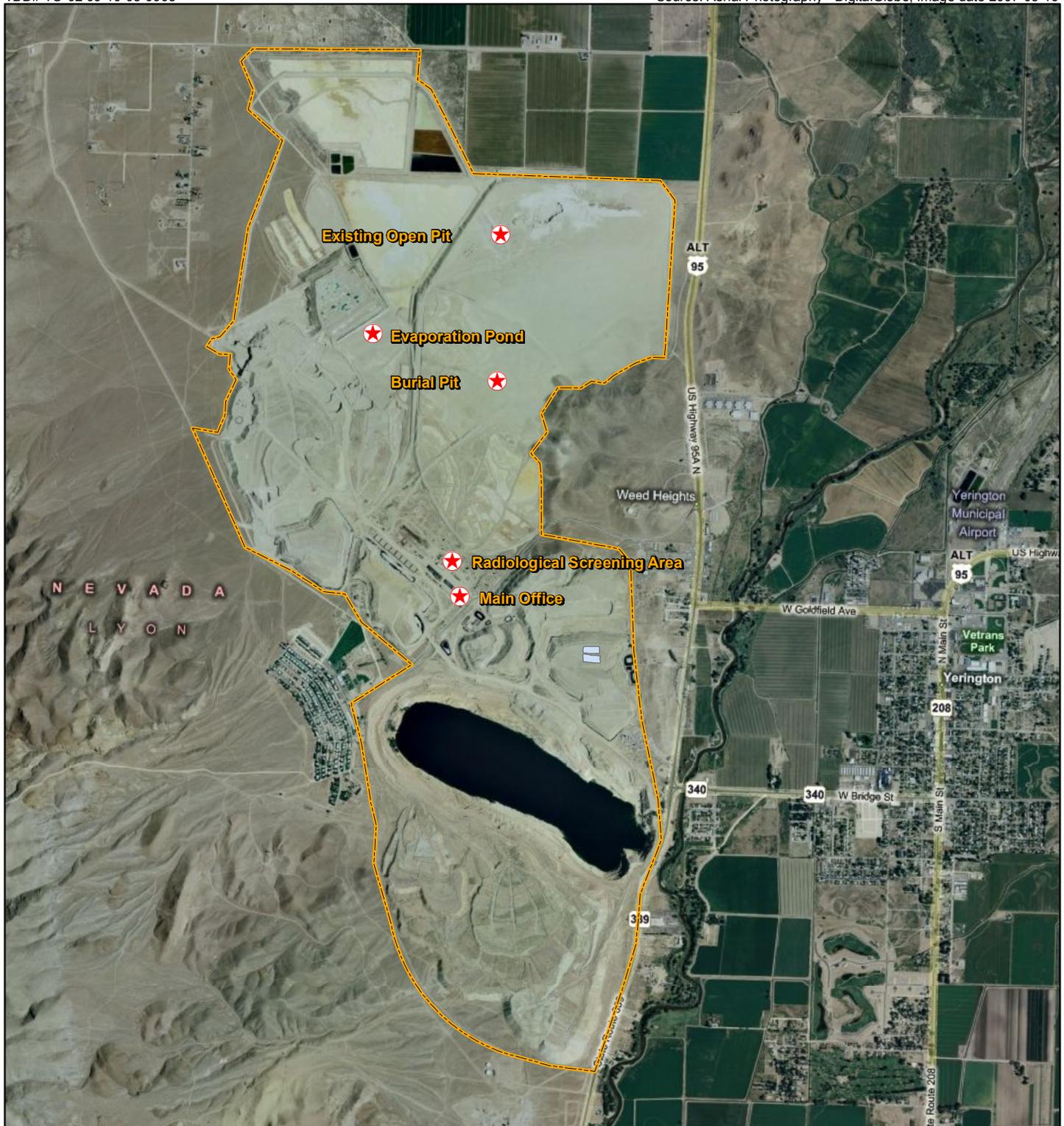


Figure 1
Site Location Map
Anaconda Removal 2010
Yerington, Nevada



LEGEND

 Site boundary



0 3,000 6,000 Feet



Figure 1-B
Work Area Location Map
Anaconda Removal 2010
Yerington, Nevada



LEGEND

- Air sampling station location
- Building location



0 75 150 Feet

Figure 2
**Anaconda Mine
Air Sampling Station Locations
Anaconda Removal
Yerington, Nevada**



LEGEND

-  PM-10 monitoring location
-  Burial pit



0 700 1,400 Feet



Figure 3
Anaconda Mine
Burial Pit Locations
Anaconda Removal 2010
Yerington, Nevada



LEGEND

- Evaporation pond sample location



0 750 1,500 Feet

Figure 4
Anaconda Mine
EPA Evaporation Pond
Sample Locations
Anaconda Removal 2010
Yerington, Nevada

Appendix B: Tables



Table 1
Asbestos Survey Summary
of Anaconda Main Office Building
ANACONDA REMOVAL 2010
YERINGTON, LYON COUNTY, NEVADA 92274

September 2009
 (Source: Lisa Monroe & Associates, Inc.)

E & E Project No 002693.2080.01RP

TDD No. TO O2-09-10-03-0003

Location	Type of Material	Asbestos Content	Asbestos Type (Friable or Non-friable)
All Walls	Wall Texture	1-5% Chrysotile Asbestos	Friable
HVAC Vents	Vent Duct Tape	60-70% Chrysotile Asbestos	Friable
Floors Over concrete & Under Carpets	All 9 inch by 9 inch floor tiles	1-5% Chrysotile Asbestos	Non-friable
Under Floor Tiles	All Black Mastic	1-5% Chrysotile asbestos	Non-friable
Building Exterior Walls	All Exterior Siding	20-30% Chrysotile Asbestos	Non-friable
Water Tank Room	Flue Pipe on Hot Water Heater	1-5% Chrysotile Asbestos	Non-friable

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**TABLE 2
ASBESTOS DATA
DURING ABATEMENT ACTIVITIES AND BACKGROUND**

**Main Office Area Perimeter
ANACONDA REMOVAL 2010
YERINGTON, LYON COUNTY, NEVADA 92274
(FIBERS PER CUBIC CENTIMETER [F/CC])**

E & E PROJECT NO 002693.2080.01RP

TDD NO. TO 02-09-10-03-0003

Action Level:	0.010								
Background Sampling		Background Sampling		Interior Abatement		Interior Abatement		Interior Abatement	
Date: 5/11/2010		Date: 5/11/2010		Date: 5/13/2010		Date: 5/14/2010		Date: 5/17/2010	
Station Location	Sampling Result								
North Sampler 5	<0.0012	North Sampler 3	<0.0006	North Sampler 1	<0.0006	North Sampler 6	<0.0005	North Sampler 3	<0.0006
North Northeast Sampler 6	<0.0008	North Northeast Sampler 4	<0.0006	North Northeast Sampler 2	<0.0006	North Northeast Sampler 5	<0.0005	North Northeast Sampler 4	<0.0006
Southwest Sampler 2	<0.0010	South Sampler 1	<0.0006	East Sampler 4	<0.0006	East Sampler 3	<0.0011	Southeast Sampler 5	<0.0006
West Sampler 3	<0.0009	South Southwest Sampler 2	<0.0006	South Sampler 5	<0.0006	South Sampler 4	<0.0005	South Sampler 6	<0.0006
Northwest Sampler 4	<0.0007	Southwest Sampler 5	<0.0006	Southwest Sampler 3	<0.0006	Southwest Sampler 1	<0.0006	Southwest Sampler 1	<0.0006
Interior Sampler 1	<0.0010	West Sampler 6	<0.0008	West Sampler 6	<0.0006	West Sampler 2	<0.0006	West Sampler 2	<0.0006
Weather Parameters									
Temperature	44-55° F	Temperature	50-66° F	Temperature	52-70° F	Temperature	56-75° F	Temperature	58-66° F
Wind Speed	0-12 mph	Wind Speed	0-6 mph	Wind Speed	0-3 mph	Wind Speed	0-4 mph	Wind Speed	0-9 mph
Local Morning Wind direction	to SSW	Local Morning Wind direction	to SSW	Local Morning Wind direction	To SW	Local Morning Wind direction	To WSW	Local Morning Wind direction	To NE
Local Afternoon Wind direction	to SSW	Local Afternoon Wind direction	to SSW	Local Afternoon Wind direction	To SW	Local Afternoon Wind direction	To WSW	Local Afternoon Wind direction	To NE
Regional Wind direction	ESE	Regional Wind direction	S	Regional Wind direction	SSW	Regional Wind direction	S	Regional Wind direction	SSE

TABLE 2 (CONT'D)
Asbestos Data
During Abatement Activities
MAIN OFFICE AREA PERIMETER
ANACONDA REMOVAL 2010
YERINGTON, LYON COUNTY, NEVADA 92274
(FIBERS PER CUBIC CENTIMETER [F/CC])

E & E PROJECT NO 002693.2080.01RP

TDD NO. TO O2-09-10-03-0003

Action Level:	0.010	Action Level:	0.010	Action Level:	0.010	Action Level:	0.010	Action Level:	0.010
Interior Abatement		Interior Abatement		Interior Abatement		Exterior Abatement		Exterior Abatement	
Date: 5/18/2010		Date: 5/19/2010		Date: 5/20/2010		Date: 5/25/2010		Date: 5/26/2010	
Station Location	Sampling Result	Station Location	Sampling Result	Station Location	Sampling Result	Station Location	Sampling Result	Station Location	Sampling Result
North Sampler 3	<0.0006	North Sampler 3	<0.0006	North Sampler 3	<0.0005	North Sampler 3	<0.0006	Northeast Sampler 1	<0.0005
North Northeast Sampler 4	<0.0006	Northeast Sampler 4	<0.0006	Northeast Sampler 4	<0.0006	Northeast Sampler 1	<0.0006	Southeast Sampler 2	<0.0005
South Sampler 6	<0.0006	Southeast Sampler 5	<0.0006	Southeast Sampler 5	<0.0006	Southeast Sampler 2	<0.0006	Southwest Sampler 5	<0.0006
Southeast Sampler 5	<0.0006	South Sampler 6	<0.0006	Southwest Sampler 1	<0.0005	West Sampler 5	<0.0007	West Sampler 4	<0.0006
Southwest Sampler 1	<0.0006	Southwest Sampler 1	<0.0006	South Sampler 6	<0.0006	Northwest Sampler 4	<0.0006	Northwest Sampler 3	<0.0006
West Sampler 2	<0.0006	Command Post Sampler 2	<0.0006	Command Post Sampler 2	<0.0005				

Weather Parameters

Temperature	44-55° F	Temperature	50-66° F	Temperature	52-70° F	Temperature	56-75° F	Temperature	58-66° F
Wind Speed	0-12 mph	Wind Speed	0-6 mph	Wind Speed	0-3 mph	Wind Speed	0-4 mph	Wind Speed	0-9 mph
Local Morning Wind direction	to SSW	Local Morning Wind direction	to SSW	Local Morning Wind direction	To SW	Local Morning Wind direction	To WSW	Local Morning Wind direction	To NE
Local Afternoon Wind direction	to SSW	Local Afternoon Wind direction	to SSW	Local Afternoon Wind direction	To SW	Local Afternoon Wind direction	To WSW	Local Afternoon Wind direction	To NE
Regional Wind direction	ESE	Regional Wind direction	S	Regional Wind direction	SSW	Regional Wind direction	S	Regional Wind direction	SSE

Shaded areas indicate the downwind sample locations for that day.

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cc = Cubic Centimeter mph = miles per hour ° F = degrees Fahrenheit
N = North E = East S = South W = West

TABLE 3
Asbestos Data
During Debris Removal Activities
MAIN OFFICE AREA PERIMETER
Anaconda Removal 2010
Yerington, Lyon County, Nevada 92274
(fibers per cubic centimeter [f/cc])

E & E Project No 002693.2080.01RP

TDD No. TO O2-09-10-03-0003

Action Level:	0.010	Action Level:	0.010	Action Level:	0.010
Date: 5/27/2010		Date: 5/28/2010		Date: 5/29/2010	
Station Location	Sampling Result	Station Location	Sampling Result	Station Location	Sampling Result
North Sampler 3	<0.0022	North Sampler 3	<0.0006	Northeast Sampler 1	<0.0006
Northeast Sampler 1	<0.0029	Northeast Sampler 1	<0.0006	South Sampler 2	<0.0005
Southeast Sampler 2	<0.0024	Southeast Sampler 2	<0.0006	Southwest Sampler 5	<0.0005
West Sampler 5	<0.0021	West Sampler 5	<0.0005	West Sampler 4	<0.0005
Northwest Sampler 4	<0.0027	Northwest Sampler 4	<0.0006	Northwest Sampler 3	<0.0007
Weather Parameters					
Temperature	52-62° F	Temperature	49-57° F	Temperature	52-70° F
Wind Speed	0-7 mph	Wind Speed	0-10 mph	Wind Speed	0-4 mph
Morning Wind direction	To S	Morning Wind direction	To NW	Morning Wind direction	To SW
Afternoon Wind direction	To S	Afternoon Wind direction	To SE	Afternoon Wind direction	To SW
Regional Wind direction	SSE	Regional Wind direction	SSE	Regional Wind direction	S

Shaded areas indicate the downwind sample locations for that day.

2010 ecology & environment, inc.

cc = Cubic Centimeter mph = miles per hour ° F = degrees Fahrenheit

N = North E = East S = South W = West

TABLE 4
PM-10 Particulate Matter Data
During Debris Removal Activities
At Excavation Pit Perimeter
Anaconda Removal 2010
YERINGTON, LYON COUNTY, NEVADA 92274
(micrograms per cubic meter)

E & E Project No 002693.2080.01RP

TDD No. TO O2-09-10-03-0003

Date	5/26/2010	5/27/2010	5/28/2010	5/29/2010
	Removal Activity			
	Excavation	Excavation and Burial	Burial	Burial
National Ambient Air Quality Standard TWA	150	150	150	150
Project Specific Construction Zone Action Level (15 minute Average)	500	500	500	500
Downwind Monitor Time Weighted Average for Day	4.0	1.54	1.44	1.3
Downwind Monitor Highest 15 minute Average	25.0	12.6	4.3	2.5
Temperature	56-71 F	52-62 F	49-57 F	52-70 F
Regional Wind Speed	0-7 mph	0-7 mph	0-10 mph	0-4 mph
Regional Wind direction	SSE	SSE	SSE	S

TWA = Time Weighted Average

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cc = Cubic Centimeter

mph = miles per hour

° F = degrees Fahrenheit

N = North

E = East

S = South

W = West

TABLE 5
Metals Concentration in
U.S. EPA Evaporation Pond
ANACONDA REMOVAL 2010
YERINGTON, LYON COUNTY, NEVADA 92274
(May 19, 2010)

E & E Project No 002693.2080.01RP

TDD No. TO O2-09-10-03-0003

Sample Name	EP-S-01	EP-D-01	EP-S-02	EP-D-02
	Aqueous Sample from Southwest End of Pond	Aqueous Sample from Northeast End of Pond	Sediment Sample from Southwest End of Pond	Sediment Sample from Northeast End of Pond
pH	2.2	2.2	2.5	1.7
Percent Solids	-	-	57 %	51 %
	ug/L	ug/L	mg/kg	mg/kg
Antimony	ND	ND	ND	ND
Arsenic	ND	ND	ND	ND
Barium	ND	ND	ND	ND
Beryllium	1,400	1,400	1.7	2.1
Cadmium	170	180	.43	ND
Chromium	2,300	2,400	50.	7.1
Cobalt	55,000	55,000	130	180
Copper	4,400,000	4,600,000	5,700	6,000
Lead	1,400	1400	ND	ND
Molybdenum	ND	ND	ND	ND
Nickel	33,000	33,000	83	110,000
Selenium	240	140	ND	ND
Silver	ND	ND	ND	ND
Thallium	770	740	ND	ND
Vanadium	51	ND	ND	ND
Zinc	64,000	67,000	120	150,000

2010 ecology & environment, inc

ug/L = micrograms per liter

mg/kg = milligrams per kilogram

ND = not detected at concentration above the method detection limit.

Appendix C: Photo Documentation



ECOLOGY AND ENVIRONMENT, INC.
Superfund Technical Assessment and Response Team
Anaconda Removal 2010

E&E Project. No.: 002693.2080.01RA

TDD No: TO2-09-10-03-0003



PHOTO 1

Date: 05/14/10

Direction: Northwest

Photographer: H. Edwards

Description: Anaconda mine office building prior to demolition and asbestos removal activities.



PHOTO 2

Date: 05/14/10

Direction: Southwest

Photographer: H. Edwards

Description: Anaconda mine office building during asbestos removal operations. Note upwind air monitoring for fugitive asbestos particles on the right side of the photograph.



PHOTO 3

Date: 05/12/10

Direction: East

Photographer: H. Edwards

Description: Additional air monitoring station west of Anaconda mine office building during removal of asbestos siding.

ECOLOGY AND ENVIRONMENT, INC.
Superfund Technical Assessment and Response Team
Anaconda Removal 2010

E&E Project. No.: 002693.2080.01RA

TDD No: TO2-09-10-03-0003



PHOTO 4

Date: 05/25/10

Direction: East

Photographer: H. Edwards

Description: Contractor taking wipe samples of tires for scalar frisker analysis.



PHOTO 5

Date: 05/24/10

Direction: East

Photographer: H. Edwards

Description: START and contractor conducting scans for alpha and beta contamination of tires with handheld devices.

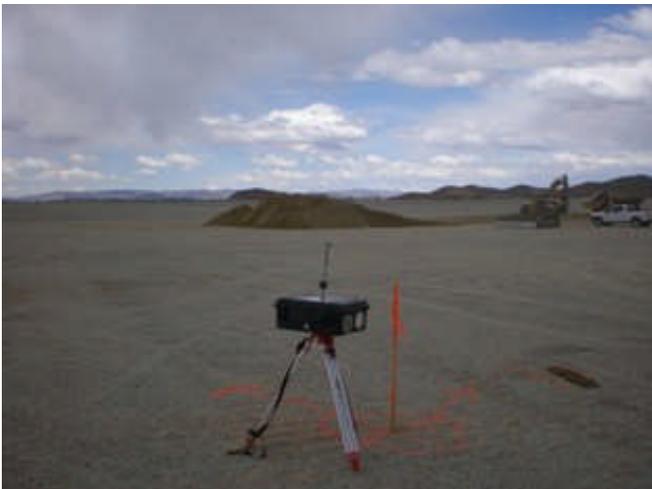


PHOTO 6

Date: 05/26/10

Direction: West

Photographer: H. Edwards

Description: Dust monitoring station downwind of landfill excavation. The debris from the demolition of Anaconda Mine office building was disposed on site once cleared of asbestos containing materials.



Appendix D:
Tetra Tech Inc.
Radiological Field Survey Report
and Field Survey Plan

FIELD SURVEY REPORT
FOR
DISPOSITION OF MATERIALS
IN
NON-RADIOLOGICAL IMPACTED AREAS

ANACONDA COPPER COMPANY MINE
YERINGTON, LYONS COUNTY, NEVADA

REPA 4, ZONE 3 PRIME CONTRACT #EP-W-07-019
EPA WORK ASSIGNMENT NUMBER 49
TETRA TECH NUS PROJECT NUMBER 112I00321

Tetra Tech, Incorporated
900 Trail Ridge Road
Aiken, South Carolina

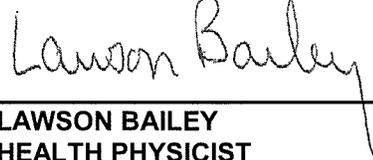
June 2010

PREPARED BY:



AMY STANFORD
HEALTH PHYSICIST
TETRA TECH, INC.

REVIEWED BY:



LAWSON BAILEY
HEALTH PHYSICIST
TETRA TECH, INC.

1.0 INTRODUCTION

The purpose of this field report is to present the findings of the radiological surveys performed at the former Anaconda Copper Company Mine, located in Yerington, Lyon County, Nevada during the week of May 24, 2010.

The objective of the survey was to characterize the nature and extent of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) contamination associated with approximately 300 large heavy haul tires. Surveys were performed in accordance with the Multi-Agency Radiological Survey and Assessment of Material and Equipment Manual (MARSAME NUREG-1575, Supplement 1) using release criteria for Natural Uranium found in U.S. Nuclear Regulatory Commission Guide 1.86 (Reg Guide 1.86 - NRC 1974).

Site Background

The Anaconda Copper Mine site covers more than 3,400 acres in the Mason Valley, near the city of Yerington, in Lyon County, central Nevada, approximately 65 miles southeast of Reno. The Singaste Range and the town of Weed Heights lie to the west, open agricultural fields and homes to the north, U.S. Bureau of Land Management (BLM) managed public land to the south, and the Walker River and the city of Yerington to the east. Portions of the site are owned by Arimetco (in bankruptcy) and portions are BLM managed public lands.

Copper was discovered in the Yerington District in 1865, and operations at this mine site began in 1918 as the Empire Nevada Mine. Anaconda purchased the Mine in 1941, and from approximately 1952 to 1978 conducted mining and milling operations at the open-pit, low-grade copper mine. Anaconda processed both copper oxide and copper sulfide ores. They removed the overburden, and dug the ore out of the pit which required pumping water out of the pit to get to the ore. The processing of the copper oxide ore involved large quantities of sulfuric acid, made in an on-site sulfuric acid manufacturing plant. The ore processing created liquid and solid wastes, such as: tailing piles, waste rock areas, liquid waste ponds, leach vats, heap leach pads, and evaporation ponds. Anaconda mining operations generated approximately 360 million tons of ore and debris from the open pit and 15 million tons of overburden resulting in 400 acres of waste rock placed south of the Pit, 900 acres of contaminated tailings, and 300 acres of disposal ponds.

In 1977, Atlantic Richfield Company (ARC) bought Anaconda, but was forced to close Anaconda's copper mining operations in 1978, and all activities were shut down in 1982. When

Anaconda operations ceased, groundwater pumping stopped, resulting in the 180 acre Pit Lake. It is now about one mile long, 800 feet deep with 500 feet of water, and contains around 40,000 acre-feet of water which increases at the rate of 10 feet/year.

In 1982, the property was sold to Don Tibbals, who refurbished Weed Heights, conducted some operations, and leased portions of the site to various companies. Following Anaconda's sale of the site, portions of the site were used for extracting copper from the tailing and waste rock piles and as a metal salvage and transformer recycling facility. Arimetco bought the property from Tibbals in 1988 and pursued leaching operations on the site, eventually building an electrowinning plant and five heap leach pads to produce copper. They used tailings material left by Anaconda and added some new ore resulting in 250 acres of heap leach piles and 12 acres of heap leach solution collection ponds. Arimetco went bankrupt in 1997 and abandoned the site in 2000.

Nearly all rocks, soils, and water contain small amounts of naturally occurring radioactive materials (NORM) such as uranium and thorium. When NORM becomes concentrated from mining and processing operations (e.g. copper), it becomes TENORM, which is one of the hazardous materials found at the Yerington site. TENORM is not suspected in the area where the tires are currently stored nor is it suspected that the tires have transited areas with TENORM contamination.

The U.S. Environmental Protection Agency (EPA) is conducting investigations and removal actions for hazardous materials found at the site using its authority under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). EPA has established eight Operable Units (OUs) to address the investigation and cleanup of the various components of the site. Each of these OUs will have their own investigation and cleanup plans. The cleanup approaches for the various hazards at the site will be determined after these investigations have been completed and potential risks have been evaluated. In the interim, EPA will determine whether emergency removals or other interim actions are warranted to mitigate immediate hazards.

One such action is the removal of a tire pile located on site within the former Anaconda process area, but not known to be used in the radiological portion of the impacted area. The tires were surveyed for radioactive material to help determine if disposal (on site or off site) and recycling options are feasible.

2.0 FIELD INVESTIGATION ACTIVITIES

Surveys were performed to determine if TENORM resulting from past operations at the site were present on approximately 300 large heavy haul tires (approximately 8 feet in diameter). Because the tires had a low potential to contain any residual radioactivity exceeding release criteria, they were given a MARSAME classification of Class 3 (Scan-Only). To be conservative, some direction from a Class 2 survey was added.

Thirty tires were randomly chosen from the entire pile to represent 10% of the material. Tires represented both rimmed and un-rimmed tires. Scan surveys were performed on all surfaces of the selected tires using hand held instruments. No contamination was found above the action levels (greater than 50% of the release criteria) that would require static count surveys. Removable contamination surveys were performed by smearing all surfaces of the tires. The media was counted with hand held instruments to determine if gross contamination was present. Other media was counted with lab instruments for comparison to the release criteria found in NRC Reg Guide 1.86 as prescribed in MARSAME. Detector efficiencies were used to convert instrument response (counts per minute [cpm]) to the activity units used in the release criteria (disintegrations per minute [dpm]).

Monitoring equipment used to perform these surveys were calibrated and response checked to ensure the proper operation and response of the equipment and to document the accuracy, precision, or sensitivity of the measurements. The instruments actually used for this survey differed slightly from those described in the Field Survey Plan and are summarized in Tables 2-1. Each instrument was calibrated with NIST traceable sources (also summarized in Table 2-1), functionally tested daily, and source checked at the beginning and end of each day using depleted Th-230 (alpha emitter) and Tc-99 (beta emitter) check sources. Calibration certificates and daily quality control (QC) forms are found in Attachment 1.

Survey activities did not generate waste that are radiologically contaminated or considered to be "Associated Waste" as described in the Field Survey Plan.

**TABLE 2-1
INSTRUMENT OPERATING PARAMETERS**

Measurement Type	Meter Model	Detector Model	Efficiency & Calibration Source	Calibration Date
Surface Scans (alpha & beta)	Ludlum 2360 SN 263977	Ludlum 43-93 SN PR283254	20% (Tc-99) 22% (Pu-239)	9/22/09
Surface Scans (alpha & beta)	Ludlum 2360 SN 263892	Ludlum 43-93 SN PR283255	17% (Tc-99) 20% (Pu-239)	9/22/09
Surface Scans (alpha only)	Ludlum 2241-2 SN 198223	Ludlum 43-90 SN PR205935	21% (Pu-239)	9/15/09
Removable Activity (alpha & beta)	Ludlum 3030 SN 200379	NA	21% (Tc-99) 33% (Th-230)	10/27/09
Dose Rate (gamma)	Ludlum 192 SN 215220	NA	Approx 10% (Cs-137)	1/20/10

3.0 FINDINGS OF ASSESSMENT

Media counting results were compared against the “Removable” activity levels for Natural Uranium (U-nat) listed in NRC Regulatory Guide 1.86 as shown in Table 3-1 of this plan. Direct survey activity was compared against the “Total” activity levels for Natural Uranium (U-nat) listed Table 3-1. Readings from scan surveys were all no detectable activity above a background of zero, which is below the < 5000 dpm alpha/100 cm² shown in Table 3-1. Readings from swipe surveys were all < 1000 dpm alpha/100 cm². A single maximum swipe result of 46 dpm alpha/100cm² was found on the tires. All other were < 20 dpm alpha / 100 cm², which is below even the most conservative release criteria for removable alpha (transuranics, Ra-226, et al), as well as Natural Uranium.

Survey data was not documented on radiological survey maps because the tires being surveyed would not need a diagram to make the survey locations more clear and because no activity was present which needed to be visually identified. As previously stated, instrument QC records are found in Attachment 1.

TABLE 3-1

ACCEPTABLE SURFACE CONTAMINATION LEVELS FROM NRC REG GUIDE 1.86

NUCLIDE ^a	AVERAGE ^{b c}	MAXIMUM ^{b d}	REMOVABLE ^{b e}
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm ²	15,000 dpm α/100 cm ²	1,000 dpm α/100 cm
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm ²	300 dpm/100 cm ²	20 dpm/100 cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-231, I-126, I-131, I-133	1000 dpm/100 cm ²	3000 dpm/100 cm ²	200 dpm/100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm β-γ/100 cm ²	15,000 dpm β-γ/100 cm ²	1000 dpm β-γ/100 cm

^aWhere surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^bAs used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^cMeasurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

^dThe maximum contamination level applies to an area of not more than 100 cm².

^eThe amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

4.0 SUMMARY AND CONCLUSIONS

The purpose of the survey described in this report was to determine if the tires contain residual amounts of radioactivity such that they would require management as low-level waste, or if they could be released for unrestricted use.

Based on the survey results, it is apparent that TENORM associated radionuclides resulting from previous operations at the site were not present above release criteria on the tires surveyed. In fact, the concentrations present represent a very small percentage of the levels found in the release criteria. Therefore, by representative survey, it is concluded that the approximate 300 tires requiring disposition would not present a hazard and no additional surveys are necessary. All of these tires can be disposed of or reused as chosen.

This report serves as a copy of field records and should be entered into the RAC program document control system in accordance with appropriate administrative guidelines. The original records will be maintained by Tetra Tech, Inc. in accordance with federal regulations.

Attachment 1
Instrument Quality Control Data



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER US EPA ORDER NO. 20139156

Mfg. Ludlum Measurements, Inc. Model 2360 Serial No. 263892

Mfg. Ludlum Measurements, Inc. Model 43-93 Serial No. PR 283255

Cal. Date 22-Sep-09 Cal Due Date 22-Sep-10 Cal. Interval 1 Year Meterface 202-855

check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 36 % Alt 705.8 mm Hg

New Instrument Instrument Received Within Toler. +-10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity

F/S Resp. ck. Reset ck. Window Operation Geotropism

Audio ck. Alarm Setting ck. Batt. ck. (Min. Volt) 2.2 VDC RS-232 Port OK

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 675 V

HV Readout (2 points) Ref./Inst. 500 / 513 V Ref./Inst. 1500 / 1490 V

Firmware Version: 3901024

(EEPROM Settings)

Alpha Threshold: 120 mV

User Time: 1.0

Beta Threshold: 3.5 mV

Alpha Alarm: 999999

Beta Window: 30 mV

Beta Alarm: 999999

Overload Set with Am241 91 mcpm

A/B Alarm: 999999

Instrument calibrated with a 39" cable.

Model 2360 Date: 9/22/2009

High voltage set with detector connected

Calibration Date Due: 9/22/2010

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400kcpm		400
x1000	100kcpm		100
x100	40kcpm		400
x100	10kcpm		100
x10	4kcpm		400
x10	1kcpm		100
x1	400cpm		400
x1	100cpm		100

*Uncertainty within ± 10% C.F. within ± 20%

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm	39903 (0)	Log Scale		
	40kcpm	3990 (0)			
	4kcpm	400 (0)			
	400cpm	40 (0)			
	40cpm	4 (0)			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. This calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: S-394/1122 1131 781 059 280 60646

Cs-137 Gamma S/N 1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Pu239 #4337 Beta S/N Tc99 #635/83, Sr90y90 #918 Other _____

m 500 S/N 38120 Oscilloscope S/N _____ Multimeter S/N 84260131

Calibrated By: Alma Ortega Date 22-Sep-09

Reviewed By: Diana DeBarra Date 22 Sep 09

Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-93 Serial No. PR 283255 Order #. 20139156
 Customer US EPA Alpha Input Sensitivity 120 mV
 Counter 2360 Serial No. 263892 Beta Input Sensitivity 3.5 mV
 Count Time 1 Minute Beta Window 30 mV
 Other _____ Distance Source to Detector Surface

High Voltage	Background		Isotope <u>Pu 239</u> Size <u>30900 dpm</u>		Isotope <u>Tl 99</u> Size <u>22900 dpm</u>		Isotope <u>Sr 90y90</u> Size <u>97539 dpm</u>	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
<u>625</u>	<u>0</u>	<u>44</u>	<u>4021</u>	<u>505</u>	<u>5</u>	<u>1567</u>	<u>2</u>	<u>12134</u>
<u>650</u>	<u>2</u>	<u>68</u>	<u>5391</u>	<u>412</u>	<u>5</u>	<u>2976</u>	<u>2</u>	<u>17528</u>
<u>✓ 675</u>	<u>1</u>	<u>104</u>	<u>6277</u>	<u>393</u>	<u>7</u>	<u>3930</u>	<u>2</u>	<u>22338</u>
<u>700</u>	<u>2</u>	<u>172</u>	<u>6516</u>	<u>454</u>	<u>7</u>	<u>4901</u>	<u>3</u>	<u>27073</u>
<u>725</u>	<u>6</u>	<u>214</u>	<u>6907</u>	<u>465</u>	<u>10</u>	<u>5566</u>	<u>5</u>	<u>28486</u>

- Gas Proportional detector count rate decreased \leq 10% after 15 hour static test using 39" cable.
- Gas proportional detector count rate decreased \leq 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature *Laura DeCaro* Date 22-Sep-09



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.

POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER US EPA ORDER NO. 20139156
Mfg. Ludlum Measurements, Inc. Model 2360 Serial No. 263977
Mfg. Ludlum Measurements, Inc. Model 43-93 Serial No. PR283254
Cal. Date 22-Sep-09 Cal Due Date 22-Sep-10 Cal. Interval 1 Year Meterface 202-855

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 36 % Alt 705.8 mm Hg

- New Instrument Instrument Received Within Toler. +10% 10-20% Out of Tol. Requiring Repair Other-See comments
- Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity
 F/S Resp. ck. Reset ck. Window Operation Geotropism
 Audio ck. Alarm Setting ck. Batt. ck. (Min. Volt) 2.2 VDC RS-232 Port OK
 Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set 675 V

HV Readout (2 points) Ref./Inst. 500 / 506 V Ref./Inst. 1500 / 1506 V

Firmware Version: 39010N24

(EEPROM Settings)

Alpha Threshold: 120mv

User Time: 1.0

Beta Threshold: 3.5mv

Alpha Alarm: 999999

Beta Window: 30mv

Beta Alarm: 999999

Overload set with Am 241 mdpm

A/B Alarm: 999999

Instrument calibrated with a 39" cable.

Model 2360 Date: 9/22/2009

High voltage set with detector connected

Calibration Date Due: 9/22/2010

COMMENTS:

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	400kcpm		400
x1000	100kcpm		100
x100	40kcpm		400
x100	10kcpm		100
x10	4kcpm		400
x10	1kcpm		100
x1	400cpm		400
x1	100cpm		100

*Uncertainty within ± 10% C.F. within ± 20%

ALL Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital Readout	400kcpm	39910 (0)	Log Scale		
	40kcpm	3991 (0)			
	4kcpm	400 (0)			
	400cpm	40 (0)			
	40cpm	4 (0)			

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978 State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: S-394/1122 1131 781 059 280 60646
Cs-137 Gamma S/N 1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Pu239 #4337 Beta S/N Tc99 #635/83, Sr90y90 #918 Other _____

m 500 S/N 38120 Oscilloscope S/N _____ Multimeter S/N 84260131

Calibrated By: [Signature] Date 22-Sep-09

Reviewed By: [Signature] Date 22 Sep 09



Designer and Manufacturer
of
Scientific and Industrial
Instruments

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

Bench Test Data For Detector

Detector 43-93 Serial No. AR283254 Order #. 20139156
 Customer US EPA Alpha Input Sensitivity 120 mV
 Counter 2360 Serial No. 2639 17 Beta Input Sensitivity 3.5 mV
 Count Time 1 Minute Beta Window 30 mV
 Other _____ Distance Source to Detector Surface

High Voltage	Background		Isotope <u>Pu239</u> Size <u>30900 dpm</u>		Isotope <u>Tc99</u> Size <u>22900 dpm</u>		Isotope <u>Sr90y90</u> Size <u>97539 dpm</u>	
	Alpha	Beta	Alpha	Beta	Alpha	Beta	Alpha	Beta
<u>625</u>	<u>2</u>	<u>43</u>	<u>4297</u>	<u>566</u>	<u>8</u>	<u>1881</u>	<u>0</u>	<u>14668</u>
<u>650</u>	<u>1</u>	<u>63</u>	<u>5765</u>	<u>462</u>	<u>5</u>	<u>3496</u>	<u>1</u>	<u>21160</u>
<u>✓ 675</u>	<u>0</u>	<u>121</u>	<u>6733</u>	<u>422</u>	<u>11</u>	<u>4498</u>	<u>1</u>	<u>26897</u>
<u>700</u>	<u>1</u>	<u>176</u>	<u>7304</u>	<u>1241</u>	<u>4</u>	<u>5369</u>	<u>2</u>	<u>30695</u>
<u>725</u>	<u>3</u>	<u>229</u>	<u>7479</u>	<u>5097</u>	<u>4</u>	<u>6101</u>	<u>5</u>	<u>31981</u>

- Gas Proportional detector count rate decreased ≤ 10% after 15 hour static test using 39" cable.
- Gas proportional detector count rate decreased ≤ 10% after 5 hour static test using 39" cable and alpha/beta counter.

Signature *Diana Oates* Date 22-Sep-09



Designer and Manufacturer
of
Scientific and Industrial
Instruments

Kit # 16R9
CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-467
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER PHOENIX MANAGEMENT

Mfg. Ludlum Measurements, Inc. Model 2241-2 ORDER NO. 20139618/341573
Serial No. 198223
Mfg. Ludlum Measurements, Inc. Model 44-9
Serial No. PR 207349
Cal. Date 15-Sep-09 Cal Due Date 15-Sep-10 Cal. Interval 1 Year Meterface 44-9, cpm

Check mark applies to applicable instr. and/or detector IAW mfg. spec. T. 74 °F RH 58 % Alt 698.8 mm Hg
 New Instrument Instrument Received Within Toler. +-10% 10-20% Out of Tol. Requiring Repair Other-See comments
 Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity
 F/S Resp. ck. Reset ck. Window Operation
 Audio ck. Alarm Setting ck. Batt. ck. (Min. Volt) 2.2 VDC
 Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set Comments V Input Sens. Comments mV Det. Oper Comments V at Comments mV Threshold Dial Ratio = mV

COMMENTS: 44-9 Det.1 44-10 & 43-90 Det.2
Deadtime: 65usec 0usec
Cal. Constant: 100e-2 100e-2
Alarm: 50kcpm 50kcpm
Alert: 20kcpm 20kcpm (Currently set for 44-10. Voltage should be adjusted for 43-90 operation.)
H.V.: 900v (1000v:44-10) (850v:43-90)
Input Sens.: 35mv 10mv
Cs137=lucci checksource sn2208 reads in ratemeter position: Det.1≈17.0kcpm (with protective screen placed against the open sourceholder.), Det.2 (44-10)≈199kcpm (with crystal end placed against the open sourceholder.)
Overload set at 1R/hr with Det.1 (44-9). Firmware: P-0915
Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
Dig.rate			
Dig.rate			

*Uncertainty within ± 10% C.F. within ± 20% Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	Scaler Readout	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
800K cpm	N/A	797 cpm		800K cpm	N/A	79787 (a)
200K cpm		199		200K cpm		19936
80K cpm		79.7		80K cpm		7978
20K cpm		19.9		20K cpm		1943
8K cpm		7.97		8K cpm		797
2K cpm		1.99		2K cpm		199
800 cpm		797 c/p		800 cpm		80
200 cpm		199		200 cpm		20

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of her International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: S-394/1122 1131 781 059 280 60646
 S-137 Gamma S/N 1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304
 Alpha S/N Pu239:8744/365,715dpm Beta S/N Other Am241:0.83uci
 m 500 S/N 949940 Oscilloscope S/N Multimeter S/N 78401031

Calibrated By: Sgt SA Date: 15-Sep-09
Reviewed By: Rhonda Haina Date: 15 Sep 09

Bench Test Data For Alpha Detector

Detector 43-90 Serial No. PR 205935
 Customer PHOENIX MANAGEMENT Order # 20139618/341573
 Counter 2241-2 Serial No. 198223 Counter Input Sensitivity 10 mV
 Count Time 1 minute Distance Source to Detector Surface
 Isotope Pu239:8744/365,715dpm Other _____

Alpha Scintillation Detector

43-4/43-44 HV Adjust for Altitude

Altitude	High Voltage
Sea Level	2050 V
1000 foot	2025 V
2000 foot	2000 V
3000 foot	1975 V
4000 foot	1950 V
5000 foot	1925 V
6000 foot	1900 V
7000 foot	1875 V

HV Plateau	Background	Source Count
700	0	38869
750	0	64514
800	1	71384
850	1	76655
900	1	80810
950	1	82211
1000	2	85335
1050	1	92147
1100	11	97306

Operating Voltage Set at 850 V

Air Proportional	43-5	43-65	43-90	Background	Meter Reading	Range/Scale
Toe	Toe	L/S*	Toe	1	73148	Dig ↓
Center	Center	Center	Center	1	76655	
Heel	Heel	Other**	Heel	1	75487	

Uniformity (± 10%) Average Efficiency 20.53 % 477

* Least Sensitive Position (Heel of Detector)
 ** Opposite Least Sensitive Position (Top of Detector)

Signature [Signature] Date 15-SEP-09



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH. 325-235-5494
501 OAK STREET FAX NO. 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER PHOENIX MANAGEMENT ORDER NO. 20143003/343615
Mfg. Ludlum Measurements, Inc. Model 3030 Serial No. 200379

Cal. Date 27-Oct-09 Cal Due Date 27-Oct-10 Cal. Interval 1 Year
Check mark Applies to applicable instr. and/or detector IAW mfg. spec. T. 73 °F RH 20 % Alt 697.8 mm Hg

New Instrument Instrument Received Within Toler. +-10% 10-20% Out of Tol. Requiring Repair Other-See comments
 Mechanical ck. Window Operation
 Audio ck. Alpha Sensitivity 120 mV Beta Sensitivity 4 mV Beta Window 50 mV

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89.
Instrument Volt Set 525 V High Voltage set with detector connected.
 HV Readout (2 points) Ref./Inst. 500 / 499 V Ref./Inst. 1200 / 1134 V

Instrument in DPM mode.
QC mode turned OFF.
Firmware version: 39013-16
Overload set at 1/4 turn past OFF.
Battery voltage measured at 13.0 Vdc.
C-14 Efficiency = 6.72 % (4 pi) Net

(EEPROM Settings)
(PC) Count Time: 20.0
Alpha Alarm: 999999 cpm
Beta Alarm: 999999 cpm
Alpha/Beta Alarm: 999999 cpm
Calibration Due Date: 10/27/2010
LOC (Loss of Count) time = 30 minutes (default)

Alpha Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	<u>40024(0)</u>	<u>40024(0)</u>
	40K cpm	<u>4003</u>	<u>4003</u>
	4K cpm	<u>400</u>	<u>400</u>
	400 cpm	<u>40</u>	<u>40</u>
	40 cpm	<u>4</u>	<u>4</u>

Beta/Gamma Channel Digital Readout	REFERENCE CAL POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
	400K cpm	<u>40046(0)</u>	<u>40046(0)</u>
	40K cpm	<u>4005</u>	<u>4005</u>
	4K cpm	<u>400</u>	<u>400</u>
	400 cpm	<u>40</u>	<u>40</u>
	40 cpm	<u>4</u>	<u>4</u>

*Uncertainty within ± 10% C.F. within ± 20%

(0) indicates 0.1 minute count

COMMENTS:
Calibrated using customer's sources.

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of other International Standards Organization members, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques.
The calibration system conforms to the requirements of ANSI/NCSL Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources:
 Alpha S/N Th230 s/n 5530-05 Beta S/N Tc99 s/n 5534-05 Other _____
 m 500 S/N 114520 Oscilloscope S/N _____ Multimeter S/N 78401030

Calibrated By: Sebast Coballes Date 27-Oct-09
Reviewed By: Rhonda Hain Date 30 Oct 09

AC Inst. Only Passed Dielectric (Hi-Pot) and Continuity Test
 Failed: _____

ements, Inc.
Parameters

PM

ader 1: EPA
ader 2: Serial#200379
ader 3: San Francisco
ader 4:
ader 5:
ader 6: Sy

alibration Due Date: 10/27/2010

odel 3030 Date: 10/27/2009
odel 3030 Time: 1:51:27 PM

ount Time Switch (min): 1.0
ser PC Time (min): 20.0

lpha Alarm: 999999
eta Alarm: 999999
lpha + Beta Alarm: 999999

igh Voltage (VDC): 525

oss of Count Time (min): 30.0

ount Mode: SCALER

lpha Efficiency %: 33.1
eta Efficiency %: 20.8

ackground Subtract: OFF
lpha Background: 0.0
eta Background: 50.0

rosstalk Correction: OFF
lpha to Beta Crosstalk %: 7.7
eta to Alpha Crosstalk %: 0.1

how Parameters during startup: Enabled

aily QC Check: NOR

ast Alpha Efficiency %: 33
ast Beta Efficiency %: 21

tandard Alpha Efficiency %: 33
tandard Beta Efficiency %: 20

allowable Alpha QC Efficiency ± %: 15
allowable Beta QC Efficiency ± %: 15

Alpha Source Size (dpm): 23100
Alpha Source Size (µCi): 0.01040540541

Beta Source Size (dpm): 21200
Beta Source Size (µCi): 0.00954954955

Last Alpha QC Background: 0.0
Last Beta QC Background: 37.0

Alpha Background Upper Limit (cpm): 3
Alpha Background Lower Limit (cpm): 0
Beta Background Upper Limit (cpm): 50
Beta Background Lower Limit (cpm): 0

Next Sample Number: 0034
User-defined Comment: TEST
Logging Mode: Log All
Recycle Mode: OFF
Printer Mode: OFF

ements, Inc.
Plateau Data

PM

ader 1: EPA
 ader 2: Serial#200379
 ader 3: San Francisco
 ader 4:
 ader 5:
 ader 6: \$y

libration Due Date: 10/27/2010

del 3030 Date: 10/27/2009
 del 3030 Time: 1:41:18 PM

er PC Time: 20.0

pha Isotope: Th230
 pha Source Size (dpm): 23100
 pha Source Size (µCi): 0.010405405

ta Isotope: Tc99
 ta Source Size (dpm): 21200
 ta Source Size (µCi): 0.00954955

arting High Voltage: 500
 arting High Voltage: 550
 gh Voltage Increment: 25

ateau Count Mode: SCALER
 ource Count Time (min): 1.0
 ickground Count Time (min): 1.0

IV	ALPHA		Eff	CrossTalk	BETA		Eff	Crosstalk
	Source (Beta)	Background			Source (Alpha)	Background		
500	7611 (441)	0	32.9%	5.4%	3527 (13)	32	16.5%	0.4%
525	7640 (640)	0	33.1%	7.7%	4449 (5)	50	20.8%	0.1%
550	7784 (814)	0	33.7%	9.8%	5355 (9)	54	25.0%	0.2%

ements, Inc.
MDA Calculation Data

SN 200379

PM

Alpha Background(cpm): 0.0
Beta Background(cpm): 50.0

Alpha Efficiency %: 33.1
Beta Efficiency %: 20.8

Confidence Level: 95%

Count Time	Alpha MDA(dpm)	Beta MDA(dpm)
1	81.9	501.2
5	16.4	219.8
10	8.2	171.2
15	4.1	143.5
20	1.6	125.1
30	0.8	118.6
40	0.1	113.0
5 (1.0)	8.2	171.2



Designer and Manufacturer
of
Scientific and Industrial
Instruments

CERTIFICATE OF CALIBRATION

LUDLUM MEASUREMENTS, INC.
POST OFFICE BOX 810 PH: 325-235-5494
501 OAK STREET FAX NO: 325-235-4672
SWEETWATER, TEXAS 79556, U.S.A.

CUSTOMER **SHILO SERVICES**

ORDER NO. **20146610/345768**

Mfg. **Ludlum Measurements, Inc.** Model **192** Serial No. **215 220**
Mfg. Model Serial No.

Cal. Date **20-Jan-10** Cal Due Date **20-Jan-11** Cal. Interval **1 Year** Meterface **202-333**

check mark applies to applicable instr. and/or detector IAW mfg. spec. T. **71** °F RH **24** % Alt **690.8** mm Hg

New Instrument Instrument Received Within Toler. +-10% 10-20% Out of Tol. Requiring Repair Other-See comments

Mechanical ck. Meter Zeroed Background Subtract Input Sens. Linearity

F/S Resp. ck. Reset ck. Window Operation Geotropism

Audio ck. Alarm Setting ck. Batt. ck. (Min. Volt) **2.2** VDC

Calibrated in accordance with LMI SOP 14.8 rev 12/05/89. Calibrated in accordance with LMI SOP 14.9 rev 02/07/97.

Instrument Volt Set **550** V Input Sens. **33** mV Det. Oper. **V** at **mV** Threshold Dial Ratio = **mV**

HV Readout (2 points) Ref./Inst. **/** V Ref./Inst. **/** V

COMMENTS:

Alarm checked. User adjustable alarm set at midscale/range dependent.

Gamma Calibration: GM detectors positioned perpendicular to source except for M 44-9 in which the front of probe faces source.

RANGE/MULTIPLIER	REFERENCE CAL. POINT	INSTRUMENT REC'D "AS FOUND READING"	INSTRUMENT METER READING*
x1000	4000 µR/hr	3.75	4
x1000	1000 µR/hr	0.95	1
x100	400 µR/hr = 252,000	3.75	4
x100	100 µR/hr	0.95	1
x10	25200 cpm	4	4
x10	6300 cpm	1	1
x1	2520 cpm	4	4
x1	630 cpm	1	1

*Uncertainty within ± 10% C.F. within ± 20%

X10,X1 Range(s) Calibrated Electronically

REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*	Log Scale	REFERENCE CAL. POINT	INSTRUMENT RECEIVED	INSTRUMENT METER READING*
Digital readout						

Ludlum Measurements, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institute of Standards and Technology, or to the calibration facilities of an International Standards Organization member, or have been derived from accepted values of natural physical constants or have been derived by the ratio type of calibration techniques. This calibration system conforms to the requirements of ANSI/NCCLS Z540-1-1994 and ANSI N323-1978. State of Texas Calibration License No. LO-1963

Reference Instruments and/or Sources: S-394/1122 1131 781 059 280 60646
 E-137 Gamma S/N 1162 G112 M565 5105 T1008 T879 E552 E551 720 734 1616 Neutron Am-241 Be S/N T-304

Alpha S/N Beta S/N Other m 500 S/N **94940** Oscilloscope S/N Multimeter S/N **78401031**

Calibrated By **[Signature]** Date **20-Jan-10**

Received By **[Signature]** Date **21 Jan 10**

Portable Instrument Pre-Operational Response Check Sheet

Instrument Model: 192 Serial Number: 215220

Probe Type: NA Serial Number: NA

Instrument Calibration Date: 1/20/10 Calibration Expiration Date: 1/20/11

Check Source ID: Tc-99 5534-05 Background At Time Of Initial Response Check 100

1st Instrument Scale: x10 Reference Reading/Unit: 110 uR/hr -20% 99 +20% 121

2nd Instrument Scale: x100 Reference Reading/Unit: 110 uR/hr -20% 99 +20% 121

3rd Instrument Scale: NA Reference Reading/Unit: NA -20% NA +20% NA

Initial Response Check Performed By:

Amy Stanford
Printed Name


Signature

5/24/10
Date

Date/Time	Bkgd.	Readings in 1 st scale	cpm / 2 nd scale	mrem/hr / 3 rd scale	μR/hr (circle one) 3 rd scale	Issue SAT (√)	Return SAT (√)	Print/Sign
5/24/10 0800	100	110	110	NA	NA	√	√	A. Stanford/ 

Reviewed By: Lawson Bairly Date: 6/1/10

DRAFT

**FIELD SURVEY PLAN
FOR
DISPOSITION OF MATERIALS
IN
NON-RADIOLOGICAL IMPACTED AREAS**

**ANACONDA COPPER COMPANY MINE
YERINGTON, LYONS COUNTY, NEVADA**

**REPA 4, ZONE 3 PRIME CONTRACT #EP-W-07-019
EPA WORK ASSIGNMENT NUMBER 49
TETRA TECH NUS PROJECT NUMBER 112I00321**

**Tetra Tech, Incorporated
900 Trail Ridge Road
Aiken, South Carolina**

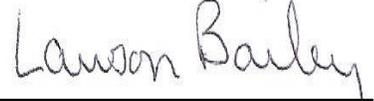
May 2010

PREPARED BY:



**AMY STANFORD
HEALTH PHYSICIST
TETRA TECH, INC.**

REVIEWED BY:



**LAWSON BAILEY
HEALTH PHYSICIST
TETRA TECH, INC.**

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LIST OF ACRONYMS

Anaconda	The Anaconda Company
ARC	Atlantic Richfield Company
Arimetco	Arimetco, Inc.
EPA	Environmental Protection Agency
MARSAME	Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual
NDEP	Nevada Division of Environmental Protection
OU	Operable Unit
USNRC	U.S. Nuclear Regulatory Commission

1.0 Introduction

This plan describes the technical approach and methodology for conducting radiological surveys at the former Anaconda Copper Company Mine, located in Yerington, Lyon County, Nevada. The radiological survey activities will be conducted to determine if residual radioactive material resulting from past operations at the site are present in concentrations detectable above natural background levels on approximately 300 large tires found outside of impacted areas on the site. Data collected during field activities will be used to prepare a radiological assessment report documenting current radiological conditions.

2.0 SITE DESCRIPTION AND BACKGROUND

The Anaconda Copper Mine site covers more than 3,400 acres in the Mason Valley, near the city of Yerington, in Lyon County, central Nevada, approximately 65 miles southeast of Reno. The Singaste Range and the town of Weed Heights lie to the west, open agricultural fields and homes to the north, U.S. Bureau of Land Management (BLM) managed public land to the south, and the Walker River and the city of Yerington to the east. Portions of the site are owned by Arimetco (in bankruptcy) and portions are BLM managed public lands.

Copper was discovered in the Yerington District in 1865, and operations at this mine site began in 1918 as the Empire Nevada Mine. Anaconda purchased the Mine in 1941, and from approximately 1952 to 1978 conducted mining and milling operations at the open-pit, low-grade copper mine. Anaconda processed both copper oxide and copper sulfide ores. They removed the overburden, and dug the ore out of the pit which required pumping water out of the pit to get to the ore. The processing of the copper oxide ore involved large quantities of sulfuric acid, made in an on-site sulfuric acid manufacturing plant. The ore processing created liquid and solid wastes, such as: tailing piles, waste rock areas, liquid waste ponds, leach vats, heap leach pads, and evaporation ponds. Anaconda mining operations generated approximately 360 million tons of ore and debris from the open pit and 15 million tons of overburden resulting in 400 acres of waste rock placed south of the Pit, 900 acres of contaminated tailings, and 300 acres of disposal ponds.

In 1977, Atlantic Richfield Company (ARC) bought Anaconda, but was forced to close Anaconda's copper mining operations in 1978, and all activities were shut down in 1982. When Anaconda operations ceased, groundwater pumping stopped, resulting in the 180 acre Pit Lake. It is now about one mile long, 800 feet deep with 500 feet of water, and contains around 40,000 acre-feet of water which increases at the rate of 10 feet/year.

In 1982, the property was sold to Don Tibbals, who refurbished Weed Heights, conducted some operations, and leased portions of the site to various companies. Following Anaconda's sale of the site, portions of the site were used for extracting copper from the tailing and waste rock piles and as a metal salvage and transformer

recycling facility. Arimetco bought the property from Tibbals in 1988 and pursued leaching operations on the site, eventually building an electrowinning plant and five heap leach pads to produce copper. They used tailings material left by Anaconda and added some new ore resulting in 250 acres of heap leach piles and 12 acres of heap leach solution collection ponds. Arimetco went bankrupt in 1997 and abandoned the site in 2000.

Nearly all rocks, soils, and water contain small amounts of naturally occurring radioactive materials (NORM) such as uranium and thorium. When NORM becomes concentrated from mining and processing operations (e.g. copper), it becomes technologically enhanced naturally occurring radioactive materials (TENORM). TENORM is one of the hazardous materials found at the Yerington site. TENORM is not suspected in the area where the tires are currently stored nor is it suspected that the tires have transited areas with TENORM contamination. All radionuclides of potential concern for the site are listed in Table 2 -1.

The U.S. Environmental Protection Agency (EPA) is conducting investigations and removal actions for hazardous materials found at the site using its authority under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). EPA has established eight Operable Units (OUs) to address the investigation and cleanup of the various components of the site. Each of these OUs will have their own investigation and cleanup plans. The cleanup approaches for the various hazards at the site will be determined after these investigations have been completed and potential risks have been evaluated. In the interim, EPA will determine whether emergency removals or other interim actions are warranted to mitigate immediate hazards.

One such action is a tire pile located on site within the former Anaconda process area. Since the tire pile could pose a threat of fire, the tires need to be removed. The tires were not known to be used in the radiological portion of the impacted area and disposal options (on site or off site) and recycling options are being evaluated. In order to determine which disposal option is appropriate, the tires require a quantitative evaluation of the radioactive hazard present. If it is determined that no radioactive material above release criteria is present, recycling is the most likely option.

**TABLE 2-1
RADIONUCLIDES OF POTENTIAL CONCERN***

Radionuclide	Half Life (years)	Radiation Emitted
Ra-226	1,599	Alpha, Gamma
Ra-228	5.76	Beta, Gamma
Th-230	7.54×10^4	Alpha, Gamma
Th-232	140×10^{10}	Alpha, Gamma
U-234	2.46×10^5	Alpha, Gamma
U-235	7.04×10^8	Alpha, Gamma
U-238	4.47×10^9	Alpha, Gamma

* This list may not be complete or comprehensive at this time, but EPA will establish an official list of contaminants of concern for each OU after remedial investigation activities, including a risk assessment, have been completed.

Figure 2-1
Site Layout



3.0 INITIAL ASSESSMENT OF MATERIAL

The proposed objective of this survey is to characterize the nature and extent of contamination associated with the tire pile. The tires are located within an area impacted for non-radiological hazards, but outside of the portion of the area that was impacted for radiological hazards. The tires were not known to have been used in the radiologically impacted area. Although the tires were never known to be exposed to radioactive materials, representatives of EPA Region 9 have taken a conservative approach and determined that the tires should be surveyed for radioactive contamination in accordance with the Multi-Agency Radiological Survey and Assessment of Material and Equipment Manual (MARSAME NUREG-1575, Supplement 1). MARSAME provides technical guidance for the planning, implementing, and documenting of radiological surveys of large quantities of materials potentially contaminated with residual radioactivity. The materials to be surveyed do not fall directly under the scope of MARSAME because they are not defined by the manual as "impacted," but the guidance found in the manual will be used whenever possible.

As stated in Section 1.0, there are approximately 300 large heavy haul tires to be dispositioned. The tires are approximately 8 feet in diameter. The primary surface of the tire with a potential for contamination would be the treaded portion. The treads would not be porous and only surface activity would need to be quantified. There is a possibility that both fixed and removable radioactive material could be present and the tires will be surveyed for each. The tire pile will be considered one survey unit.

Action levels are amounts of radioactivity that would require a response. Applied to the surveys described in this plan, exceeding the action level would require additional surveys. If the measurement exceeds the release criteria, the material would be removed from consideration for unconditional release without further action (e.g. decontamination). Because of process history specific to the radiologically impacted area adjacent to the tires, release criteria for Natural Uranium found in U.S. Nuclear Regulatory Commission Guide 1.86 (Reg Guide 1.86 - NRC 1974) will be used for these surveys. Table 3-1 lists Reg Guide 1.86 criteria. Surveys will be performed in order to unconditionally release these tires for any use.

**TABLE 3-1
 ACCEPTABLE SURFACE CONTAMINATION LEVELS FROM NRC REG GUIDE 1.86**

NUCLIDE ^a	AVERAGE ^{b c}	MAXIMUM ^{b d}	REMOVABLE ^{b e}
U-nat, U-235, U-238, and associated decay products	5,000 dpm α /100 cm ²	15,000 dpm α /100 cm ²	1,000 dpm α /100 cm
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm ²	300 dpm/100 cm ²	20 dpm/100 cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm ²	3000 dpm/100 cm ²	200 dpm/100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm β - γ /100 cm ²	15,000 dpm β - γ /100 cm ²	1000 dpm β - γ /100 cm

^aWhere surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^bAs used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^cMeasurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

^dThe maximum contamination level applies to an area of not more than 100 cm².

^eThe amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

4.0 SURVEY UNIT CLASSIFICATION

Classification is used to determine the level of survey effort for the disposition survey. The level of survey effort is linked to the potential to exceed release criteria (i.e., classification), and is a graded approach to survey design. Impacted M&E with the highest potential to exceed release criteria (i.e., Class 1) receive the greatest effort for the disposition survey, while M&E with a lower potential to exceed release criteria (i.e., Class 2 or Class 3) require less survey effort. M&E can be subdivided into three classes:

- Class 1: Impacted M&E that have, or had the following: (1) highest potential for, or known, radionuclide concentration(s) or radioactivity above release criteria; (2) highest potential for small areas of elevated radionuclide concentration(s) or radioactivity; and (3) insufficient evidence to support reclassification as Class 2 M&E or Class 3 M&E. Examples of Class 1 M&E include: 1) processing equipment, components, or bulk materials that may have been in direct contact with radioactive materials during operations, 2) processing equipment, components, or bulk materials that may have been affected by a liquid or airborne release, including, for example, inadvertent effects from spills, and 3) M&E that have been cleaned to remove residual radioactivity above release criteria.
- Class 2: impacted M&E that have, or had, (1) low potential for radionuclide concentration(s) or radioactivity above the release criteria; and (2) little or no potential for small areas of elevated radionuclide concentration(s) or radioactivity based on historical information, process knowledge, or preliminary surveys. To justify changing an area's classification from Class 1 to Class 2, the existing data should provide a high degree of confidence that no individual measurement would exceed the release criteria. Examples of M&E that might be classified as Class 2 are electrical panels, water pipe, conduit, ventilation ductwork, structural steel, and other materials that might have come in contact with radioactive materials.
- Class 3: impacted M&E that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the release criteria, based on site operating history or previous radiological surveys. Examples of M&E that might be classified as Class 3 include M&E with very low potential for residual contamination but insufficient information to justify a non-impacted classification.

Based on these definitions, and the historical knowledge of the tires at the Yerington site, a survey unit classification of Class 3 is proposed for this survey.

5.0 MEASUREMENT QUALITY OBJECTIVES

The purpose of the Measurement Quality Objective (MQO) process as described in MARSAME is to determine the uncertainties in measurement methods. Many of these uncertainties are negligible for this survey due to survey protocols, instrument sensitivities and efficiencies, radionuclides of concern, and the comparison of measurements to release criteria as opposed to background.

Because these tires have very little or no potential for exceeding release criteria, a Class 3 Scan-Only survey will be performed. The decision to survey 10% of the entire tire pile comes from MARSAME Class 2 Scan-Only survey guidance. Class 3 Scan-Only surveys can be less than 10%, but 10% will be used for conservatism. Additionally, as in a Class 2 Scan-Only survey, this survey will include random surveys in addition to the biased surveys required for Class 3 Scan-Only, and static (in-situ) surveys have been added to insure the accurate quantification of scan survey results.

Hand held instruments allow for very accurate scanning because the user can compensate for uneven surfaces that would be missed by fixed geometry surveys. Instruments have efficiencies between 16% and 20% and minimum detectable count rates (MDCRs) will be zero because there is no background (or crosstalk) associated with alpha instrumentation.

Release criteria, as well as action levels that apply to the survey effort, are easily seen with field instruments, with no measurement uncertainty. Error that could be caused from source-to-detector distance, scanning too fast, and uneven surfaces being surveyed are compensated for by conservative action levels and follow up static (in-situ) surveys. Results are being compared to the release criteria, not to background, which would cause the need for statistical analysis.

The action levels that ensure adequate surveys are performed on areas with elevated activity, also verify the assumptions for classifying survey units. If these investigation levels are exceeded, an investigation will be performed to verify the initial assumptions for classification and determine the appropriate resolution. These action levels are shown in Table 5-1.

**TABLE 5-1
SURVEY ACTION LEVELS**

Survey Unit Classification	Flag Direct Measurement When:	Flag Scanning Measurement When:
Class 1	> release criteria	> release criteria
Class 2	> 75 % of release criteria	> 75 % of release criteria
Class 3	> 50 % of release criteria	> 50 % of release criteria

6.0 SURVEY INSTRUMENTS

The instruments to be used for this survey are summarized in Tables 6-1. This table lists the standard features and typical operational parameters of each instrument.

6.1 INSTRUMENT CALIBRATION

Field instruments will be calibrated with NIST traceable sources to radiation emission types and energies that provide detection capabilities similar to the isotopes of concern. For example, instruments used for alpha surface scans will be calibrated with Am-241 to ensure conservative detection efficiency with respect to alpha emissions. While Table 6-1 gives typical efficiencies for instruments to be used, the actual efficiencies to be used will be listed on the calibration record for each instrument.

6.2 DAILY RESPONSE CHECKS

Functional tests will be performed on field instruments twice daily when used. Functional tests include visual inspection, battery check, calibration verification, and response checks (background and source). Background and source measurements will be compared with the acceptance range for the instrument and site conditions. Source checks will be performed using depleted Th-230 (alpha emitter) and Tc-99 (beta emitter) check sources, as applicable to each instrument.

**TABLE 6-1
 TYPICAL INSTRUMENT OPERATING PARAMETERS AND SENSITIVITIES**

Measurement Type	Meter Model	Detector Model	Detector Area	Window Thickness	Typical Total Efficiency	Scan Rate	Count Time
Surface In-Situ Measurements (beta)	Ludlum 2221	Ludlum 43-93	Active = 100 cm ² Open = 88 cm ²	1.2 mg/cm ²	20% (Sr/Y-90)	NA	2 min
Surface Scans (beta)	Ludlum 2221	Ludlum 43-93	Active = 100 cm ² Open = 88 cm ²	1.2 mg/cm ²	20% (Sr/Y-90)	2.5 in/sec	NA
Removable Activity (beta)	Ludlum 3030	Ludlum 43-10-1	Active and Open = 20.3 cm ²	0.4 mg/cm ²	26% (Sr/Y-90)	NA	1 min
Surface In-Situ Measurements (beta & gamma)	Ludlum 2241	Ludlum 44-9	Active = 15 cm ² Open = 12 cm ²	1.7 ± 0.3 mg/cm ²	22% (Sr/Y-90)	NA	2 min
Surface Scans (beta & gamma)	Ludlum 2241	Ludlum 44-9	Active = 15 cm ² Open = 12 cm ²	1.7 ± 0.3 mg/cm ²	22% (Sr/Y-90)	2.5 in/sec	NA
Surface In-Situ Measurement (alpha)	Ludlum 2221	Ludlum 43-93	Active = 100 cm ² Open = 88 cm ²	1.2 mg/cm ²	20% (Pu-239)	NA	2 min
Surface Scans (alpha)	Ludlum 2221	Ludlum 43-93	Active = 100 cm ² Open = 88 cm ²	1.2 mg/cm ²	20% (Pu-239)	2.5 in/sec	NA
Removable Activity (alpha)	Ludlum 3030	Ludlum 43-10-1	Active and Open = 20.3 cm ²	0.4 mg/cm ²	37% (Pu-239)	NA	1 min

7.0 MATERIAL SURVEYS

The purpose of the survey will be to determine if the M&E of concern contains residual amounts of radioactivity such that they would require management as low-level waste, or if they could be released for unrestricted use. The survey will be conducted by performing the appropriate combination of scan surveys, static (in-situ) measurements, and removable contamination measurements. Approximately 30 tires (10% of the total) will be surveyed. Due to the size of the tires, the surveys will be performed where the tires are presently located and the representative tires will be selected from tires with accessible surfaces presented for survey.

7.1 BACKGROUND DETERMINATION

After consideration of the materials to be surveyed, it was determined that the best approach for surface surveys would be to determine compliance with the release criteria without consideration of a reference material background. If it is discovered, once on site, that the background is unusually high, a survey of passenger vehicle tires will be performed to determine a background.

7.2 REMOVABLE CONTAMINATION SURVEY

Removable contamination levels on M&E surfaces will be determined by smear sampling. Large area masslin wipes will be performed initially to determine if gross contamination exists. This method is used for personnel safety and to ensure laboratory equipment does not become contaminated. Disc smears (5) will be taken and counted in a Ludlum Model 3030.

7.3 TOTAL SURFACE ACTIVITY SURVEY

Total surface activity is determined with direct scan and static (in-situ) surveys. The tires will be surveyed for total surface activity using a scaler/rate meter with a dual phosphor alpha/beta scintillator probe. Detector efficiencies will be used to convert instrument response (counts per minute [cpm]) to activity (disintegrations per minute [dpm]).

A scan survey of all accessible exterior tire surfaces will be performed. The surface will be scanned with consistent geometry (1/2 inch from the surface being surveyed) with a speed of approximate 1-2 inches per second. Scanning is used to identify locations within the survey unit

that exceed an applicable action level (action levels are listed in Table 5-1). These locations are marked and investigated to determine the concentration, area, and extent of the contamination. Scanning surveys are designed to detect small areas of elevated activity that may not be detected by systematic measurements. Static (in-situ) measurements are taken in locations where contamination was determined to be above action levels. A two minute count with fixed geometry is performed with the instrument scaler function to quantify the radioactivity present. Areas that were found to be below action levels do not require static measurements.

7.4 ELEVATED MEASUREMENT COMPARISON

The surveys described above evaluate whether or not residual radioactivity on M&E could exceed the release criteria for contamination. In addition, there should be a reasonable level of assurance that any small areas of elevated residual radioactivity that could be significant relative to the release criteria were not missed.

Smear counting results will be compared against the "Removable" activity levels for Natural Uranium (U-nat) listed in NRC Regulatory Guide 1.86 as shown in Table 3-2 of this plan. Direct survey activity is compared against the "Total" activity levels for Natural Uranium (U-nat) listed in Table 3-2. Any material found to be above the release criteria stated above will be posted as radioactive material. Additionally, the material will have to be re-evaluated as impacted material.

8.0 DOCUMENTATION

Survey data will be documented on radiological survey maps. Normally, a bound/weatherproof field notebook would be maintained for field activities, but due to the short length of this task, all field information will be documented on the survey map.

The calibration of monitoring equipment is necessary to ensure the proper operation and response of the equipment and to document the accuracy, precision, or sensitivity of the measurements. Each instrument requiring calibration will have its own equipment calibration log documenting the calibration of the equipment, including the frequency and type of standard or calibration procedure. Response checks will be documented using appropriate field records.

At the completion of field activities, copies of all field records and data will be given to the project manager to be entered into the RAC Program document control system in accordance with appropriate administrative guidelines. The original records will be maintained by Tt in accordance with federal regulations. A report will be generated following the completion of field activities for data assessment and material disposition recommendations.

9.0 DECONTAMINATION AND IDW MANAGEMENT

9.1 DECONMTAMINATION OF MATERIALS AND PERSONNEL

MATERIALS

If project materials or instrumentation are found to be contaminated, items must be decontaminated prior to removal from the site. Periodic monitoring using portable radiation detection instruments will be conducted during decontamination. Any activity above background indicates the presence of radiological contamination and decontamination will be performed until readings are below background. All decontamination will be performed under the guidance of the Tt Health Physicist on site.

PERSONNEL

If personnel are found to be contaminated, they must be decontaminated immediately to prevent the further spread of contamination. Periodic monitoring using portable radiation detection instruments will be conducted during decontamination. Any activity above background indicates the presence of radiological contamination and decontamination will be performed until readings are below background. All decontamination will be performed under the guidance of the Tt Health Physicist on site.

9.2 INVESTIGATION-DERIVED WASTE MANAGEMENT

Survey activities should not generate wastes that are radiologically contaminated. If material or personnel are found to be contaminated and/or require decontamination, items such as gloves and swipes with radioactive contaminants would be disposed of as radioactive waste. The Site Project Manager will be contacted for guidance on radioactive waste disposal.

Items that are considered to be "Associated Waste" will be generated. Associated waste is materials that are not actually contaminated, but require special handling to be disposed of as clean waste. Items considered to be associated waste include any material that has a radiological marking, such as radioactive labeling. All associated waste must be shredded prior to disposal as clean waste.

10.0 REFERENCES

Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual (MARSAME), NUREG-1575, Supplement 1, January 2009.

U.S. Nuclear Regulatory Commission, 1974, Termination of Operating Licenses for Nuclear Reactors. Regulatory Guide 1.86. June 1974



Appendix E: Laboratory Data Reports for Asbestos in Air





**United States Environmental Protection Agency
Region 9 Laboratory**

**1337 S. 46th Street Building 201
Richmond, CA 94804**

**Subject: Analytical Testing Results - Project R10S65
SDG: 10141C**

**From: Brenda Bettencourt, Director
EPA Region 9 Laboratory
MTS-2**

**To: Thomas Dunkelman
Emergency Response Section
SFD-9-2**

Attached are the results from the analysis of samples from the **Anaconda Mine 2010 Old Raffinate Pond Sampling** project. These data have been reviewed in accordance with EPA Region 9 Laboratory policy.

A full documentation package for these data, including raw data and sample custody documentation, is on file at the EPA Region 9 Laboratory. If you would like to request additional review and/or validation of the data, please contact Eugenia McNaughton at the Region 9 Quality Assurance Office.

If you have any questions, please ask for Richard Bauer, the Lab Project Manager at (510)412-2300.

Analyses included in this report:

Metals by ICP

pH

pH

Metals by ICP

pH

Percent Solids



United States Environmental Protection Agency

Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804

Phone:(510) 412-2300

Fax:(510) 412-2302

Project Manager: Thomas Dunkelman

Project Number: R10S65

Project: Anaconda Mine 2010 Old Raffinate Pond
Sampling

Emergency Response Section

75 Hawthorne Street

San Francisco CA, 94105

SDG: 10141C

Reported: 06/21/10 11:14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Collected	Date Received
EP-S-01	1005034-01	Waste, Aqueous	05/19/10 09:05	05/21/10 10:15
EP-S-02	1005034-02	Waste, Solid	05/19/10 09:15	05/21/10 10:15
EP-D-01	1005034-03	Waste, Aqueous	05/19/10 09:30	05/21/10 10:15
EP-D-02	1005034-04	Waste, Solid	05/19/10 09:35	05/21/10 10:15

SDG ID 10141C

Work Order(s)

1005034

pH: Samples were re-run past the requested 24-hr hold time because the original run did not include a QC duplicate. Final results with proper QC were not flagged, however, as the samples were found to be classified as waste (ie, not water or soil) and did not require 24-hr hold time.



United States Environmental Protection Agency Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman Project Number: R10S65 Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	Emergency Response Section 75 Hawthorne Street San Francisco CA, 94105	SDG: 10141C Reported: 06/21/10 11:14
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Sample Results

Analyte	Reanalysis / Extract	Result	Qualifiers / Comments	Quantitation Limit	Units	Batch	Prepared	Analyzed	Method
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Lab ID: 1005034-01

Waste, Aqueous - Sampled: 05/19/10 09:05

Sample ID: EP-S-01

Metals by EPA 200 Series Methods

Antimony		ND	U	200	ug/L	B0E0103	05/26/10	06/04/10	200.7/SOP505
Arsenic		ND	U	200	"	"	"	06/05/10	200.7/SOP505
Barium		ND	U	100	"	"	"	06/04/10	200.7/SOP505
Beryllium		1,400		10	"	"	"	"	200.7/SOP505
Cadmium		170		50	"	"	"	"	200.7/SOP505
Chromium		2,300		100	"	"	"	"	200.7/SOP505
Cobalt		55,000		100	"	"	"	"	200.7/SOP505
Copper		4,400,000		2,000	"	"	"	06/01/10	200.7/SOP505
Lead		1,400		800	"	"	"	06/04/10	200.7/SOP505
Molybdenum		ND	U	2,000	"	"	"	06/04/10	200.7/SOP505
Nickel		33,000		100	"	"	"	06/04/10	200.7/SOP505
Selenium		240		200	"	"	"	"	200.7/SOP505
Silver		ND	U	100	"	"	"	"	200.7/SOP505
Thallium		770		400	"	"	"	06/04/10	200.7/SOP505
Vanadium		51	C1, J	100	"	"	"	06/04/10	200.7/SOP505
Zinc		64,000		2,000	"	"	"	06/01/10	200.7/SOP505

Sample ID: EP-S-01

Conventional Chemistry Parameters by APHA/EPA Methods

pH	RE1	2.2		0.10	pH Units	B0E0101	05/25/10	05/25/10	SM4500-H+/SOP 580
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Lab ID: 1005034-02

Waste, Solid - Sampled: 05/19/10 09:15

Sample ID: EP-S-02

Metals by EPA 6000/7000 Series Methods

Antimony		ND	U	3.3	mg/kg dry	B0E0111	05/27/10	06/07/10	6010C/SOP503
Arsenic		ND	U	3.3	"	"	"	"	6010C/SOP503
Barium		ND	J, Q4, U	8.2	"	"	"	"	6010C/SOP503
Beryllium		1.7		0.16	"	"	"	"	6010C/SOP503
Cadmium		0.43	C1, J	0.82	"	"	"	"	6010C/SOP503
Chromium		5.6		1.6	"	"	"	"	6010C/SOP503
Cobalt		130		3.3	"	"	"	"	6010C/SOP503
Copper		5,700		6.6	"	"	"	"	6010C/SOP503
Lead		ND	U	4.9	"	"	"	"	6010C/SOP503
Molybdenum		ND	J, Q4, U	8.2	"	"	"	"	6010C/SOP503
Nickel		83		8.2	"	"	"	"	6010C/SOP503
Selenium		ND	U	3.3	"	"	"	"	6010C/SOP503
Silver		ND	U	1.6	"	"	"	"	6010C/SOP503
Thallium		ND	U	8.2	"	"	"	"	6010C/SOP503
Vanadium		ND	U	3.3	"	"	"	"	6010C/SOP503
Zinc		120		13	"	"	"	"	6010C/SOP503

Sample ID: EP-S-02

Conventional Chemistry Parameters by APHA/EPA Methods

pH	RE1	2.5		0.10	pH Units	B0E0102	05/25/10	05/25/10	9040C/9045D/SOP58:
% Solids		57		1	%	B0F0014	06/03/10	06/04/10	3550C/SOP460



United States Environmental Protection Agency Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone: (510) 412-2300 Fax: (510) 412-2302

Project Manager: Thomas Dunkelman Project Number: R10S65 Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	Emergency Response Section 75 Hawthorne Street San Francisco CA, 94105	SDG: 10141C Reported: 06/21/10 11:14
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Sample Results

Analyte	Reanalysis / Extract	Result	Qualifiers / Comments	Quantitation Limit	Units	Batch	Prepared	Analyzed	Method
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Lab ID: 1005034-03

Waste, Aqueous - Sampled: 05/19/10 09:30

Sample ID: EP-D-01

Metals by EPA 200 Series Methods

Antimony		ND	U	200	ug/L	B0E0103	05/26/10	06/04/10	200.7/SOP505
Arsenic		ND	U	200	"	"	"	06/05/10	200.7/SOP505
Barium		ND	U	100	"	"	"	06/04/10	200.7/SOP505
Beryllium		1,400		10	"	"	"	"	200.7/SOP505
Cadmium		180		50	"	"	"	"	200.7/SOP505
Chromium		2,400		100	"	"	"	"	200.7/SOP505
Cobalt		55,000		100	"	"	"	"	200.7/SOP505
Copper		4,600,000		2,000	"	"	"	06/01/10	200.7/SOP505
Lead		1,400		800	"	"	"	06/04/10	200.7/SOP505
Molybdenum		ND	U	2,000	"	"	"	06/04/10	200.7/SOP505
Nickel		33,000		100	"	"	"	06/04/10	200.7/SOP505
Selenium		140	C1, J	200	"	"	"	"	200.7/SOP505
Silver		ND	U	100	"	"	"	"	200.7/SOP505
Thallium		740		400	"	"	"	06/04/10	200.7/SOP505
Vanadium		ND	U	100	"	"	"	06/04/10	200.7/SOP505
Zinc		67,000		2,000	"	"	"	06/01/10	200.7/SOP505

Sample ID: EP-D-01

Conventional Chemistry Parameters by APHA/EPA Methods

pH	RE1	2.2		0.10	pH Units	B0E0101	05/25/10	05/25/10	SM4500-H+/SOP 580
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Lab ID: 1005034-04

Waste, Solid - Sampled: 05/19/10 09:35

Sample ID: EP-D-02

Metals by EPA 6000/7000 Series Methods

Antimony		ND	U	7.2	mg/kg dry	B0E0111	05/27/10	06/07/10	6010C/SOP503
Arsenic		ND	U	7.2	"	"	"	"	6010C/SOP503
Barium		ND	U	18	"	"	"	"	6010C/SOP503
Beryllium		2.1		0.36	"	"	"	"	6010C/SOP503
Cadmium		ND	U	1.8	"	"	"	"	6010C/SOP503
Chromium		7.1		3.6	"	"	"	"	6010C/SOP503
Cobalt		180		7.2	"	"	"	"	6010C/SOP503
Copper		6,000		14	"	"	"	"	6010C/SOP503
Lead		ND	U	11	"	"	"	"	6010C/SOP503
Molybdenum		ND	U	18	"	"	"	"	6010C/SOP503
Nickel		110		18	"	"	"	"	6010C/SOP503
Selenium		ND	U	7.2	"	"	"	"	6010C/SOP503
Silver		ND	U	3.6	"	"	"	"	6010C/SOP503
Thallium		ND	U	18	"	"	"	"	6010C/SOP503
Vanadium		ND	U	7.2	"	"	"	"	6010C/SOP503
Zinc		150		29	"	"	"	"	6010C/SOP503

Sample ID: EP-D-02

Conventional Chemistry Parameters by APHA/EPA Methods

pH	RE1	1.7		0.10	pH Units	B0E0102	05/25/10	05/25/10	9040C/9045D/SOP58:
% Solids		52		1	%	B0F0014	06/03/10	06/04/10	3550C/SOP460



United States Environmental Protection Agency
Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman	Emergency Response Section	SDG: 10141C
Project Number: R10S65	75 Hawthorne Street	Reported: 06/21/10 11:14
Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	San Francisco CA, 94105	

Sample Results

Analyte	Reanalysis / Extract	Result	Qualifiers / Comments	Quantitation Limit	Units	Batch	Prepared	Analyzed	Method
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Lab ID: 1005034-04

Waste, Solid - Sampled: 05/19/10 09:35



United States Environmental Protection Agency Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman Project Number: R10S65 Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	Emergency Response Section 75 Hawthorne Street San Francisco CA, 94105	SDG: 10141C Reported: 06/21/10 11:14
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Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0101 -- General Inorganic - pH by 150.1

Prepared & Analyzed: 05/25/10

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Duplicate (B0E0101-DUP1)		Source: 1005034-01RE1								
pH	2.17			0.1	pH Units		2.18		0.5	20

Reference (B0E0101-SRM1)

pH	7.02				pH Units	7.00		100	98.6-101.4	
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Batch B0E0102 -- Water Extract Inorg - pH by 9000 series

Prepared & Analyzed: 05/25/10

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Duplicate (B0E0102-DUP1)		Source: 1005034-02RE1								
pH	2.5			0.1	pH Units		2.54		2	20

Reference (B0E0102-SRM1)

pH	7.02				pH Units	7.00		100	98.6-101.4	
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Batch B0E0103 - 200 Series Digest - Metals by 200.7

Prepared: 05/26/10 Analyzed: 06/01/10

Metals by EPA 200 Series Methods - Quality Control

Blank (B0E0103-BLK1)

Aluminum	ND	U		100	ug/L					
Antimony	ND	U		20	"					
Arsenic	ND	U		20	"					
Barium	ND	U		10	"					
Beryllium	ND	U		1	"					
Boron	ND	U		100	"					
Cadmium	ND	U		5	"					
Calcium	ND	U		100	"					
Chromium	ND	U		10	"					
Cobalt	ND	U		10	"					
Copper	ND	U		10	"					
Iron	ND	U		100	"					
Lead	ND	U		20	"					
Lithium	ND	U		5	"					
Magnesium	ND	U		500	"					
Manganese	ND	U		5	"					
Molybdenum	ND	U		20	"					
Nickel	ND	U		10	"					
Potassium	ND	U		2,000	"					
Selenium	ND	U		20	"					
Silica (SiO2)	ND	U		500	"					
Silver	ND	U		10	"					
Sodium	ND	U		500	"					
Thallium	ND	U		20	"					
Vanadium	ND	U		10	"					
Zinc	ND	U		10	"					

LCS (B0E0103-BS1)

Aluminum	2,020			100	ug/L	2000		101	85-115		200
Antimony	838			20	"	800		105	85-115		200



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Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0103 - 200 Series Digest - Metals by 200.7

Prepared: 05/26/10 Analyzed: 06/05/10
Metals by EPA 200 Series Methods - Quality Control

LCS (B0E0103-BS1)

Arsenic	844		20	"	800		105	85-115		200
Barium	200		10	"	200		100	85-115		200
Beryllium	200		1	"	200		100	85-115		200
Boron	298		100	"	300		99	85-115		200
Cadmium	203		5	"	200		101	85-115		200
Calcium	975		100	"	1000		98	85-115		200
Chromium	402		10	"	400		101	85-115		200
Cobalt	199		10	"	200		99	85-115		200
Copper	299		10	"	300		100	85-115		200
Iron	3,060		100	"	3000		102	85-115		200
Lead	1,010		20	"	1000		101	85-115		200
Lithium	208		5	"	200		104	85-115		200
Magnesium	1,990		500	"	2000		100	85-115		200
Manganese	206		5	"	200		103	85-115		200
Molybdenum	402		20	"	400		101	85-115		200
Nickel	521		10	"	500		104	85-115		200
Potassium	10,100		2,000	"	10000		101	85-115		200
Selenium	2,140		20	"	2000		107	85-115		200
Silica (SiO2)	2,040		500	"	2000		102	85-115		200
Silver	75.1		10	"	75.0		100	85-115		200
Sodium	3,130		500	"	3000		104	85-115		200
Thallium	2,000		20	"	2000		100	85-115		200
Vanadium	296		10	"	300		99	85-115		200
Zinc	203		10	"	200		102	85-115		200

Matrix Spike (B0E0103-MS4)

Source: 1005034-01

Antimony	6,550		200	ug/L	8000	ND	82	70-130		20
Arsenic	7,180		200	"	8000	ND	90	70-130		20
Barium	1,620		100	"	2000	ND	81	70-130		20
Beryllium	3,030		10	"	2000	1,370	83	70-130		20
Cadmium	1,650		50	"	2000	174	74	70-130		20
Chromium	5,360		100	"	4000	2,340	76	70-130		20
Cobalt	55,100	Q10	100	"	2000	55,300	NR	70-130		20
Copper	4,250,000	Q10	2,000	"	3000	4,360,000	NR	70-130		20
Lead	10,700		800	"	10000	1,400	93	70-130		20
Molybdenum	4,330		2,000	"	4000	ND	108	70-130		20
Nickel	36,100	Q10	100	"	5000	33,200	57	70-130		20
Selenium	19,300		200	"	20000	237	95	70-130		20
Silver	621		100	"	750	ND	83	70-130		20
Thallium	17,200		400	"	20000	772	82	70-130		20
Vanadium	2,430		100	"	3000	50.6	79	70-130		20
Zinc	63,600	Q10	2,000	"	2000	63,500	6	70-130		20



United States Environmental Protection Agency Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman Project Number: R10S65 Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	Emergency Response Section 75 Hawthorne Street San Francisco CA, 94105	SDG: 10141C Reported: 06/21/10 11:14
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Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0103 - 200 Series Digest - Metals by 200.7

Prepared: 05/26/10 Analyzed: 06/04/10

Matrix Spike Dup (B0E0103-MSD4)

Source: 1005034-01

Metals by EPA 200 Series Methods - Quality Control

Antimony	6,680			200 ug/L	8000	ND	83	70-130	2	20
Arsenic	7,090			200 "	8000	ND	89	70-130	1	20
Barium	1,600			100 "	2000	ND	80	70-130	1	20
Beryllium	3,010			10 "	2000	1,370	82	70-130	0.6	20
Cadmium	1,670			50 "	2000	174	75	70-130	1	20
Chromium	5,440			100 "	4000	2,340	77	70-130	1	20
Cobalt	55,000	Q10		100 "	2000	55,300	NR	70-130	0.3	20
Copper	4,560,000	Q10		2,000 "	3000	4,360,000	NR	70-130	7	20
Lead	10,700			800 "	10000	1,400	93	70-130	0.1	20
Molybdenum	4,600			2,000 "	4000	ND	115	70-130	6	20
Nickel	36,000	Q10		100 "	5000	33,200	55	70-130	0.2	20
Selenium	19,600			200 "	20000	237	97	70-130	1	20
Silver	626			100 "	750	ND	84	70-130	0.9	20
Thallium	17,200			400 "	20000	772	82	70-130	0.03	20
Vanadium	2,410			100 "	3000	50.6	79	70-130	0.7	20
Zinc	68,000	Q10		2,000 "	2000	63,500	226	70-130	7	20

Batch B0E0111 - 3050B Sld Acid Dig - Metals by 6010

Prepared: 05/27/10 Analyzed: 06/07/10

Blank (B0E0111-BLK1)

Metals by EPA 6000/7000 Series Methods - Quality Control

Antimony	ND	U		2 mg/kg wet						
Arsenic	ND	U		2 "						
Barium	ND	U		5 "						
Beryllium	ND	U		0.1 "						
Cadmium	ND	U		0.5 "						
Chromium	ND	U		1 "						
Cobalt	ND	U		2 "						
Copper	ND	U		4 "						
Lead	ND	U		3 "						
Molybdenum	ND	U		5 "						
Nickel	ND	U		5 "						
Selenium	ND	U		2 "						
Silver	ND	U		1 "						
Thallium	ND	U		5 "						
Vanadium	ND	U		2 "						
Zinc	ND	U		8 "						

Matrix Spike (B0E0111-MS1)

Source: 1005034-02

Antimony	130			3.3 mg/kg dry	166	ND	79	75-125		20
Arsenic	509			3.3 "	662	ND	77	75-125		20
Barium	449			17 "	662	ND	68	75-125		20
Beryllium	16.7			0.33 "	16.6	1.71	91	75-125		20



United States Environmental Protection Agency Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone: (510) 412-2300 Fax: (510) 412-2302

Project Manager: Thomas Dunkelman Project Number: R10S65 Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	Emergency Response Section 75 Hawthorne Street San Francisco CA, 94105	SDG: 10141C Reported: 06/21/10 11:14
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Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0111 - 3050B Sld Acid Dig - Metals by 6010

Prepared: 05/27/10 Analyzed: 06/07/10

Metals by EPA 6000/7000 Series Methods - Quality Control

Matrix Spike (B0E0111-MS1)

Source: 1005034-02

Cadmium	13		0.83	"	16.6	0.427	76	75-125		20
Chromium	56		1.7	"	66.2	5.62	76	75-125		20
Cobalt	302		6.6	"	166	133	102	75-125		20
Copper	6,260	Q10	13	"	82.8	5,670	711	75-125		20
Lead	126		5	"	166	ND	76	75-125		20
Molybdenum	123		8.3	"	166	ND	74	75-125		20
Nickel	213		8.3	"	166	83.2	79	75-125		20
Selenium	500		3.3	"	662	ND	75	75-125		20
Silver	13.2		1.7	"	16.6	ND	80	75-125		20
Thallium	508		8.3	"	662	ND	77	75-125		20
Vanadium	132		3.3	"	166	ND	80	75-125		20
Zinc	296		26	"	166	124	103	75-125		20

Matrix Spike Dup (B0E0111-MSD1)

Source: 1005034-02

Antimony	133		3.5	mg/kg dry	170	ND	78	75-125	2	20
Arsenic	524		3.5	"	681	ND	77	75-125	3	20
Barium	471		18	"	681	ND	69	75-125	5	20
Beryllium	16.9		0.35	"	17.0	1.71	89	75-125	1	20
Cadmium	13.4		0.88	"	17.0	0.427	76	75-125	3	20
Chromium	57.6		1.8	"	68.1	5.62	76	75-125	3	20
Cobalt	312		7	"	170	133	105	75-125	3	20
Copper	6,530	Q10	14	"	85.2	5,670	1000	75-125	4	20
Lead	129		5.3	"	170	ND	76	75-125	3	20
Molybdenum	125		8.8	"	170	ND	73	75-125	2	20
Nickel	225		8.8	"	170	83.2	83	75-125	5	20
Selenium	512		3.5	"	681	ND	75	75-125	3	20
Silver	13.4		1.8	"	17.0	ND	79	75-125	2	20
Thallium	523		8.8	"	681	ND	77	75-125	3	20
Vanadium	132		3.5	"	170	ND	78	75-125	0.4	20
Zinc	305		28	"	170	124	106	75-125	3	20

Reference (B0E0111-SRM1)

Antimony	216		2	mg/kg wet	213		102	60.75-140		
Arsenic	978		2	"	930		105	65.98-134		
Barium	5.6		5	"	5.30		106	47.17-153		
Beryllium	19.2		0.1	"	18.8		102	81.38-118		
Cadmium	38.5		0.5	"	41.6		93	77.16-123		
Chromium	100		1	"	96.5		104	80.06-119		
Cobalt	134		2	"	140		96	82.42-118		
Copper	6,460		20	"	6680		97	85.73-114		
Lead	197		3	"	224		88	74.82-125		
Nickel	55.3		5	"	56.8		97	76.58-123		



**United States Environmental Protection Agency
Region 9 Laboratory**

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman	Emergency Response Section	SDG: 10141C
Project Number: R10S65	75 Hawthorne Street	Reported: 06/21/10 11:14
Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	San Francisco CA, 94105	

Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0111 - 3050B Sld Acid Dig - Metals by 6010

Prepared: 05/27/10 Analyzed: 06/07/10

Metals by EPA 6000/7000 Series Methods - Quality Control

Reference (B0E0111-SRM1)

Selenium	48.4			2 "	37.0		131	47.57-152		
Silver	24.6			1 "	20.9		118	63.16-136		
Thallium	33.8			5 "	38.1		89	64.57-135		
Vanadium	71			2 "	65.8		108	80.55-119		
Zinc	177			8 "	175		101	72.97-127		

Batch B0F0014 - Solids, Dry Weight (Prep) - Solids, Dry Weight

Prepared: 06/03/10 Analyzed: 06/04/10

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Blank (B0F0014-BLK1)

% Solids	ND	U		1 %						
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Duplicate (B0F0014-DUP1)

Source: 1005034-02

% Solids	55			1 %		57			4	20
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United States Environmental Protection Agency
Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman

Project Number: R10S65

Project: Anaconda Mine 2010 Old Raffinate Pond
Sampling

Emergency Response Section

75 Hawthorne Street

San Francisco CA, 94105

SDG: 10141C

Reported: 06/21/10 11:14

Qualifiers and Comments

Q4 The matrix spike and/or matrix spike duplicate associated with this sample did not meet recovery criteria for this analyte (see MS/MSD results for this batch in QC summary)

Q10 The analyte concentration in the unfortified sample is significantly greater than the concentration spiked into the matrix spike and matrix spike duplicate. The reported spike recovery is not a meaningful measure of the dataset's analytical accuracy.

J The reported result for this analyte should be considered an estimated value.

C1 The reported concentration for this analyte is below the quantitation limit.

U Not Detected

NR Not Reported

RE1, RE2, etc: Result is from a sample re-analysis.

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: <u>101634</u> Report No: <u>137736</u> Client: <u>EPA</u> Address: <u>1337 S 46TH ST, BLDG 210</u> <u>RICHMOND, CA 94804</u>	Attention: <u>H EDWARDS</u> Project: <u>ANACONDA REMOVAL</u> File Name: <u>137736EPA.AIR</u>	Filter Type/Size: <u>MCE/25mm</u> Filter Area (sqmm): <u>385</u> Field Area (sqmm): <u>0.00785</u> Mag: <u>400x</u>
Date Sampled: <u>5-13-10</u> Date Received: <u>5-14-10</u> Date Analyzed: <u>5-20-10</u>		

Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
BK-05112010-01	100	4.5	6	2207	2658.0	<0.0010	0.0010	0.0148	0.0002
BK-05112010-02	100	1	1	490	2646.0	<0.0010	0.0010	0.0148	0.0002
BK-05112010-03	100	0	0	0	3018.0	<0.0009	0.0009	0.0130	0.0002
BK-05112010-04	100	3	4	1471	4036.0	<0.0007	0.0007	0.0097	0.0001
BK-05112010-05	100	1	1	490	2336.0	<0.0012	0.0012	0.0168	0.0002
BK-05112010-06	100	1	1	490	3203.0	<0.0008	0.0008	0.0122	0.0002

N.A. = Not Applicable
 Note: NIOSH 7400 requires 2 field blanks or 10% of the set which ever is greater
 Results have been corrected for the field blank or EMS blank if the analyte is detected in the blank
 Samples were received in good condition unless otherwise noted.
 Result only pertain to items actually tested.

f/cc = Fibers per cubic centimeter
 LOD = LIMIT OF DETECTION (5.5 fiber/100 field)
 LOQ = LIMIT OF QUANTITATION (80 fiber/100 field)
 A. S. = ANALYTICAL SENSITIVITY (1 fiber/100 field)
 INTRA-LABORATORY Sr = 0.198

AIHA Registered Asbestos Analyst
CARL BERGMAN
 I.D. 7795

 B. M. Kolk, Laboratory Director



Laboratory Submittal Form

137736

Date:	Time:	Relinquished by:
Client: Environmental Protection Agency	Date of Shipment:	
Address: 1337 S. 46th St., Bldg 201	Shipped from:	Carrier:
Richmond, CA 94804	Client P.O. No: 002693.2080.01RP	
Telephone: 415-264-9962	Client Project ID: ANACONDA REMOVAL	
Contact:		

Results via: Fax No: Email address: hedwards@ene.com Verbal
 (Complete written reports will follow all analyses, in addition to any prior verbal, fax, or email results)

Turnaround Time: Standard	Sample Preservatives:
Number of Samples: 6	Sampler's Name:
Date & Time of Sample Collection:	Holding Times: Signature:
Type: <input type="checkbox"/> Water <input type="checkbox"/> Waste Water <input type="checkbox"/> Soil	<input type="checkbox"/> Filter <input type="checkbox"/> Impinger <input type="checkbox"/> Sorbent Tube <input type="checkbox"/> Other

EMS Only	Sample ID	Analysis	Volume/Weight
137736-01	BK-05112010-01		
2	BK-05112010-02		
3	BK-05112010-03		
4	BK-05112010-04		
5	BK-05112010-05		
6	BK-05112010-06		
7	SEE ATTACHMENT		
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			

Laboratory Number: 137736	Received by: <i>[Signature]</i>	Time: 9:35
Date of Package Delivery: 5/14/2010	Shipping Bill Retained? yes	
Condition of Package on Receipt: OK	Condition of Custody Seal: NONE	
Number of Samples: 6	Chain of Custody Signature:	
Disposition of Samples: EMS LABS	Misc. Info: SF 7/06	

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: 101634	Filter Type/Size: MCE/25mm	Mag: 400x
Report No: 137767	Filter Area (sqmm): 385	
Client: ECOLOGY & ENVIRONMENTAL	Field Area (sqmm): 0.00785	
Address: 3708 INDUSTRY AVE, STE. 102		
LAKEWOOD, CA 90712		
Attention: H EDWARDS	Date Sampled: 5-13-10	
Project: ANACONDA REMOVAL	Date Received: 5-17-10	
File Name: 13776TECO&ENVIR.AIR	Date Analyzed: 5-21-10	

Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
A-05132010-01	100	3.5	4	1717	4715.0	<0.0006	0.0006	0.0083	0.0001
A-05132010-02	100	4	5	1962	4704.0	<0.0006	0.0006	0.0083	0.0001
A-05132010-03	100	3	4	1471	4743.0	<0.0006	0.0006	0.0083	0.0001
A-05132010-03D	100	2	3	981	4743.0	<0.0006	0.0006	0.0083	0.0001
A-05132010-04	100	3.5	4	1717	4593.0	<0.0006	0.0006	0.0085	0.0001
A-05132010-05	100	1.5	2	736	4565.0	<0.0006	0.0006	0.0086	0.0001
A-05132010-06	100	3	4	1471	4317.0	<0.0006	0.0006	0.0091	0.0001
FB-05132010	100	0	0	0		N.A.			
BB-05132010	100	0	0	0		N.A.			

N.A. = Not Applicable
 f/cc = Fibers per cubic centimeter
 LOD = LIMIT OF DETECTION (5.5 fiber/100 field)
 LOQ = LIMIT OF QUANTITATION (80 fiber/100 field)
 A. S. = ANALYTICAL SENSITIVITY (1 fiber/100 field)
 INTRA-LABORATORY Sr = 0.198

AIHA Registered Asbestos Analyst
CARL BERGMAN

 I.D. 7795
 B. M. Kolk, Laboratory Director

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: 101634
Report No: 137801
Client: ECOLOGY & ENVIRONMENTAL
Address: 3708 INDUSTRY AVE, STE. 102
 LAKEWOOD, CA 90712
Attention: M TYMKOW
Project: ANACONDA REMOVAL
File Name: 137801ECO&ENVIR-AIRI
Date Sampled: 5-14-10
Date Received: 5-18-10
Date Analyzed: 5-19-10
Filter Type/Size: MCE/25mm
Filter Area (sqmm): 385
Field Area (sqmm): 0.00785
Mag: 400x

Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
BB-0514-2010	100	0	0	0		N.A.	ERR	ERR	ERR
FB-0514-2010-01	100	0	0	0		N.A.	ERR	ERR	ERR
FB-0514-2010-02	100	0	0	0		N.A.	ERR	ERR	ERR
A-05142010-01	100	3	4	1471	4980.0	<0.0005	0.0005	0.0079	0.0001
A-05142010-01D	100	3	4	1471	4980.0	<0.0005	0.0005	0.0079	0.0001
A-05142010-02	100	2.5	3	1226	4970.0	<0.0005	0.0005	0.0079	0.0001
A-05142010-03	100	1	1	490	2497.0	<0.0011	0.0011	0.0157	0.0002
A-05142010-04	100	1	1	490	4939.0	<0.0005	0.0005	0.0079	0.0001
A-05142010-05	100	2	3	981	4809.0	<0.0006	0.0006	0.0082	0.0001
A-05142010-06	100	1	1	490	4805.0	<0.0006	0.0006	0.0082	0.0001

N.A. = Not Applicable
 N.D. = None Detected
 Note: NIOSH 7400 requires 2 field blanks or 10% of the set which ever is greater
 Results have been corrected for the field blank or EMS blank if the analyte is detected in the blank
 Samples were received in good condition unless otherwise noted.
 Result only pertain to items actually tested.

f/cc = Fibers per cubic centimeter
 LOD = LIMIT OF DETECTION (5.5 fiber/100 field)
 LOQ = LIMIT OF QUANTITATION (80 fiber/100 field)
 A. S. = ANALYTICAL SENSITIVITY (1 fiber/100 field)
 INTRA-LABORATORY Sr = 0.198

AIHA Registered Asbestos Analyst
CARL BERGMAN

 I.D. 7795
 B. M. Kolk, Laboratory Director

SUBMITTAL FORM/Laboratory Services

137801

TURNAROUND TIME: STD 48 HR. 24 HR.
 <8 HR. WKND OTHER:

RELINQUISHED BY _____
 TIME / DATE _____

CLIENT Ecology & Environmental
 ADDRESS 3700 Industry Ave Ste. 102
Lakewood, CA 90712
 TELEPHONE 415-264-9112
 CONTACT Maggie Tymfow

DATE OF SHIPMENT _____ CARRIER _____
 CLIENT P.O. NO. _____
 CLIENT JOB/PROJECT ID NO(S) DD21093.2000
OIRP - Anaconda Removal
 PACKAGE SHIPPED FROM _____

RESULTS REQUESTED VIA VERBAL FAX E-MAIL E-MAIL hedwards@ene.com
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal, fax or e-mail results) FAX NO. _____

DATE/TIME OF SAMPLE COLLECTION 5-14-10 @ 0756 → 0833
 SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 NO. OF SAMPLES SENT 10 SAMPLER'S NAME _____
 TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____

(FOR EMS ONLY)

EMS Sample No. 137801-

CLIENT SAMPLE NO. DESCRIPTION/LOCATION/ANALYSIS VOLUME TIME WEIGHT (IF APPLICABLE)

CLIENT SAMPLE NO.	DESCRIPTION/LOCATION/ANALYSIS	VOLUME	TIME	WEIGHT (IF APPLICABLE)
BB-0514-2010				
FB-0514-2010-01				
FB-0514-2010-02				
A-05142010-01	See attachment			
A-05142010-01D				
A-05142010-02				
A-05142010-03				
A-05142010-04				
A-05142010-05				
A-05142010-06				

137801

Laboratory No. _____ Received By [Signature] Time 9:52

Date of Package Delivery 5.19.10 Shipping Bill Retained: YES NONE

Condition of Package on Receipt OK Condition of Custody Seal _____
 (NOTE: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.)

No. of Samples 10 Chain-of-Custody Signature _____

Date of Acceptance into Sample Bank 5.19.10 Misc. Info. _____

Disposition of Samples EMS

FOR EMS ONLY (SF 6/07)

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: 101634
 Report No: 137819
 Client: ECOLOGY & ENVIRONMENTAL
 Address: 3708 INDUSTRY AVE, STE. 102
LAKEWOOD, CA 90712

Attention: H EDWARDS
 Project: ANACONDA REMOVAL
 File Name: 137819ECO&ENVIR-AIR

Date Sampled: 5-17-10
 Date Received: 5-19-10
 Date Analyzed: 5-20-10

Filter Type/Size: MCE/25mm
 Filter Area (sqmm): 385
 Field Area (sqmm): 0.00785
 Mag: 400x

Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
A-05172010-01	100	3	4	1471	4838.0	<0.0006	0.0006	0.0081	0.0001
A-05172010-01D	100	2	3	981	4814.0	<0.0006	0.0006	0.0082	0.0001
A-05172010-02	100	2	3	981	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05172010-03	100	1	1	490	4728.0	<0.0006	0.0006	0.0083	0.0001
A-05172010-04	100	0.5	1	245	4742.0	<0.0006	0.0006	0.0083	0.0001
A-05172010-05	100	2	3	981	4714.0	<0.0006	0.0006	0.0083	0.0001
A-05172010-06	100	1	1	490	4824.0	<0.0006	0.0006	0.0081	0.0001
BB-05172010	100	0	0	0		N.A.			
FB-05172010-01	100	0	0	0		N.A.			
FB-05172010-02	100	0	0	0		N.A.			

N.A. = Not Applicable
 Note: NIOSH 7400 requires 2 field blanks or 10% of the set which ever is greater
 Results have been corrected for the field blank or EMS blank if the analyte is detected in the blank
 Samples were received in good condition unless otherwise noted.
 Result only pertain to items actually tested.

f/cc = Fibers per cubic centimeter
 LOD = LIMIT OF DETECTION (5.5 fiber/100 field)
 LOQ = LIMIT OF QUANTITATION (80 fiber/100 field)
 A. S. = ANALYTICAL SENSITIVITY (1 fiber/100 field)
 INTRA-LABORATORY Sr = 0.198

AIHA Registered Asbestos Analyst
 CARL BERGMAN
 I.D. 7795

B. M. Kolk, Laboratory Director



Laboratory Submittal Form

137819

Date: _____ Time: _____ Relinquished by: _____
 Client: Ecology & Environmental Inc. Date of Shipment: _____
 Address: 3700 Industry Ave. Ste 102 Shipped from: _____ Carrier: _____
 Lakewood, CA 90712 Client P.O. No: ~~MAAA~~
 Telephone: 415-264-9962 Client Project ID: ~~002693.2000~~ 012P
 Contact: ANACONDA REMOVAL@ENE.COM
 Results via: Fax No: _____ Email address: HEDWARDS Verbal
 (Complete written reports will follow all analyses in addition to any prior verbal, fax, or email results)

Turnaround Time: 24 hours Sample Preservatives: _____
 Number of Samples: 10 Sampler's Name: _____
 Date & Time of Sample Collection: _____ Holding Times: _____ Signature: _____
 Type: Water Waste Water Soil Filter Impinger Sorbent Tube Other

EMS Only	Client Sample No.	Description/Location	Analysis	Volume/ Weight
137819 AD1	A-05172010-01		NIOSH 7400	
AD1D	A-05172010-01D		"	
AD2	A-05172010-02		"	
AD3	A-05172010-03		"	
AD4	A-05172010-04		"	
AD5	A-05172010-05		"	
AD6	A-05172010-06	SEE ATTACHMENT	"	
BB 8	BB-05172010		"	
FB01	FB-05172010-01		"	
FB02	FB-05172010-02		"	
11				
12				
13				
14				
15				
16				
17				

For EMS Only
 Laboratory Number: 137819 Received by: *Kirshul* Time: 10:05
 Date of Package Delivery: 5/19/2010 Shipping Bill Retained? yes
 Condition of Package on Receipt: OK Condition of Custody Seal: NONE
 Number of Samples: 10 Chain of Custody Signature: _____
 Disposition of Samples: EMS LABS Misc. Info: SF 7/06

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: 101634
Report No: 137862
Client: ECOLOGY & ENVIRONMENTAL
Address: 3708 INDUSTRY AVE, STE. 102
 LAKEWOOD, CA 90712
Attention: HEDWARDS
Project: ANACONDA REMOVAL
File Name: 137862ECO&ENVIR-AIR
Date Sampled: 5-18-10
Date Received: 5-20-10
Date Analyzed: 5-20-10
Filter Type/Size: MCE/25mm
Filter Area (sqmm): 385
Field Area (sqmm): 0.00785
Mag: 400x

Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
A-05182010-01	100	3	4	1471	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05182010-01D	100	2	3	981	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05182010-02	100	3	4	1471	4805.0	<0.0006	0.0006	0.0082	0.0001
A-05182010-03	100	2	3	981	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05182010-04	100	1.5	2	736	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05182010-05	100	3	4	1471	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05182010-06	100	3	4	1471	4814.0	<0.0006	0.0006	0.0082	0.0001
BB-05182010	100	0	0	0		N.A.			
FB-05182010-01	100	0	0	0		N.A.			
FB-05182010-02	100	0	0	0		N.A.			

N.A. = Not Applicable
 N.D. = None Detected
 Note: NIOSH 7400 requires 2 field blanks or 10% of the set which ever is greater
 Results have been corrected for the field blank or EMS blank if the analyte is detected in the blank
 Samples were received in good condition unless otherwise noted.
 Result only pertain to items actually tested.
 f/cc = Fibers per cubic centimeter
 LOD = LIMIT OF DETECTION (5.5 fiber/100 field)
 LOQ = LIMIT OF QUANTITATION (80 fiber/100 field)
 A. S. = ANALYTICAL SENSITIVITY (1 fiber/100 field)
 INTRA-LABORATORY Sr = 0.198

AIHA Registered Asbestos Analyst
CARL BERGMAN

 I.D. 7795

B. M. Kolk, Laboratory Director

SUBMITTAL FORM/Laboratory Services

137862

TURNAROUND TIME: STD 48 HR. 24 HR.
 <8 HR. WKND OTHER:

RELINQUISHED BY _____
 TIME / DATE _____
 DATE OF SHIPMENT _____ CARRIER _____
 CLIENT P.O. NO. DD2695, 1030 OREP
 CLIENT JOB/PROJECT ID NO(S). ANACONDA REMOVAL
 PACKAGE SHIPPED FROM _____

CLIENT ECOLGY & ENVIRONMENTAL
 ADDRESS 3700 INDUSTRY AVE, STE 102
LAKEWOOD, CA 90712
 TELEPHONE _____
 CONTACT _____

RESULTS REQUESTED VIA VERBAL FAX E-MAIL E-MAIL HEDWARDS@ENE.COM
 (NOTE: Complete written reports will follow all analyses, in addition to any prior transmitted verbal, fax or e-mail results) FAX NO. _____

DATE/TIME OF SAMPLE COLLECTION _____
 SAMPLE PRESERVATIVES _____ HOLDING TIMES _____
 NO. OF SAMPLES SENT _____ SAMPLER'S NAME _____
 TYPE: WATER WASTE WATER SOIL FILTER SORBENT TUBE IMPINGER OTHER _____

(FOR EMS ONLY)

EMS Sample No.	CLIENT SAMPLE NO.	DESCRIPTION	LOCATION	ANALYSIS
137862 - AD1	A-05182010-01		NIDSH 7400	
- AD1D	A-05182010-01D			
- AD2	A-05182010-02			
- AD3	A-05182010-03			
- AD4	A-05182010-04	SEE ATTACHMENT		
- AD5	A-05182010-05			
- AD6	A-05182010-06			
- BB	BB-05182010			
FB01	FB-05182010-01			
FB02	FB-05182010-02			

(SF 6/07)

FOR EMS ONLY

Laboratory No. 137862 Received By [Signature] Time 920
 Date of Package Delivery 5/20/10 Shipping Bill Retained: YES NONE
 Condition of Package on Receipt OK Condition of Custody Seal NONE
 (NOTE: If the package has sustained substantial damage or the custody seal is broken, stop and contact the project manager and the shipper.)
 No. of Samples 10 Chain-of-Custody Signature _____
 Date of Acceptance into Sample Bank 5/20/10 Misc. Info. [Signature]
 Disposition of Samples EMC LABS

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: 101634
Report No: 137899
Client: ECOLOGY & ENVIRONMENTAL
Address: 3708 INDUSTRY AVE, STE. 102
 LAKEWOOD, CA 90712

Filter Type/Size: MCE/25mm
Filter Area (sqmm): 385
Field Area (sqmm): 0.00785
Mag: 400x

Attention: H EDWARDS
Project: ANACONDA REMOVAL
File Name: 137899ECO&ENVIR-AIR

Date Sampled: 5-19-10
Date Received: 5-21-10
Date Analyzed: 5-24-10

Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
A-05192010-01	100	0.5	1	245	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05192010-01D	100	2	3	981	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05192010-02	100	2	3	981	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05192010-03	100	1	1	490	4819.0	<0.0006	0.0006	0.0081	0.0001
A-05192010-04	100	0.5	1	245	4834.0	<0.0006	0.0006	0.0081	0.0001
A-05192010-05	100	2	3	981	4838.0	<0.0006	0.0006	0.0081	0.0001
A-05192010-06	100	1.5	2	736	4819.0	<0.0006	0.0006	0.0081	0.0001
BB-05192010	100	0	0	0		N.A.			
FB-05192010-01	100	0	0	0		N.A.			
FB-05192010-02	100	0	0	0		N.A.			

N.A. = Not Applicable
 N.D. = None Detected
 f/cc = Fibers per cubic centimeter
 Note: NIOSH 7400 requires 2 field blanks or 10% of the set which ever is greater
 Results have been corrected for the field blank or EMS blank if the analyte is detected in the blank
 Samples were received in good condition unless otherwise noted.
 Result only pertain to items actually tested.

LOD = LIMIT OF DETECTION (5.5 fiber/100 field)
 LOQ = LIMIT OF QUANTITATION (80 fiber/100 field)
 A. S. = ANALYTICAL SENSITIVITY (1 fiber/100 field)
 INTRA-LABORATORY Sr = 0.198

AIHA Registered Asbestos Analyst
CARL BERGMAN

 I.D. 7795

B. M. Kolk, Laboratory Director

CHAIN OF CUSTODY RECORD

PROJ. NO. 002693.2080
PROJECT NAME ANA CONDA REMOVAL
DATE 01 FEB 2010
SAMPLERS: (Signature) MMB

NO. OF CONTAINERS

SAMPLE IDENTIFICATION

REMARKS

5-19-10 0800 11 LTR
0800 1
0805 1
0820 1
0822 1
0830 1
0832 1
- 1
- 1
- 1
- 1

A-05192010-01
A-05192010-01D
A-05192010-02
A-05192010-03
A-05192010-04
A-05192010-05
BB-05192010-06
FB-05192010-01
FB-05192010-02

1
1
1
1
1
1
1
1
1
1

4,819 LITERS
4,819 LITERS
4,819 LITERS
4,819 LITERS
4,834 LITERS
4,838 LITERS
4,819 LITERS
-
-
-
-

24 LTR
Please email data to
nedward@ene.com
415-264-9662

Relinquished by: (Signature) MMB
Date / Time 5-19-10 1030
Received by: (Signature) [Signature]

Relinquished by: (Signature)
Date / Time
Received by: (Signature)

Received for Laboratory by: (Signature)
Date / Time
Temp.
Seals Intact (Y/N)

Conditions / Remarks

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: 101634 Report No: 137948 Client: ECOLOGY & ENVIRONMENTAL Address: 3708 INDUSTRY AVE., STE. 102 LAKEWOOD, CA 90712	Filter Type/Size: MCE/25mm Filter Area (sqmm): 385 Field Area (sqmm): 0.00785 Mag: 400x
Attention: M. EDWARDS Project: 002693.2080 01RP File Name: 137948ECOLOGY.AIR	Date Sampled: 05-20-10 Date Received: 05-24-10 Date Analyzed: 05-28-10

Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
A-05202010-01	100	4	5	1962	5025.0	<0.0005	0.0005	0.0078	0.0001
A-05202010-01D	100	2.5	3	1226	4990.0	<0.0005	0.0005	0.0079	0.0001
A-05202010-02	100	2	3	981	4995.0	<0.0005	0.0005	0.0079	0.0001
A-05202010-03	100	3.5	4	1717	4905.0	<0.0005	0.0005	0.0080	0.0001
A-05202010-04	100	2	3	981	4894.0	<0.0006	0.0006	0.0080	0.0001
A-05202010-05	100	3.5	4	1717	4904.0	<0.0006	0.0006	0.0080	0.0001
A-05202010-06	100	3	4	1471	4884.0	<0.0006	0.0006	0.0080	0.0001
BB-05202010	100	0	0	0		N.A.			
FB-05202010-01	100	0	0	0		N.A.			
FB-05202010-02	100	0	0	0		N.A.			

N.A. = Not Applicable
 N.D. = None Detected
 Note: NIOSH 7400 requires 2 field blanks or 10% of the set which ever is greater
 Results have been corrected for the field blank or EMS blank if the analyte is detected in the blank
 Samples were received in good condition unless otherwise noted.
 Result only pertain to items actually tested.

AIHA Registered Asbestos Analyst
NANCY ZEIGLER 
 B. M. Kolk, Laboratory Director

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: 101634

Report No: 138057

Client: ECOLOGY & ENVIRONMENTAL

Address: 3708 INDUSTRY AVE, STE. 102

LAKEWOOD, CA 90712

Attention: H EDWARDS

Project: ANACONDA MINE REMOVAL

File Name: 138057ECOL&ENVIR.AIR

Date Sampled: N.A.

Date Received: 5-28-10

Date Analyzed: 6-3-10

Filter Type/Size: MCE/25mm

Filter Area (sqmm): 385

Field Area (sqmm): 0.00785

Mag: 400x

Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
A-52510-1	100	4.5	6	2207	4583.5	<0.0006	0.0006	0.0086	0.0001
A-52510-2	100	2	3	981	4512.9	<0.0006	0.0006	0.0087	0.0001
A-52510-3	100	1.5	2	736	4317.1	<0.0006	0.0006	0.0091	0.0001
A-52510-4	100	2.5	3	1226	4282.6	<0.0006	0.0006	0.0092	0.0001
A-52510-5	100	2	3	981	3984.8	<0.0007	0.0007	0.0098	0.0001
FB-52510-FB1	100	0	0	0	N.A.	N.A.			
A-52610-1	100	5	6	2452	5132.7	<0.0005	0.0005	0.0076	0.0001
A-52610-2	100	1	1	490	4974.6	<0.0005	0.0005	0.0079	0.0001
A-52610-3	100	2	3	981	4841.6	<0.0006	0.0006	0.0081	0.0001
A-52610-4	100	2	3	981	4760.6	<0.0006	0.0006	0.0082	0.0001
A-52610-4D	100	3	4	1471	4635.4	<0.0006	0.0006	0.0085	0.0001
A-52610-5	100	1	1	490	4689.9	<0.0006	0.0006	0.0084	0.0001
FB-52610-FB1	100	0	0	0	N.A.	N.A.			
FB-52610-FB2	100	0	0	0	N.A.	N.A.			
LOT BLANK	100	0	0	0	N.A.	N.A.			

N.A. = Not Applicable

N.D. = None Detected

Note: NIOSH 7400 requires 2 field blanks or 10% of the set which ever is greater

Results have been corrected for the field blank or EMS blank if the analyte is detected in the blank

Samples were received in good condition unless otherwise noted.

Result only pertain to items actually tested.

f/cc = Fibers per cubic centimeter

LOD = LIMIT OF DETECTION (5.5 fiber/100 field)

LOQ = LIMIT OF QUANTITATION (80 fiber/100 field)

A. S. = ANALYTICAL SENSITIVITY (1 fiber/100 field)

INTRA-LABORATORY Sr = 0.198

AIHA Registered Asbestos Analyst

CARL BERGMAN

I.D. 7795



B. M. Kolk, Laboratory Director

NOTE: This report shall not be reproduced, except in full, without the written approval of EMS Laboratories, Inc.

EMS LABORATORIES 117 West Bellevue Dr. / Pasadena, CA 91105-2503 / 626-568-4065 / FAX: 626-796-5282

PCM VERSION: 7 (8-2008)

138057



Laboratory Submittal Form

Date: _____ Time: _____ Relinquished by: _____
 Client: Ecology & Environment Date of Shipment: _____
 Address: 3700 Industry Ave., Ste. 102 Shipped from: _____ Carrier: _____
 Lakewood, CA 90712 Client P.O. No: _____
 Telephone: _____ Client Project ID: Anaconda Mine Removal
 Contact: H. Edwards

Results via: Fax No: _____ Email address: _____ Verbal
 (Complete written reports will follow all analyses, in addition to any prior verbal, fax, or email results)

Turnaround Time: Standard Sample Preservatives: _____
 Number of Samples: 14 + 1 Sampler's Name: _____
 Date & Time of Sample Collection: _____ Holding Times: _____ Signature: _____
 Type: Water Waste Water Soil Filter Impinger Sorbent Tube Other

EMS Only			
138057-			PCM
25-1 to 5 FBI	SEE ATTACHMENT		
26-1 to 5 HD			
26-2 FBI to FBI			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			

Laboratory Number: 138057 Received by: *Meg Any* Time: 10:11
 Date of Package Delivery: 5/28/2010 Shipping Bill Retained? yes
 Condition of Package on Receipt: OK Condition of Custody Seal: yes
 Number of Samples: 14 Chain of Custody Signature: *[Signature]*
 Disposition of Samples: EMS LABS Misc. Info: SF 7/06

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: 101634 Report No: 138143 Client: ECOLOGY & ENVIRONMENTAL Address: 3708 INDUSTRY AVE, STE. 102 LAKEWOOD, CA 90712	Attention: H EDWARDS Project: ANACONDA REMOVAL File Name: 138143ECOL&ENVIR-AIR	Date Sampled: 5/27-29/10 Date Received: 6-3-10 Date Analyzed: 6-4-10	Filter Type/Size: MCE/25mm Filter Area (sqmm): 385 Field Area (sqmm): 0.00785 Mag: 400x
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Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
A52710-1	100	1	1	490	935.0	<0.0029	0.0029	0.0420	0.0005
A52710-2	100	1	1	490	1115.0	<0.0024	0.0024	0.0352	0.0004
A52710-3	100	1.5	2	736	1233.0	<0.0022	0.0022	0.0318	0.0004
A52710-4	100	2	3	981	1007.0	<0.0027	0.0027	0.0390	0.0005
A52710-5	100	2	3	981	1292.0	<0.0021	0.0021	0.0304	0.0004
FBS2710-FB	100	0	0	0	N.A.	N.A.			
A52810-1	100	4.5	6	2207	4894.0	<0.0006	0.0006	0.0080	0.0001
A52810-2	100	5	6	2452	4892.0	<0.0006	0.0006	0.0080	0.0001
A52810-3	100	3.5	4	1717	4280.0	<0.0006	0.0006	0.0092	0.0001
A52810-4	100	6	8	2943	5034.0	0.0006	0.0005	0.0078	0.0001
A52810-5	100	3	4	1471	5369.0	<0.0005	0.0005	0.0073	0.0001
A52810-FB1	100	0	0	0	N.A.	N.A.			
A52810-FB2	100	4	5	1962	4900.0	<0.0006	0.0006	0.0080	0.0001
A52910-1	100	1	1	490	5012.0	<0.0005	0.0005	0.0078	0.0001
A52910-2	100	7.5	10	3678	5324.0	0.0007	0.0005	0.0074	0.0001
A52910-3	100	3	4	1471	5159.0	<0.0005	0.0005	0.0076	0.0001
A52910-3D	100	3	4	1471	5219.0	<0.0005	0.0005	0.0075	0.0001
A52910-4	100	3	4	1471	5114.0	<0.0005	0.0005	0.0077	0.0001

f/cc = Fibers per cubic centimeter

N.D. = None Detected

Note: NIOSH 7400 requires 2 field blanks or 10% of the set which ever is greater

Results have been corrected for the field blank or EMS blank if the analyte is detected in the blank

Samples were received in good condition unless otherwise noted.

Result only pertain to items actually tested.

LOD = LIMIT OF DETECTION (5.5 fiber/100 field)

LOQ = LIMIT OF QUANTITATION (80 fiber/100 field)

A. S. = ANALYTICAL SENSITIVITY (1 fiber/100 field)

INTRA-LABORATORY Sr = 0.198


 AIHA Registered Asbestos Analyst
CARL BERGMAN
 I.D. 7795

B. M. Kolk, Laboratory Director

Phase Contrast Microscopy of Air Samples

NIOSH Fiber Count (Method 7400, Issue 2, A Rules)

(Aspect ratio >3:1; Fiber length >5µm; Fields counted: 20 to 100 fields)

AIHA LAB. No: 101634

Report No: 138143

Client: ECOLOGY & ENVIRONMENTAL

Address: 3708 INDUSTRY AVE, STE. 102

LAKEWOOD, CA 90712

Attention: H EDWARDS

Project: ANACONDA REMOVAL

File Name: 138143ECOL&ENVIR-AIR1

Date Sampled: 5/27-29/10

Date Received: 6-3-10

Date Analyzed: 6-4-10

Filter Type/Size: MCE/25mm

Filter Area (sqmm): 385

Field Area (sqmm): 0.00785

Mag: 400x

Sample I.D.	Fields Counted	Fibers Counted	Fiber/sqmm	Fiber/Filter	Vol (Lit.)	Fibers/cc	LOD (f/cc)	LOQ (f/cc)	A. S. (f/cc)
A52910-5	100	2.5	3	1226	4816.0	<0.0006	0.0006	0.0081	0.0001
FB52910-FB1	100	0	0	0		N.A.			
FB52910-FB2	100	0	0	0	5000.0	<0.0005	0.0005	0.0078	0.0001

N.A. = Not Applicable

N.D. = None Detected

Note: NIOSH 7400 requires 2 field blanks or 10% of the set which ever is greater

Results have been corrected for the field blank or EMS blank if the analyte is detected in the blank

Samples were received in good condition unless otherwise noted.

Result only pertain to items actually tested.

f/cc = Fibers per cubic centimeter
 LOD = LIMIT OF DETECTION (5.5 fiber/100 field)
 LOQ = LIMIT OF QUANTITATION (80 fiber/100 field)
 A. S. = ANALYTICAL SENSITIVITY (1 fiber/100 field)
 INTRA-LABORATORY S_r = 0.198

AIHA Registered Asbestos Analyst

CARL BERGMAN

I.D. 7795



B. M. Kolk, Laboratory Director

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EMS LABORATORIES 117 West Bellevue Dr. / Pasadena, CA 91105-2503 / 626-568-4065 / FAX: 626-796-5282

PCM VERSION: 7 (8-2008)

138143



Laboratory Submittal Form

Date: _____ Time: _____ Relinquished by: _____
 Client: Ecology & Environment Date of Shipment: _____
 Address: 3700 Industry Ave., Ste. 102 Shipped from: _____ Carrier: _____
 Lakewood, CA 90712 Client P.O. No: 002693-2080-01RP
 Telephone: _____ Client Project ID: Anaconda Removal
 Contact: H. Edwards
 Results via: Fax No: _____ Email address: hedwards@ene.com Verbal
 (Complete written reports will follow all analyses, in addition to any prior verbal, fax, or email results)

Turnaround Time: Standard Sample Preservatives: _____
 Number of Samples: 21 Sampler's Name: _____
 Date & Time of Sample Collection: _____ Holding Times: _____ Signature: _____
 Type: Water Waste Water Soil Filter Impinger Sorbent Tube Other

EMS Only	DATE RECEIVED	LABORATORY	ANALYSIS	STATUS
138143-71				PCM
TO				
138143-75			SEE ATTACHMENT	
138143-7FB				
138143-81				
TO				
138143-85				
138143-8FB				
138143-8FB				
138143-91				
TO				
138143-93				
138143-93D				
138143-94				
138143-95				
138143-9FB				
138143-9FB				

138143

Laboratory Number: _____ Received by: [Signature] Time: 9:45
 Date of Package Delivery: 6/3/2010 Shipping Bill Retained? YES
 Condition of Package on Receipt: OK Condition of Custody Seal: NONE
 Number of Samples: 21 Chain of Custody Signature: _____
 Disposition of Samples: EMS LABS Misc. Info: SF 7/06

Appendix F: Asbestos Building Clearance Report



Lisa Monroe & Associates, Inc.
P.O. Box 2252
Sparks, NV 89432
Phone/Fax: 775-355-1011

Final Clearance Report

Date of Report: 5-27-10

Date of Inspection: 5-27-10

Contractor/Owner: Environmental Quality management

Address: 6825 216th Street SW, Suite J

City, State & Zip: Lynnwood, WA 98036

Project Name: Anaconda Mine Office-Asbestos Abatement Clearance

Project Location: 102 Birch Road, Yerington, NV

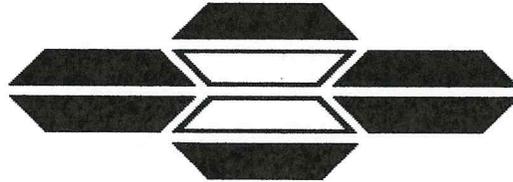
Lisa Monroe & Associates performed a visual inspection and collected final clearance samples within the asbestos containment located in the Anaconda Mine Office building at 1-2 Birch Road, Yerington, Nevada. The project involved the removal of asbestos containing wall materials, floor tiles, black mastic, vent duct tape, transite pipe and exterior transite shingles. Five final clearance samples were collected and submitted to an accredited laboratory for Phase Contrast Microscopy (PCM) analysis. The PCM clearance standard is .01 Fibers per Cubic Centimeter (.01 F/CC) of air. The sample analysis shows that all of the samples are below the current clearance standard. The asbestos removal area was released to the asbestos abatement contractor for the containment removal.

The inspection and final clearance testing that was performed involved only the asbestos removal areas, and this report does not guarantee that the entire facility is free of hazards associated with asbestos.

Submitted By,

Lisa D. Monroe, President

Lisa Monroe & Associates, Inc.
NV DIROSHES: IJPM0061
CAC: 92-0660



ASBESTOS TEM LABORATORIES, INC.

**NIOSH 7400 Method
Phase Contrast Microscopy
Analytical Report**

Report No.: 114230

1350 Freeport Blvd.
Sparks, NV 89431
(775) 3598-3377
FAX (775) 359-2798

With Main Office Located at:
630 Bancroft Way, Berkeley CA 94710
Ph. (510) 704-8930 Fax (510) 704-8929



ASBESTOS TEM LABORATORIES, INC

May/27/2010

Ms. Lisa Monroe
Lisa Monroe & Associates
P.O. Box 2252
Sparks, NV 89432

RE: LABORATORY REPORT #114230
Phase contrast microscopy analytical results for 5 air sample(s).
Job Site: Anaconda Mine Office, 103 Birch Street
Job No.: 10-NV-7812

Enclosed please find the analytical results for one or more air samples submitted for phase contrast microscopy (PCM) analysis. All analysts participate in the American Industrial Hygiene Association (AIHA) Asbestos Analyst Registry Registry proficiency testing program.

Prior to analysis, air sample cassettes are logged-in and all data pertinent to the sample is recorded into a computer based laboratory information management system. The samples are checked for damage or disruption of any chain-of-custody seals. A unique laboratory ID number is assigned to each sample. A hard copy log-in sheet containing all pertinent information concerning the sample is generated. This and all other relevant paper work are kept with the sample throughout the analytical procedures to assure proper sample tracking.

After sample login is complete, the air samples are analyzed as follows: Air filters are individually removed from the cassette holders, a quarter section is separated and placed onto a glass microscope slide. The filter section is collapsed using a "QuikFix" acetone vaporizer. A drop of Triacetin is added and a coverslip is emplaced over the filter. The slide is then placed under an Olympus CH-2 or Meiji ML-POL Phase Contrast Microscope. Fibers are counted until either 100 fibers are counted in a minimum of 20 fields or 100 fields total are observed. Analytical results are calculated according to NIOSH 7400 protocols. Data is then compiled into a standard report format and subjected to a quality assurance review before the information is released to the client.

Sincerely Yours,

A handwritten signature in black ink, reading "Dotter Gullett". The signature is written in a cursive, flowing style.

Laboratory Manager
ASBESTOS TEM LABORATORIES, INC.

PHASE CONTRAST MICROSCOPY ANALYTICAL REPORT

NIOSH 7400 Method

Page: 1 of 1

Contact: Ms. Lisa Monroe	Samples Submitted: 5	Report No.: 114230
Address: Lisa Monroe & Associates	Samples Processed: 5	Date Submitted: May-27-10
P.O. Box 2252	Job Site / No. Anaconda Mine Office, 103 Birch Street	Date Reported: May-27-10
Sparks, NV 89432	10-NV-7812	

SAMPLE ID	FIBERS per CC	95% UCL	FIBERS per FIELDS	FIBERS per FILTER	LOCATION / DESCRIPTION
NV-7812-1. Lab ID # 913-02175-001	< 0.0021	< 0.0040	< $\frac{5.5}{100}$	< 1962	Final, Southeast Room <u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u> 1283.6 129 9.95
NV-7812-2. Lab ID # 913-02175-002	< 0.0021	< 0.0021	< $\frac{5.5}{100}$	< 490	Final, South Hall <u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u> 1279.0 129 9.915
NV-7812-3. Lab ID # 913-02175-003	< 0.0021	< 0.0056	< $\frac{5.5}{100}$	< 490	Final, Center West Room <u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u> 1282.3 129 9.94
NV-7812-4. Lab ID # 913-02175-004	< 0.0021	< 0.0046	< $\frac{5.5}{100}$	< 981	Final, North End of Hall <u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u> 1290.9 130 9.93
NV-7812-5. Lab ID # 913-02175-005	< 0.0021	< 0.0056	< $\frac{5.5}{100}$	< 490	Final, Northwest Room <u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u> 1284.2 129 9.955
Lab ID #					<u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u>
Lab ID #					<u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u>
Lab ID #					<u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u>
Lab ID #					<u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u>
Lab ID #					<u>Volume(L)</u> <u>Pump Time(Min)</u> <u>Flow Rate(LPM)</u>

Detection Limit = 7 Fibers/MM2

Reviewer *Dottie Guilbert*
Dottie Guilbert

Analyst *Dottie Guilbert*
Dottie Guilbert

Appendix G: Laboratory Data Reports for Evaporation Pond





**United States Environmental Protection Agency
Region 9 Laboratory**

**1337 S. 46th Street Building 201
Richmond, CA 94804**

**Subject: Analytical Testing Results - Project R10S65
SDG: 10141C**

**From: Brenda Bettencourt, Director
EPA Region 9 Laboratory
MTS-2**

**To: Thomas Dunkelman
Emergency Response Section
SFD-9-2**

Attached are the results from the analysis of samples from the **Anaconda Mine 2010 Old Raffinate Pond Sampling** project. These data have been reviewed in accordance with EPA Region 9 Laboratory policy.

A full documentation package for these data, including raw data and sample custody documentation, is on file at the EPA Region 9 Laboratory. If you would like to request additional review and/or validation of the data, please contact Eugenia McNaughton at the Region 9 Quality Assurance Office.

If you have any questions, please ask for Richard Bauer, the Lab Project Manager at (510)412-2300.

Analyses included in this report:

Metals by ICP

pH

pH

Metals by ICP

pH

Percent Solids



United States Environmental Protection Agency

Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804

Phone:(510) 412-2300

Fax:(510) 412-2302

Project Manager: Thomas Dunkelman

Project Number: R10S65

Project: Anaconda Mine 2010 Old Raffinate Pond
Sampling

Emergency Response Section

75 Hawthorne Street

San Francisco CA, 94105

SDG: 10141C

Reported: 06/21/10 11:14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Collected	Date Received
EP-S-01	1005034-01	Waste, Aqueous	05/19/10 09:05	05/21/10 10:15
EP-S-02	1005034-02	Waste, Solid	05/19/10 09:15	05/21/10 10:15
EP-D-01	1005034-03	Waste, Aqueous	05/19/10 09:30	05/21/10 10:15
EP-D-02	1005034-04	Waste, Solid	05/19/10 09:35	05/21/10 10:15

SDG ID 10141C

Work Order(s)

1005034

pH: Samples were re-run past the requested 24-hr hold time because the original run did not include a QC duplicate. Final results with proper QC were not flagged, however, as the samples were found to be classified as waste (ie, not water or soil) and did not require 24-hr hold time.



United States Environmental Protection Agency
Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
 Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman	Emergency Response Section	SDG: 10141C
Project Number: R10S65	75 Hawthorne Street	Reported: 06/21/10 11:14
Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	San Francisco CA, 94105	

Sample Results

Analyte	Reanalysis / Extract	Result	Qualifiers / Comments	Quantitation Limit	Units	Batch	Prepared	Analyzed	Method
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Lab ID: 1005034-01 **Waste, Aqueous - Sampled: 05/19/10 09:05**

Sample ID: EP-S-01 **Metals by EPA 200 Series Methods**

Antimony		ND	U	200	ug/L	B0E0103	05/26/10	06/04/10	200.7/SOP505
Arsenic		ND	U	200	"	"	"	06/05/10	200.7/SOP505
Barium		ND	U	100	"	"	"	06/04/10	200.7/SOP505
Beryllium		1,400		10	"	"	"	"	200.7/SOP505
Cadmium		170		50	"	"	"	"	200.7/SOP505
Chromium		2,300		100	"	"	"	"	200.7/SOP505
Cobalt		55,000		100	"	"	"	"	200.7/SOP505
Copper		4,400,000		2,000	"	"	"	06/01/10	200.7/SOP505
Lead		1,400		800	"	"	"	06/04/10	200.7/SOP505
Molybdenum		ND	U	2,000	"	"	"	06/04/10	200.7/SOP505
Nickel		33,000		100	"	"	"	06/04/10	200.7/SOP505
Selenium		240		200	"	"	"	"	200.7/SOP505
Silver		ND	U	100	"	"	"	"	200.7/SOP505
Thallium		770		400	"	"	"	06/04/10	200.7/SOP505
Vanadium		51	C1, J	100	"	"	"	06/04/10	200.7/SOP505
Zinc		64,000		2,000	"	"	"	06/01/10	200.7/SOP505

Sample ID: EP-S-01 **Conventional Chemistry Parameters by APHA/EPA Methods**
 pH RE1 2.2 0.10 pH Units B0E0101 05/25/10 05/25/10 SM4500-H+/SOP 580

Lab ID: 1005034-02 **Waste, Solid - Sampled: 05/19/10 09:15**

Sample ID: EP-S-02 **Metals by EPA 6000/7000 Series Methods**

Antimony		ND	U	3.3	mg/kg dry	B0E0111	05/27/10	06/07/10	6010C/SOP503
Arsenic		ND	U	3.3	"	"	"	"	6010C/SOP503
Barium		ND	J, Q4, U	8.2	"	"	"	"	6010C/SOP503
Beryllium		1.7		0.16	"	"	"	"	6010C/SOP503
Cadmium		0.43	C1, J	0.82	"	"	"	"	6010C/SOP503
Chromium		5.6		1.6	"	"	"	"	6010C/SOP503
Cobalt		130		3.3	"	"	"	"	6010C/SOP503
Copper		5,700		6.6	"	"	"	"	6010C/SOP503
Lead		ND	U	4.9	"	"	"	"	6010C/SOP503
Molybdenum		ND	J, Q4, U	8.2	"	"	"	"	6010C/SOP503
Nickel		83		8.2	"	"	"	"	6010C/SOP503
Selenium		ND	U	3.3	"	"	"	"	6010C/SOP503
Silver		ND	U	1.6	"	"	"	"	6010C/SOP503
Thallium		ND	U	8.2	"	"	"	"	6010C/SOP503
Vanadium		ND	U	3.3	"	"	"	"	6010C/SOP503
Zinc		120		13	"	"	"	"	6010C/SOP503

Sample ID: EP-S-02 **Conventional Chemistry Parameters by APHA/EPA Methods**
 pH RE1 2.5 0.10 pH Units B0E0102 05/25/10 05/25/10 9040C/9045D/SOP58:
 % Solids 57 1 % B0F0014 06/03/10 06/04/10 3550C/SOP460



United States Environmental Protection Agency
Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
 Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman	Emergency Response Section	SDG: 10141C
Project Number: R10S65	75 Hawthorne Street	Reported: 06/21/10 11:14
Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	San Francisco CA, 94105	

Sample Results

Analyte	Reanalysis / Extract	Result	Qualifiers / Comments	Quantitation Limit	Units	Batch	Prepared	Analyzed	Method
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Lab ID: 1005034-03 **Waste, Aqueous - Sampled: 05/19/10 09:30**

Sample ID: EP-D-01 **Metals by EPA 200 Series Methods**

Antimony		ND	U	200	ug/L	B0E0103	05/26/10	06/04/10	200.7/SOP505
Arsenic		ND	U	200	"	"	"	06/05/10	200.7/SOP505
Barium		ND	U	100	"	"	"	06/04/10	200.7/SOP505
Beryllium		1,400		10	"	"	"	"	200.7/SOP505
Cadmium		180		50	"	"	"	"	200.7/SOP505
Chromium		2,400		100	"	"	"	"	200.7/SOP505
Cobalt		55,000		100	"	"	"	"	200.7/SOP505
Copper		4,600,000		2,000	"	"	"	06/01/10	200.7/SOP505
Lead		1,400		800	"	"	"	06/04/10	200.7/SOP505
Molybdenum		ND	U	2,000	"	"	"	06/04/10	200.7/SOP505
Nickel		33,000		100	"	"	"	06/04/10	200.7/SOP505
Selenium		140	C1, J	200	"	"	"	"	200.7/SOP505
Silver		ND	U	100	"	"	"	"	200.7/SOP505
Thallium		740		400	"	"	"	06/04/10	200.7/SOP505
Vanadium		ND	U	100	"	"	"	06/04/10	200.7/SOP505
Zinc		67,000		2,000	"	"	"	06/01/10	200.7/SOP505

Sample ID: EP-D-01 **Conventional Chemistry Parameters by APHA/EPA Methods**

pH	RE1	2.2		0.10	pH Units	B0E0101	05/25/10	05/25/10	SM4500-H+/SOP 580
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Lab ID: 1005034-04 **Waste, Solid - Sampled: 05/19/10 09:35**

Sample ID: EP-D-02 **Metals by EPA 6000/7000 Series Methods**

Antimony		ND	U	7.2	mg/kg dry	B0E0111	05/27/10	06/07/10	6010C/SOP503
Arsenic		ND	U	7.2	"	"	"	"	6010C/SOP503
Barium		ND	U	18	"	"	"	"	6010C/SOP503
Beryllium		2.1		0.36	"	"	"	"	6010C/SOP503
Cadmium		ND	U	1.8	"	"	"	"	6010C/SOP503
Chromium		7.1		3.6	"	"	"	"	6010C/SOP503
Cobalt		180		7.2	"	"	"	"	6010C/SOP503
Copper		6,000		14	"	"	"	"	6010C/SOP503
Lead		ND	U	11	"	"	"	"	6010C/SOP503
Molybdenum		ND	U	18	"	"	"	"	6010C/SOP503
Nickel		110		18	"	"	"	"	6010C/SOP503
Selenium		ND	U	7.2	"	"	"	"	6010C/SOP503
Silver		ND	U	3.6	"	"	"	"	6010C/SOP503
Thallium		ND	U	18	"	"	"	"	6010C/SOP503
Vanadium		ND	U	7.2	"	"	"	"	6010C/SOP503
Zinc		150		29	"	"	"	"	6010C/SOP503

Sample ID: EP-D-02 **Conventional Chemistry Parameters by APHA/EPA Methods**

pH	RE1	1.7		0.10	pH Units	B0E0102	05/25/10	05/25/10	9040C/9045D/SOP58:
% Solids		52		1	%	B0F0014	06/03/10	06/04/10	3550C/SOP460



United States Environmental Protection Agency
Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman	Emergency Response Section	SDG: 10141C
Project Number: R10S65	75 Hawthorne Street	Reported: 06/21/10 11:14
Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	San Francisco CA, 94105	

Sample Results

Analyte	Reanalysis / Extract	Result	Qualifiers / Comments	Quantitation Limit	Units	Batch	Prepared	Analyzed	Method
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Lab ID: 1005034-04

Waste, Solid - Sampled: 05/19/10 09:35



United States Environmental Protection Agency Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman Project Number: R10S65 Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	Emergency Response Section 75 Hawthorne Street San Francisco CA, 94105	SDG: 10141C Reported: 06/21/10 11:14
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Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0101 -- General Inorganic - pH by 150.1

Prepared & Analyzed: 05/25/10

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Duplicate (B0E0101-DUP1)		Source: 1005034-01RE1								
pH	2.17			0.1	pH Units	2.18			0.5	20

Reference (B0E0101-SRM1)

pH	7.02				pH Units	7.00		100	98.6-101.4	
----	------	--	--	--	----------	------	--	-----	------------	--

Batch B0E0102 -- Water Extract Inorg - pH by 9000 series

Prepared & Analyzed: 05/25/10

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Duplicate (B0E0102-DUP1)		Source: 1005034-02RE1								
pH	2.5			0.1	pH Units	2.54			2	20

Reference (B0E0102-SRM1)

pH	7.02				pH Units	7.00		100	98.6-101.4	
----	------	--	--	--	----------	------	--	-----	------------	--

Batch B0E0103 - 200 Series Digest - Metals by 200.7

Prepared: 05/26/10 Analyzed: 06/01/10

Metals by EPA 200 Series Methods - Quality Control

Blank (B0E0103-BLK1)

Aluminum	ND	U		100	ug/L					
Antimony	ND	U		20	"					
Arsenic	ND	U		20	"					
Barium	ND	U		10	"					
Beryllium	ND	U		1	"					
Boron	ND	U		100	"					
Cadmium	ND	U		5	"					
Calcium	ND	U		100	"					
Chromium	ND	U		10	"					
Cobalt	ND	U		10	"					
Copper	ND	U		10	"					
Iron	ND	U		100	"					
Lead	ND	U		20	"					
Lithium	ND	U		5	"					
Magnesium	ND	U		500	"					
Manganese	ND	U		5	"					
Molybdenum	ND	U		20	"					
Nickel	ND	U		10	"					
Potassium	ND	U		2,000	"					
Selenium	ND	U		20	"					
Silica (SiO2)	ND	U		500	"					
Silver	ND	U		10	"					
Sodium	ND	U		500	"					
Thallium	ND	U		20	"					
Vanadium	ND	U		10	"					
Zinc	ND	U		10	"					

LCS (B0E0103-BS1)

Aluminum	2,020			100	ug/L	2000		101	85-115		200
Antimony	838			20	"	800		105	85-115		200



United States Environmental Protection Agency Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman Project Number: R10S65 Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	Emergency Response Section 75 Hawthorne Street San Francisco CA, 94105	SDG: 10141C Reported: 06/21/10 11:14
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Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0103 - 200 Series Digest - Metals by 200.7

Prepared: 05/26/10 Analyzed: 06/05/10
Metals by EPA 200 Series Methods - Quality Control

LCS (B0E0103-BS1)

Arsenic	844		20	"	800		105	85-115		200
Barium	200		10	"	200		100	85-115		200
Beryllium	200		1	"	200		100	85-115		200
Boron	298		100	"	300		99	85-115		200
Cadmium	203		5	"	200		101	85-115		200
Calcium	975		100	"	1000		98	85-115		200
Chromium	402		10	"	400		101	85-115		200
Cobalt	199		10	"	200		99	85-115		200
Copper	299		10	"	300		100	85-115		200
Iron	3,060		100	"	3000		102	85-115		200
Lead	1,010		20	"	1000		101	85-115		200
Lithium	208		5	"	200		104	85-115		200
Magnesium	1,990		500	"	2000		100	85-115		200
Manganese	206		5	"	200		103	85-115		200
Molybdenum	402		20	"	400		101	85-115		200
Nickel	521		10	"	500		104	85-115		200
Potassium	10,100		2,000	"	10000		101	85-115		200
Selenium	2,140		20	"	2000		107	85-115		200
Silica (SiO2)	2,040		500	"	2000		102	85-115		200
Silver	75.1		10	"	75.0		100	85-115		200
Sodium	3,130		500	"	3000		104	85-115		200
Thallium	2,000		20	"	2000		100	85-115		200
Vanadium	296		10	"	300		99	85-115		200
Zinc	203		10	"	200		102	85-115		200

Matrix Spike (B0E0103-MS4)

Source: 1005034-01

Antimony	6,550		200	ug/L	8000	ND	82	70-130		20
Arsenic	7,180		200	"	8000	ND	90	70-130		20
Barium	1,620		100	"	2000	ND	81	70-130		20
Beryllium	3,030		10	"	2000	1,370	83	70-130		20
Cadmium	1,650		50	"	2000	174	74	70-130		20
Chromium	5,360		100	"	4000	2,340	76	70-130		20
Cobalt	55,100	Q10	100	"	2000	55,300	NR	70-130		20
Copper	4,250,000	Q10	2,000	"	3000	4,360,000	NR	70-130		20
Lead	10,700		800	"	10000	1,400	93	70-130		20
Molybdenum	4,330		2,000	"	4000	ND	108	70-130		20
Nickel	36,100	Q10	100	"	5000	33,200	57	70-130		20
Selenium	19,300		200	"	20000	237	95	70-130		20
Silver	621		100	"	750	ND	83	70-130		20
Thallium	17,200		400	"	20000	772	82	70-130		20
Vanadium	2,430		100	"	3000	50.6	79	70-130		20
Zinc	63,600	Q10	2,000	"	2000	63,500	6	70-130		20



United States Environmental Protection Agency Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman Project Number: R10S65 Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	Emergency Response Section 75 Hawthorne Street San Francisco CA, 94105	SDG: 10141C Reported: 06/21/10 11:14
---	---	---

Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0103 - 200 Series Digest - Metals by 200.7

Prepared: 05/26/10 Analyzed: 06/04/10

Matrix Spike Dup (B0E0103-MSD4)

Source: 1005034-01

Metals by EPA 200 Series Methods - Quality Control

Antimony	6,680			200	ug/L	8000	ND	83	70-130	2	20
Arsenic	7,090			200	"	8000	ND	89	70-130	1	20
Barium	1,600			100	"	2000	ND	80	70-130	1	20
Beryllium	3,010			10	"	2000	1,370	82	70-130	0.6	20
Cadmium	1,670			50	"	2000	174	75	70-130	1	20
Chromium	5,440			100	"	4000	2,340	77	70-130	1	20
Cobalt	55,000	Q10		100	"	2000	55,300	NR	70-130	0.3	20
Copper	4,560,000	Q10		2,000	"	3000	4,360,000	NR	70-130	7	20
Lead	10,700			800	"	10000	1,400	93	70-130	0.1	20
Molybdenum	4,600			2,000	"	4000	ND	115	70-130	6	20
Nickel	36,000	Q10		100	"	5000	33,200	55	70-130	0.2	20
Selenium	19,600			200	"	20000	237	97	70-130	1	20
Silver	626			100	"	750	ND	84	70-130	0.9	20
Thallium	17,200			400	"	20000	772	82	70-130	0.03	20
Vanadium	2,410			100	"	3000	50.6	79	70-130	0.7	20
Zinc	68,000	Q10		2,000	"	2000	63,500	226	70-130	7	20

Batch B0E0111 - 3050B Sld Acid Dig - Metals by 6010

Prepared: 05/27/10 Analyzed: 06/07/10

Blank (B0E0111-BLK1)

Metals by EPA 6000/7000 Series Methods - Quality Control

Antimony	ND	U		2	mg/kg wet						
Arsenic	ND	U		2	"						
Barium	ND	U		5	"						
Beryllium	ND	U		0.1	"						
Cadmium	ND	U		0.5	"						
Chromium	ND	U		1	"						
Cobalt	ND	U		2	"						
Copper	ND	U		4	"						
Lead	ND	U		3	"						
Molybdenum	ND	U		5	"						
Nickel	ND	U		5	"						
Selenium	ND	U		2	"						
Silver	ND	U		1	"						
Thallium	ND	U		5	"						
Vanadium	ND	U		2	"						
Zinc	ND	U		8	"						

Matrix Spike (B0E0111-MS1)

Source: 1005034-02

Antimony	130			3.3	mg/kg dry	166	ND	79	75-125		20
Arsenic	509			3.3	"	662	ND	77	75-125		20
Barium	449			17	"	662	ND	68	75-125		20
Beryllium	16.7			0.33	"	16.6	1.71	91	75-125		20



United States Environmental Protection Agency Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
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---	---	---

Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0111 - 3050B Sld Acid Dig - Metals by 6010

Prepared: 05/27/10 Analyzed: 06/07/10

Metals by EPA 6000/7000 Series Methods - Quality Control

Matrix Spike (B0E0111-MS1)

Source: 1005034-02

Cadmium	13		0.83	"	16.6	0.427	76	75-125		20
Chromium	56		1.7	"	66.2	5.62	76	75-125		20
Cobalt	302		6.6	"	166	133	102	75-125		20
Copper	6,260	Q10	13	"	82.8	5,670	711	75-125		20
Lead	126		5	"	166	ND	76	75-125		20
Molybdenum	123		8.3	"	166	ND	74	75-125		20
Nickel	213		8.3	"	166	83.2	79	75-125		20
Selenium	500		3.3	"	662	ND	75	75-125		20
Silver	13.2		1.7	"	16.6	ND	80	75-125		20
Thallium	508		8.3	"	662	ND	77	75-125		20
Vanadium	132		3.3	"	166	ND	80	75-125		20
Zinc	296		26	"	166	124	103	75-125		20

Matrix Spike Dup (B0E0111-MSD1)

Source: 1005034-02

Antimony	133		3.5	mg/kg dry	170	ND	78	75-125	2	20
Arsenic	524		3.5	"	681	ND	77	75-125	3	20
Barium	471		18	"	681	ND	69	75-125	5	20
Beryllium	16.9		0.35	"	17.0	1.71	89	75-125	1	20
Cadmium	13.4		0.88	"	17.0	0.427	76	75-125	3	20
Chromium	57.6		1.8	"	68.1	5.62	76	75-125	3	20
Cobalt	312		7	"	170	133	105	75-125	3	20
Copper	6,530	Q10	14	"	85.2	5,670	1000	75-125	4	20
Lead	129		5.3	"	170	ND	76	75-125	3	20
Molybdenum	125		8.8	"	170	ND	73	75-125	2	20
Nickel	225		8.8	"	170	83.2	83	75-125	5	20
Selenium	512		3.5	"	681	ND	75	75-125	3	20
Silver	13.4		1.8	"	17.0	ND	79	75-125	2	20
Thallium	523		8.8	"	681	ND	77	75-125	3	20
Vanadium	132		3.5	"	170	ND	78	75-125	0.4	20
Zinc	305		28	"	170	124	106	75-125	3	20

Reference (B0E0111-SRM1)

Antimony	216		2	mg/kg wet	213		102	60.75-140		
Arsenic	978		2	"	930		105	65.98-134		
Barium	5.6		5	"	5.30		106	47.17-153		
Beryllium	19.2		0.1	"	18.8		102	81.38-118		
Cadmium	38.5		0.5	"	41.6		93	77.16-123		
Chromium	100		1	"	96.5		104	80.06-119		
Cobalt	134		2	"	140		96	82.42-118		
Copper	6,460		20	"	6680		97	85.73-114		
Lead	197		3	"	224		88	74.82-125		
Nickel	55.3		5	"	56.8		97	76.58-123		



**United States Environmental Protection Agency
Region 9 Laboratory**

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman	Emergency Response Section	SDG: 10141C
Project Number: R10S65	75 Hawthorne Street	Reported: 06/21/10 11:14
Project: Anaconda Mine 2010 Old Raffinate Pond Sampling	San Francisco CA, 94105	

Quality Control

Analyte	Result	Qualifiers / Comments	Quantitation Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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Batch B0E0111 - 3050B Sld Acid Dig - Metals by 6010

Prepared: 05/27/10 Analyzed: 06/07/10

Metals by EPA 6000/7000 Series Methods - Quality Control

Reference (B0E0111-SRM1)

Selenium	48.4			2 "	37.0		131	47.57-152		
Silver	24.6			1 "	20.9		118	63.16-136		
Thallium	33.8			5 "	38.1		89	64.57-135		
Vanadium	71			2 "	65.8		108	80.55-119		
Zinc	177			8 "	175		101	72.97-127		

Batch B0F0014 - Solids, Dry Weight (Prep) - Solids, Dry Weight

Prepared: 06/03/10 Analyzed: 06/04/10

Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control

Blank (B0F0014-BLK1)

% Solids	ND	U		1 %						
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Duplicate (B0F0014-DUP1)

Source: 1005034-02

% Solids	55			1 %		57			4	20
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United States Environmental Protection Agency
Region 9 Laboratory

1337 S. 46th Street, Building 201, Richmond, CA 94804
Phone:(510) 412-2300 Fax:(510) 412-2302

Project Manager: Thomas Dunkelman

Project Number: R10S65

Project: Anaconda Mine 2010 Old Raffinate Pond
Sampling

Emergency Response Section

75 Hawthorne Street

San Francisco CA, 94105

SDG: 10141C

Reported: 06/21/10 11:14

Qualifiers and Comments

Q4 The matrix spike and/or matrix spike duplicate associated with this sample did not meet recovery criteria for this analyte (see MS/MSD results for this batch in QC summary)

Q10 The analyte concentration in the unfortified sample is significantly greater than the concentration spiked into the matrix spike and matrix spike duplicate. The reported spike recovery is not a meaningful measure of the dataset's analytical accuracy.

J The reported result for this analyte should be considered an estimated value.

C1 The reported concentration for this analyte is below the quantitation limit.

U Not Detected

NR Not Reported

RE1, RE2, etc: Result is from a sample re-analysis.

Appendix H: START Sampling Plans



Sampling Analysis Plan

**Anaconda Removal
Air Sampling and Monitoring
102 Burch Drive
Yerington, Nevada**

**TDD No.: TO-02 09-10-03-0003
Job No.: 002693.2080.01RP**

May 2010

Prepared for:

**U.S. ENVIRONMENTAL PROTECTION AGENCY
Region IX**

Prepared by:

ECOLOGY AND ENVIRONMENT, INC.
3700 Industry Avenue
Lakewood, California 90712

Superfund Technical Assessment and Response Team

Anaconda Removal
Air Sampling and Monitoring
102 Burch Drive
Yerington, Nevada

Sampling Analysis Plan

TDD No.: TO-02 09-10-03-0003
Job No.: 002693.2080.01RP

May 2010

Approved by: _____
Maggie Tymkow, START Field Team Member
Ecology and Environment, Inc.

Approved by: _____
Howard Edwards, START Quality Assurance Coordinator
Ecology and Environment, Inc.

Approved by: _____
Tom Dunkelman, Federal On-Scene Coordinator
U.S. Environmental Protection Agency, Region IX

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1 Introduction

The United States Environmental Protection Agency (USEPA) tasked Ecology and Environment, Inc.'s (E & E's) Superfund Technical Assessment and Response Team (START) to conduct air monitoring and sampling during asbestos removal activities at the mine office building that is proposed for demolition at the Anaconda Mine (the Site) near Yerington, Nevada. The USEPA will undertake activities to mitigate the potential for exposure during the asbestos removal activities. Additionally, dust monitoring will be performed during disposal pit excavation and back-fill.

The specific field sampling and chemical analysis information pertaining to the site is addressed in this Sampling and Analysis Plan (SAP), in accordance with the following documents: *EPA Requirement for Quality Assurance Project Plans (QA/R-5)*, March 2001, *Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4)*, February 2006, and *Guidance on Choosing a Sampling Design for Environmental Data Collection (QA/G-5S)*, December 2002.

This SAP describes the project and data use objectives, data collection rationale, quality assurance goals, and requirements for sampling and analysis activities. It also defines the sampling and data collection methods that will be used for this project. This SAP is intended to accurately reflect the planned data-gathering activities for this investigation; however, site conditions and additional circumstance may warrant modifications. All significant changes will be documented in site records and in the final report.

1.1 Project Organization

USEPA Federal On-Scene Coordinator (FOSC) – The USEPA On-Scene Coordinator and Task Monitor (TM) will be Tom Dunkelman. FOSC Dunkelman is the primary decision-maker and will direct the project, specify tasks, and ensure that the project is proceeding on schedule and is within budget. Additional duties include coordination of communication with the START Project Manager, USEPA Quality Assurance Office, and community residents.

START Project Manager (PM) – Howard Edwards is the START PM. The PM manages the project's data collection efforts and is responsible for developing the SAP, specifically the documentation of project objectives and preparing and reviewing the draft and final SAP document. The PM is also responsible for implementing the SAP, coordinating project tasks and field sampling, managing field data, and completing all preliminary and final reporting.

Principal Data Users – Data generated during the implementation of this SAP will be used by the FOSC to make decisions regarding potential removal activities.

START Quality Assurance (QA) Coordinator – Howard Edwards is the START QA Coordinator. Mr. Edwards will coordinate with the USEPA's Quality Assurance Office as needed.

START Field Team Member (FTM) – Maggie Tymkow and Adam Smith are the START FTMs. FTMs are responsible for the performance of tasks assigned to the START by the

USEPA. Specifically, FTMs are responsible for implementing the SAP; implementing the sampling design; collecting, handling, documenting, and transporting samples; generating field documentation of sampling activities; working with the START QA Coordinator to ensure project quality assurance goals are met; and preparing a final report for submission to the USEPA.

Sample Analysis and Laboratory Support – The analytical laboratory has not yet been identified. The laboratory is responsible for handling, analysis, and documentation of samples in accordance with specified analytical methods.

1.2 Distribution List

Copies of the final SAP will be distributed to the following persons and organizations:

- Tom Dunkelman, USEPA, Region 9
- USEPA, Region 9, Quality Assurance Office
- E & E START Field Team
- E & E START project files

1.3 Statement of the Specific Problem

On September 21, 2009, an asbestos survey was performed at the Anaconda Mine office building by Lisa Monroe & Associates, Inc. (LMA). According to laboratory analysis, the wall texture contains 1-5 percent (%) chrysotile asbestos; the joint compound contains 1-5% chrysotile asbestos; the 9- by 9-inch floor tiles contain 1-5% chrysotile asbestos; the black mastic under all of the floor tiles contains 1-5% chrysotile asbestos; the vent duct tape on the [heating, ventilating, and air conditioning](#) (HVAC) ducting contains 60-70% chrysotile asbestos; and the exterior siding contains 20-30% chrysotile asbestos. Also noted to be present is a transite flue pipe on the hot water heater.

The USEPA's National Emission Standards for Hazardous Air Pollutants (NESHAPS-40 Code of Federal Regulations [CFR] 61 Subpart A & M) requires that all regulated friable and non-friable asbestos-containing materials (ACMs) be removed from a facility prior the demolition process. The removal of the regulated ACMs must be performed by an asbestos abatement contractor. All regulated friable and non-friable ACMs must be disposed at a USEPA approved landfill that accepts asbestos waste, and all waste must have waste manifest documentation. Notifications for the asbestos abatement and the demolition must also be filed with the USEPA Region 9 and Nevada Occupational Safety and Health Administration (OSHA).

The non-asbestos containing debris from the planned demolition and tires that have been abandoned on-site will be deposited in excavation pits located at the Anaconda Site. During the pit excavation and back-filling effort, dust from the activities needs to be monitored, concentrations documented, and decisions need to be made concerning dust control.

2 Site Background

2.1 Site Location and Description

The Site is located at 102 Burch Drive near the City of Yerington, Nevada (Figure 2-1). The geographic coordinates for the Site are 38° 59' 38.57" latitude and 119° 11' 53.64" longitude. The Site covers several square miles and includes Township 13N, Range 25E, Sections 4, 5, 8, 9, 16, 17, 20, and 21 on the Mason Valley and Yerington USGS 7.5 minute quadrangles. The Site occupies 3,468 acres (about 5.5 square miles) of disturbed land in a rural area approximately 1 mile west of the City of Yerington (NDEP, 1994). The Site is bordered to the north by open agricultural fields, to the west and southwest by the Singatse Mountain Range and the town of Weed Heights, to the south by Bureau of Land Management (BLM) land, and to the east by Highway 95A, which separates the site from the City of Yerington (NDEP, 1994; USGS, 1987a; USGS, 1987b). The Site land ownership includes parcels owned by BLM, Atlantic Richfield Company, and Arimetco, Inc.

The approximate 8,000-square foot Anaconda Mine office building that is scheduled for demolition is located on the southeastern portion of the Site. The building location is shown in Figure 2-2.

2.2 Site History and Previous Investigations

The Anaconda Mine site began operation in 1918 and was originally known as the Empire Nevada Mine. From 1951 to 1978, the Site was occupied by the Anaconda Copper Company. In approximately 1978, the Site was occupied by Atlantic Richfield Company (Atlantic Richfield). In 1982, Atlantic Richfield sold its interests in the private lands within the site to Don Tibbals, a local resident, who conducted minor mining operations at the Site. In 1988, Mr. Tibbals subsequently sold his interests, with the exception of the Weed Heights community, to Arimetco, Inc. (Arimetco). Arimetco operated a copper recovery operation from existing ore heaps within the Site from 1989 to November 1999, when they filed for bankruptcy. The Nevada Division of Environmental Protection (NDEP) has been managing the Site since January 2000, and in 2004 the state requested USEPA assistance.

An asbestos survey was performed on September 21, 2009 at the Anaconda Mine office building by Lisa Monroe & Associates, Inc. (LMA), and ACMs were identified in the building. The survey consisted of 28 bulk samples from wall texture, joint compound, floor tiles, black mastic, ceiling tile, ceiling tile glue, vent duct tape, exterior siding and roofing materials.

Based on the asbestos survey, the following regulated friable and Category II non-friable ACMs must be removed by an asbestos abatement contractor prior to the demolition of the facility:

- All walls and wall texture; 1-5% chrysotile asbestos/friable; approximately 6,300 square feet.
- Heating, ventilating, and air conditioning (HVAC) vents and vent duct tape; 60-70% chrysotile asbestos/friable; approximately 30-50 linear feet.

- All 9- by 9-inch floor tiles on concrete and under carpets; 1-5% chrysotile asbestos/non-friable; approximately 6,800 square feet.
- All black mastic under floor tiles; 1-5% chrysotile asbestos/non-friable; approximately 6,800 square feet.
- All exterior siding; 20-30% chrysotile asbestos/non-friable; approximately 5,300 square feet.
- Flue pipe on hot water heater; chrysotile asbestos/non-friable; approximately 25 linear feet.

Based on the asbestos survey, the following conclusions were made by LMA:

- Not all of the wall texture contains 1-5% chrysotile asbestos; however, the walls still contain a trace amount of asbestos and a defining line distinguishing asbestos content above and below 1% can not be drawn. Therefore, all of the walls with wall texture will need to be removed.
- The asbestos-containing floor tiles and black mastic are on concrete and are also present under the carpets. All of the floor tiles and black mastic will need to be removed.
- The vent duct tape on the HVAC ducting is visible in the attic area and may also be present on the vents that are not visible. All HVAC vents and vent duct tape must be removed.
- The asbestos-containing flue pipe on the hot water heater also extends into the attic and must be removed.
- The exterior of the building has areas that are in poor condition, and visible siding debris was observed in the soil. The soil containing siding debris must be removed.

The asbestos survey is included in Appendix A.



Figure 2-1
(insert here)



Figure 2-2
(insert here)

3 Project Objectives

3.1 Data Use and Sampling Objectives

Data generated from this event will be used to:

- Establish background levels of any asbestos fibers that might be in the air inside and outside the Anaconda Mine office building (regulated work area).
- Determine if asbestos fiber has been released into the air during removal activities.
- Determine whether dust with a particle size that is less than 10 microns in diameter (PM-10) is being released into the air during pit excavation and back-filling activities in order to evaluate if dust control measures are effective.

The principal questions that are being addressed are as follows:

- Has asbestos been released into the air during abatement and demolition activities?
- If asbestos was released, at what concentrations?
- What is PM-10 concentration in ambient air during activities?

The START will collect samples to characterize asbestos in air and conduct real-time air monitoring to measure total dust. The START will contract a certified laboratory for asbestos sample analysis.

3.2 Action Levels

3.2.1 Asbestos

The National Institute of Occupational Safety and Health (NIOSH)/OSHA work group concluded that there was no level of exposure to asbestos below which clinical effects did not occur. They recommended a Permissible Exposure Limit (PEL) based on the lowest measurable airborne fiber level, 0.01 fibers per cubic centimeter (fibers/cc). The USEPA has accepted this conclusion and recommends that 0.01 fibers/cc be used to define the successful completion of asbestos abatement work. Therefore, the action level for perimeter monitoring for asbestos is 0.01 fiber/cc over a 6 to 12 hour activity period.

3.2.2 PM10

The National Ambient Air Quality Standards (NAAQS) include a PM-10 standards established by the USEPA under authority of the Clean Air Act. However for this project there are pre-existing PM-10 action limits that will be used as the project action levels for PM-10 concentration monitoring (Table 3-1).

Table 3-1 Construction Zone Action Level Criteria and Air Monitoring Parameters Anaconda Removal Project TDD No.: TO-02 09-10-03-0003 Job No.: 002693.2080.01RP			
Parameter	Action Level 1	Action Level 2	Action Level 3
PM-10 Dust Monitor	500 µg/m ³	1,000 µg/m ³	2,500 µg/m ³
Construction Work Action	<u>Notify earthwork crew</u> Increase dust control measures – visually monitor display to ensure levels fall below Action Level 1.	<u>Notify ERRS Response Manager and USEPA OSC</u> Notify earthwork crew – increase dust control measures – visually monitor display to ensure levels fall below Action Level 1.	<u>Stop work – Notify site manager and USEPA</u> Notify earthwork crew – increase dust control measures – visually monitor display to ensure levels fall below Action Level 2. Approval from site manager and USEPA required to resume work.

3.3 Data Quality Objectives

3.3.1 Data Quality Objective (DQO) Process

The DQO process, as set forth in the USEPA document, *Guidance on Systematic Planning Using the Data Quality Objectives Process*, EPA QA/G-4, was followed to establish the data quality objectives for this project. An outline of the process and the outputs for this project are included in Appendix B.

3.3.2 DQO Data Categories

This investigation will involve the generation of quantitative, definitive asbestos concentration data from fixed, analytical laboratories and semi-quantitative, field data for dust (screening data). The analytical data generated under this project will comply with requirements detailed in Section 9.

3.4 Data Quality Indicators (DQIs)

The DQI goals for this project were developed following guidelines in the EPA *Guidance for Quality Assurance Project Plans*, EPA QA/G-5, 2002. Valid samples are defined as those samples that meet all criteria associated with sampler calibration, sample collection and review, and laboratory analysis outlined in the this SAP, the analytical method, and applicable sampling and laboratory SOPs.

All sampling procedures detailed in Section 6.2 and appropriate standard operating procedures (SOPs) will be followed to ensure representativeness of sample results by obtaining characteristic samples. To collect representative spatial and temporal data, the START designed the sampling in accordance with guidelines in the *Superfund Program Representative Sampling Guidance Volume 2: Air (Short-Term Monitoring)*, EPA 540/R-95/140, 1995.

3.5 Schedule of Sampling Activities

The asbestos removal will take place from May 12 through May 24, 2010, followed by building demolition activities.

3.6 Special Training Requirements/Certifications

Training requirements relevant to E & E's health and safety program, which complies with 29 CFR 1910.120, are detailed in the site-specific health and safety plan (Appendix C).

4 Sampling/Monitoring Rationale and Design

The principal focus of this sampling/monitoring event is to determine and document whether airborne asbestos and PM-10 concentrations are present in the air at the Site in-order to evaluate whether appropriate control measures are/were in place during the removal and burial pit excavation and backfilling activities.

Sampling design was determined with guidance from *Superfund Program Representative Sampling Guidance Volume 2: Air (Short-Term Monitoring)*, EPA 540/R.-95/140, 1995. The following are guidelines and requirements for sampling/ monitoring:

- Sampling and monitoring locations will be situated at the border between the exclusion zone and the contamination reduction zone.
- Where the work zone has relatively unobstructed airflow, wind direction will be monitored with a portable meteorological station and recorded for the duration of sampling/monitoring.
- Sampling and monitoring locations should border the work zone, but should not interfere with access to the work zone.
- Sampling and monitoring locations should be co-located in as many locations as possible around the work zone. At minimum they will be co-located both upwind and downwind of the work zone (as near as allowed by work zone access constraints).
- Sampling and monitoring equipment will be operated concurrently to work in the work zone(s); equipment will be started when work begins for the day and stopped when work ends. Equipment will be operated during break/lunch intervals; the times of breaks will be recorded in the site log.
- The length of time operations will be conducted in a work zone will be ascertained prior to calibration of sampling equipment. If operations in a work zone will not continue for a length of time sufficient for a viable sample to be collected, then samplers will be relocated to operations at a new work zone or, if no other work zone is to be established, left in place to operate the minimum amount of time to achieve a viable sample.
- Background ambient dust concentrations will be established for each work zone prior to the beginning of operations each day.
- Two background asbestos samples will be collected per day of operations. The sample location will be upwind of the work zone in an area of similar properties and a location unlikely to be impacted by site operations regardless of wind direction.
- Sampler and monitor inlets will be placed at normal breathing height, approximately 5 feet above ground level.
- One co-located sample (duplicate) per day or one per ten samples collected in a day (10 percent), whichever is greater, will be collected each day of sampling.

4. Sampling/Monitoring Rationale and Design

The total number of samples expected for the project is not known, however the Planning Team estimates that approximately 126 samples plus associated quality control (QC) samples will be collected during this project. The order in which different locations will be mitigated will not be determined in advance of field activities. It is anticipated that mitigation of areas near classrooms will occur first; however, the order in which these areas will be approached has not been determined.

4.1 Sampling/Monitoring Locations

Sampling/monitoring locations will be arranged to distinguish spatial trends in airborne asbestos and PM-10 concentrations. Sampling schedules will be fashioned to establish temporal trends. The sampling strategy requires that the concentration of asbestos be quantified at the source (worst case) or area of concern (downwind) and crosswind. The background (upwind) contributions must also be quantified.

4.1.1 Building Asbestos Abatement and Demolition

Sampling will be restricted to a specified area within a perimeter that surrounds the building planned for abatement and demolition. The eastern investigation perimeter is Burch Drive, with the southern, western, and eastern perimeters at a 50 to 100 feet radius around the building.

- Sample collection must take place during abatement and demolition activities.
- In order to generate data that can affect on-site control methods, some data must be available within 24 to 48 hours after samples are collected.

Sample locations for ambient air are summarized in Table 4-1.

Table 4-1 Sample Locations for Asbestos Sampling (Ambient Air) Anaconda Removal Project TDD No.: TO-02 09-10-03-0003 Job No.: 002693.2080.01RP		
Sample Location	Sample Numbers	Rationale
Upwind/Background	Minimum of two simultaneous upwind/background samples 30 degrees apart from the prevailing wind-lines.	Establishes background fiber levels.
Downwind	Minimum of three in a 180 degree arc downwind from the source.	Indicates if asbestos is leaving the perimeter.
Indoor Sampling /or Worst Case	Obtain one site representative sample which shows average indoor air condition on-site which would be a worst case sample (optional).	Verify and continually confirm and document selection of proper levels of worker protection and establish worst case baseline.

4. Sampling/Monitoring Rationale and Design

4.1.2 Burial Pit Excavation and Backfilling Sampling/Monitoring

Real-time monitoring will be restricted to outside a perimeter of 100 feet around the excavation area.

- Sampling must take place during excavation and backfilling activities.

Sampling/monitoring locations are provided in Table 4-3.

Table 4-3 Sampling/Monitoring Locations for PM-10 Anaconda Removal Project TDD No.: TO-02 09-10-03-0003 Job No.: 002693.2080.01RP		
Sample Location	Sample Numbers	Rationale
Upwind/Background	One upwind monitor that is moved based upon actual prevailing wind-lines.	Establishes background levels.
Downwind	One downwind monitor that is moved based upon actual prevailing wind-lines.	Indicates if PM-10 is leaving the perimeter.
Site Representative/or Worst Case	Obtain one site representative sample which shows average condition on-site or obtain worst case sample (optional).	Verify and continually confirm and document selection of proper levels of worker protection.

4.2 Analytes of Concern

The analytes of concern for this project include:

- *Building Asbestos Abatement and Demolition*
Asbestos above the action level of 0.01 fibers/cc.
- *Burial Pit Excavation and Backfilling Activities*
Dust with a particle size that is less than 10 microns in diameter.

5 Analytical Methods

All laboratory services will be provided by a START-contracted laboratory:

EMS Laboratories, Inc.
 117 West Bellevue Drive
 Pasadena, CA 91105.
 Bernadine (Bernie) Kolk
 Laboratory Director
 e-mail: bkolk@emslabs.com
 phone: (626) 568-4065
 (800) 675-5777

Table 5-1 summarizes the sample containers and number of samples proposed for the investigation.

Table 5-1 Analytical Methods and Requirements Matrix-Air Anaconda Removal Project TDD No.: TO-02 09-10-03-0003 Job No.: 002693.2080.01RP	
Method:	National Institute of Occupational Safety and Health (NIOSH) Methods 7400 and if necessary 7402
Sample Container:	Cassette with a 25 millimeter diameter, mixed cellulose ester filter with pore size less than or equal to 0.80 micrometers
Number of Samples	
Field Samples:	126 (estimated)
Duplicates:	13 (10% of field samples)
Field Blanks:	1 per day
Filter Blanks:	1 per day
Background:	1 per day

5.1 Building Asbestos Abatement and Demolition

Air samples will be analyzed for asbestos using two primary measurements methods: NIOSH Method 7400 for Phase Contract Microscopes and if necessary, NIOSH Method 7402 for Transmission Electron Microscopy (TEM). These methods are included in Appendix D.

Both methods have sufficient sensitivity, accuracy, precision to generate necessary data provided sufficient air volumes have been sampled. However, the TEM method provides more definitive identification data.



5.2 Burial Pit Excavation and Backfilling Activities

Dust monitoring for PM-10 concentrations will be performed with MIE DataRam-4000 real-time, aerosol monitors. DataRam units will be operated in accordance with manufacturer's guidelines.

6 Field Methods and Procedures

The following sections describe field procedures and equipment used during the site activities.

6.1 Field Procedures

6.1.1 Equipment

The following equipment will be utilized to obtain environmental data and/or samples from the respective media:

Table 6-1 Equipment Anaconda Removal Project TDD No.: TO-02 09-10-03-0003 Job No.: 002693.2080.01RP			
Parameter	Asbestos	Meteorological Conditions	Dust Monitoring
Matrix	Air	Air	Air
Equipment (Fabrication/Dedicated)	Low-flow sampling pump (Various/No) Sample tubing (Tygon/Yes) Sampling Cassette with MCE filter (Various/Yes)	Portable weather stations (Various/Not applicable)	Thermo DataRam™ (Various/Not applicable)

The planned equipment is in accordance with the USEPA Environmental Response Team (ERT) SOP 2015 Asbestos Sampling. The SOP is included in Appendix D.

6.1.2 Equipment Maintenance

Field equipment will be operated and maintained by the START according to the manufacturers' instructions.

- Sample pumps will be calibrated before and after use each sampling day.
- The background dust level measured by the DataRam in a clean environment will be evaluated daily by the START and the DataRam will be re-zeroed as necessary.
- Any pump that does not maintain calibration over the course of a day will be removed from service and evaluated. All equipment maintenance will be recorded in the START field logbook.

6.1.3 Inspection/Acceptance Requirements for Supplies and Consumables

There are no project-specific inspection/acceptance criteria for supplies and consumables. It is standard operating procedure that personnel will not use broken or defective materials; items will not be used past their expiration date; supplies and consumables will be checked against order

and packing slips to verify that the correct items were received; and the supplier will be notified of any missing or damaged items.

6.1.4 Logbooks

A logbook will be maintained for field work. Field logbooks will document where, when, how, and from whom any vital project information was obtained. Logbook entries will be complete and accurate enough to permit reconstruction of field activities. Logbooks will be kept in accordance with E & E SOP for Field Activity Logbooks. Use of subsidiary logbooks and field data sheets to record field and sampling information is allowed as long as a record of these documents is made in the site logbook and information is recorded in the subsidiary documents in accordance with the E & E SOP. The use of data acquisition and data management software, such as Scribe, does not constitute a substitute for a site logbook, and information entered into the computer program must be documented in a field logbook or data sheet.

The following information will be recorded, if applicable, during the collection of each sample:

- Sample location and description
- Site sketch showing sample location(s) and measured distances
- Sampler's name(s)
- Date and time of sample collection
- Sample matrix
- Sample equipment used
- Field observations and details important to analysis or integrity of samples (rain, odors, etc.)
- Instrument reading
- Sample description
- Shipping arrangements (airbill numbers)
- Receiving laboratory(ies).

In addition to sampling information, the following specifics may also be recorded in the field logbook for each day of sampling:

- Names of personnel on site and their responsibilities
- Time of arrival/entry on site and time of departure
- A summary of meetings or discussions with any potentially responsible party representatives, or representatives of any federal, state, or other regulatory agency
- Descriptions of deviations from project scope, work plans, sampling plans, site safety plans, or QA procedures
- Levels of safety protection

- Equipment calibration and equipment models and serial numbers
- Record of photographs
- Field screening measurements
- A list of subsidiary logbooks or field logsheets.

6.1.5 Photographs

Photographs will be taken at representative sampling locations and at other areas of interest onsite. They will serve to verify information entered in the field logbook. When a photograph is taken, the following information will be written in the logbook or will be recorded in a separate field photography log:

- Time, date, location, and, if appropriate, weather conditions
- Description of the subject photographed
- Name of person taking the photograph
- Photograph number

6.1.6 Sample Logging

The following information should be entered for each sample after collection:

- Sample name
- Sample date and time
- Number of sample cassettes
- Analyses

Sampling personnel will generate chain-of-custody forms for all samples packaged and sent to a laboratory. Each chain-of-custody form will refer to the shipping method and tracking number. Printed chain-of-custody forms will be submitted to the laboratory with the samples.

6.2 Air Sampling and Monitoring Procedures

All air monitoring and sampling will be conducted in accordance with the previously cited methods and SOPs. Any deviations will be noted in the site logbook. Monitoring and sampling locations will be selected as outlined in Section 4. Air monitors and sampler intakes will be placed in the breathing zone. Sample locations will be recorded in the field logbook with a sketch or description of the sample location and physical reference points. If possible, distances to reference points will be labeled or noted. Sample points and site features will be documented with a Global Positioning System (GPS) unit. The GPS will be used to assign precise latitude and longitude positions to sample locations on the Site. GPS mapping will be done by personnel trained in the use of the equipment and will be completed in accordance with the manufacturer's

instructions. Expected output from the use of the GPS mapping will be a site map with sample locations.

6.2.1 Air Sampling Procedure

Air samples will be collected with high-volume sampling pumps equipped with cassettes that contain a 25 millimeter diameter mixed cellulose ester (MCE) filter with a pore size less than or equal to 0.80 micrometers. Each sampler will be operated at approximately ten liters per minute. Samplers will be calibrated, using an electronic calibrator, prior to and after use each day using a cassette reserved for calibration (from the lot of the sample cassettes to be used in the field). For pre-sampling calibration, calibration will be considered complete when plus/minus five percent of the desired flow rate is attained, as determined by three measurements with the calibrator. For post-sampling, three separate constant flow calibration readings will be obtained and those flow readings will be averaged. If the flow rate changes by more than five percent during the sampling period, the average of the pre- and post-sampling rates will be used to calculate the total sample volume.

Samples for which there is more than a 25 percent difference from initial calibration to end calibration will be invalidated. The START will record the pump serial number, sample number, initial flow rate, sample start/end times, sample locations, and final flow rate in the field logbook. Calibration SOPs are included in Appendix D.

6.2.2 Dust Monitoring Procedure

Air monitoring for dust will be conducted with DataRam aerosol monitors. Each day prior to the start of mitigation activities a background level of dust will be established for each work zone. The START will deploy DataRams as described in Section 4 and operate them concurrently with removal activities. The DataRam will generate 15 minute average concentrations that are electronically stored in the instrument's memory. START will also record periodic readings (every 15 to 30 minutes) from the DataRams in a field logbook, noting the dust reading and site activities. If a DataRam is moved during the work day from one work zone to another, the time of the move and the dust reading will be recorded in the logbook. At the end of each work day, the START will download data files from the DataRams.

6.3 Decontamination Procedures

Only dedicated sampling equipment will be used for sample collection during the course of this project.

6.4 Field Health and Safety Procedures

Field activities will be conducted under the Site-Specific Health and Safety Plan included as Appendix B.

6.5 Data Management Procedures

Field data generated in this project will be included in the permanent project file maintained in the START office. Information for all air sampling conducted will also be recorded in the Scribe program, as required by the USEPA Region 9 Emergency Response Section.

Laboratory data generated in this project will be provided to the START by the laboratory in both hard-copy and electronic format. The data will be reviewed and summarized in tables by START in the final report to the USEPA OSC. Copies of the full laboratory data summary forms will be provided to the USEPA as an appendix to the final report, or earlier upon request.

7 Disposal of Investigation-Derived Waste

In the process of collecting environmental samples at the site, START members may generate several different types of potentially contaminated investigation-derived waste (IDW) that include the following:

- Used PPE
- Disposable sampling equipment

The USEPA's National Contingency Plan requires that management of IDW generated during site sampling investigations comply with all relevant or appropriate requirements to the extent practicable. This sampling plan will follow the *Guide to Management of Investigation-Derived Wastes* (USEPA, 1992), which provides the guidance for management of IDW. In addition, other legal and practical considerations that may affect the handling of IDW will be considered. Listed below are the procedures that will be followed for handling IDW. The procedures are flexible enough to allow the site investigation team to use its professional judgment on the proper method for the disposal of each type of IDW generated at each sampling location.

Used PPE and disposable sampling equipment will be double-bagged in plastic trash bags and disposed of in a municipal refuse dumpster. These wastes are not considered hazardous and can be sent to a municipal landfill. Any PPE or dedicated equipment that is to be disposed of that can still be reused will be rendered inoperable before disposal.

8 Sample Identification, Documentation and Shipment

8.1 Sample Nomenclature

Sample identification numbers (IDs) will be assigned to each sample as it is collected. The sample prefix “A” (ambient) or “I” (indoor) will identify the work zone where the sample was collected followed by the calendar date (e.g., 05112010) that will indicate the date of sample collection. The remainder of the sample ID will consist of the consecutive number identifying the order of sample collection. For example, A-05112010-1 corresponds to the first ambient sample collected on May 11, 2010. Duplicate samples will have an indicator “D” at the end of the sample ID (e.g., A-05112010-1D). For background samples, instead of a number identifying the work zone, the sample ID will begin with “BK” (e.g., BK-05112010-1). Blank samples will have an “FB” indicator for field blanks and “BB” indicator for filter blanks, followed by the date of sample collection (e.g., FB-05112010). The START will use the USEPA Scribe software to generate sampling paperwork. Sample numbers and locations will be entered into Scribe by START.

8.2 Container, Preservation, and Holding Time Requirements

All sample containers will have been delivered to the START in a pre-cleaned condition. Container requirements are summarized in Table 5-1. Reagents are not required for the preservation of asbestos samples.

8.3 Sample Labeling, Packaging, and Shipping

All laboratory samples collected will be labeled in a clear and precise way for proper identification in the field and for tracking in the laboratory. Sample labels will be affixed to the sample containers and secured with clear tape. Samples will have pre-assigned, identifiable and unique numbers in accordance with Section 8.1. The sample labels will contain the following information:

- Sample number
- Date and time of collection
- Site name
- Analytical parameter

Samples will be stored in a secure location on site pending shipment to the contract laboratory. Samples will be retained in the custody of site personnel at all times or secured so as to deny access to anyone else. When samples are not under the direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. All samples will be placed in delivery container with the appropriate chain-of-custody forms. All forms will be enclosed in plastic bags and included with the delivery container. Empty space in the delivery container will be filled with bubble wrap or styrofoam peanuts to prevent movement

8. Sample Identification, Documentation and Shipment

and breakage during shipment. Each delivery container will be securely taped shut with strapping tape, and custody seals will be affixed to the front, right, and back of each delivery container. Samples will be shipped for immediate delivery to the contracted laboratory. Upon shipping, the laboratory will be notified of:

- Shipment date and expected delivery date;
- Total number of samples by matrix and concentration;
- Carrier, air bill number(s), method of shipment (e.g., priority);
- Irregularities or anticipated problems associated with the samples; and
- Whether additional samples will be sent or if this is the last shipment.

8.4 Chain-of-Custody Forms and QA/QC Summary Forms

A chain of custody form will be maintained for all samples to be submitted for laboratory analysis, from the time the sample is selected for analysis to its final deposition. The chain-of-custody must include the following:

- Sample identification number
- Site name
- Sample date
- Number and volume of sample containers
- Required analyses
- Signature and name of samplers
- Signature(s) of any individual(s) with control over samples

Every transfer of custody must be noted and signed for; a copy of this record is kept by each individual who has signed. The original records will accompany the sample shipment with a separate record for each cooler. Corrections on sample paperwork will be made by drawing a single line through the mistake, initialing and dating the deletion. The correct information will be entered above, below, or after the mistake.

9 Quality Assurance and Control (QA/QC)

9.1 Field Quality Control Samples

The QA/QC samples described in the following subsections, which are also listed in Tables 5-1, will be collected during this investigation.

9.1.1 Filter Blanks

A filter blank is an unused filter that is analyzed to determine the background asbestos structure count for the sample media. The blank is kept with the sample set in the field but is not opened at any time. One filter blank per day will be submitted to the laboratory. The sample will be identified as a filter blank on the chain-of-custody form.

9.1.2 Field Blanks

A field blank is a filter cassette that has been taken to the sampling site, opened, and then closed. Such a filter is analyzed to determine the background asbestos structure count for the measurement. Two field blanks will be submitted to the laboratory for asbestos analysis each day of sampling. These samples will be identified as field blanks on the chain of custody forms.

9.1.3 Duplicate Samples

Duplicate samples are collected to evaluate the reproducibility of sampling and analysis. START data quality guidelines require that at least 10 percent of samples analyzed must be field duplicates. Duplicate samples will be packaged and sealed in the same manner as the other samples. An indicator "D" will be noted for each duplicate sample ID. If the relative percent difference between the duplicate pair exceeds 35 percent, the impact on data quality will be evaluated by the START QA chemist. Both asbestos sampling and particulate monitoring will include duplicate sampling.

9.1.4 Background Samples

One background sample will be collected each day of sampling. Background samples will be collected upwind from the planned work zones for the day. If the background level of asbestos exceeds the site action level, then the background asbestos concentration will become the action level for that day of sampling. Both asbestos sampling and particulate monitoring will include background sampling.

9.1.5 Laboratory QC Samples

The laboratory will examine laboratory blanks and conduct recounts and second analyst recounts in accordance with asbestos method requirements.

9.2 Analytical and Data Package Requirements

It is required that all asbestos samples be analyzed in accordance with the analytical methods listed in Table 5-1. The laboratory is required to supply documentation to demonstrate that their data meet the requirements specified in the method. A preliminary data summary will be required 10 working days after submission of samples for analysis. A full validation data package will be required 25 days after submission of samples. The laboratory(ies) will also provide all data electronically in a Microsoft™ Access database compatible format, such as an Excel spreadsheet or delimited text file.

The data package shall include all original documentation generated in support of this project. In addition, the lab shall provide original documentation to support that all requirements of the methods have been met. This includes, but is not limited to, sample tags, custody records, shipping information, sample preparation/extraction records, and instrument printouts such as mass spectra. Copies of information and documentation required in this document are acceptable. Deliverables for this project must meet the guidelines in *Laboratory Documentation Requirements for Data Evaluation* (R9/QA/004.1), EPA Region 9, March 2001.

It is required that all PM-10 real-time data be either downloaded archived or recorded in a log book.

9.3 Data Validation

PM-10 Monitoring Data

All PM-10 Monitoring Data will be quality assurance reviewed prior to reporting. Data validation will not be done and a formal report of the quality assurance review will not be generated.

Asbestos PCM Data

All PM-10 Monitoring Data will be quality assurance reviewed prior to reporting. Data validation will not be done and a formal report of the quality assurance review will not be generated.

Upon completion of the data review the data will be classified as one of the following: acceptable for use without qualifications, acceptable for use with qualifications, or unacceptable for use.

9.4 Field Variances

As conditions in the field may vary, it may become necessary to implement modifications to the proposed sampling as presented in this plan. When appropriate, the START QA Coordinator will be notified of the modifications and a verbal approval obtained before implementing the modifications. Modifications to the approved plan will be recorded in site records and reported in the post-sampling report.

9.5 Assessment of Project Activities

9.5.1 START Assessment Activities

The following assessment activities will be performed by the START:

- All project deliverables (SAP, Data Summaries, Final Report) will be peer reviewed prior to release to the USEPA. In time-critical situations, the peer review process may be concurrent with the release of a draft to the USEPA. Errors discovered during the peer review process will be reported by the reviewer to the originator of the document, who will be responsible for corrective action.
- The START QA Coordinator will review project documentation (logbooks, chain of custody records, etc.) to ensure the SAP was followed and that sampling activities were adequately documented. The QA Coordinator will document deficiencies and the PM will be responsible for corrective action.

9.5.2 USEPA Assessment Activities

USEPA assessment activities, which can include surveillance, management system reviews, readiness reviews, technical system audits, performance evaluation, and audits and assessments of data quality, have not been formally identified to the START by the USEPA at the time of generation of this SAP.

9.5.3 Project Status Reports to Management

It is standard operating procedure for the START PM to report to the USEPA TM issues as they occur or arise during the course of the project that could affect data quality, data use objectives, project objectives, or project schedules.

9.5.4 Reconciliation of Data with DQOs

Assessment of data quality is an ongoing activity throughout all phases of the project. The following outlines the methods to be used by the START for evaluating the results obtained from the project.

- Review of the DQO outputs and the sampling design will be conducted by the START QA Coordinator (and in some cases the USEPA Quality Assurance Office) prior to sampling activities. The reviewer will submit comments to the START PM for action, comment, or clarification. This process will be iterative.
- A preliminary data review will be conducted by the START. The purpose of this review is to look for problems or anomalies in the implementation of the sample collection and analysis procedures and to examine QC data for information to verify assumptions underlying the DQOs and the SAP. When appropriate to the sample design, basic statistical quantities will be calculated and the data will be graphically presented.



9. Quality Assurance and Control (QA/QC)

- When appropriate to the sample design and if specifically requested by the USEPA TM, the START will select a statistical hypothesis test and identify assumptions underlying the test.
- When appropriate to the sample design and if specifically requested by the USEPA TM, the START will examine the underlying assumptions of the statistical hypothesis test in the light of the environmental data. This will be accomplished by determining the approach for verifying assumptions, performing tests for the assumptions, and determining corrective actions.

10 References

Lisa Monroe & Associates, Inc. (LMA). 2009. “*Bulk Sample Short Report*” September 21, 2009

U.S EPA, 1990. *Quality Assurance Quality Control Guidance for Removal Activities, Sampling QA/QC Plans and Data Validation Procedures*, (OSWER Directive 9340.4-1, EPA/540/G-90/004), April

U.S EPA, 1992. *Guide to Management of Investigation-Derived Wastes*, (OSWER Directive 9345.3-03FS), January

U.S. EPA, 1995. *Superfund Program Representative Sampling Guidance Volume 2: Air (Short-Term Monitoring)*, (EPA 540/R-95/140), December

U.S. EPA, 2001. *Laboratory Documentation Requirements for Data Evaluation* (EPA Region IX R9/QA/00.4.1), March

U.S. EPA, 2001. *Requirements for Quality Assurance Project Plans* (EPA QA/R 5, EPA/240/B 01/003), March

U.S. EPA, 2002. *Guidance on Choosing a Sampling Design for Environmental Data Collection* (EPA QA/G 5S, EPA/240/R 02/005), December

U.S EPA, 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process*, (EPA QA/G-4, EPA/240/B-06/001), February

Appendix A

Previous Asbestos Survey

Appendix B

Data Quality Objective Process Document

Anaconda Removal Project

Data Quality Objectives (DQO) Process Document for Air Sampling

TDD No.: TO-02 09-10-03-0003

Job No.: 002693.2080.01RP

This DQO documentation version reflects the initial project objectives as of April 21, 2010 that include dust monitoring during disposal pit excavation and back-fill.

1. THE PROBLEM

Background

The Anaconda Site is located at 102 Burch Drive near Yerington, Nevada. The geographic coordinates for the site are 38° 59' 38.57" latitude and 119° 11' 53.64" longitude, taken by global positioning system (GPS) at the mine office on Burch Drive. This Site covers several square miles and includes Township 13N, Range 25E, Sections 4, 5, 8, 9, 16, 17, 20, and 21 on the Mason Valley and Yerington USGS 7.5 minute quadrangles. The Site is bordered to the north by open agricultural fields, to the west and southwest by the Singatse Mountain Range and the town of Weed Heights, to the south by Bureau of Land Management (BLM) land, and to the east by Highway 95A, which separates the site from the city of Yerington (NDEP, 1994; USGS, 1987a; USGS, 1987b).

The Anaconda Copper Company operated the mine from 1953 until 1978 and disposed of mining wastes into evaporation ponds on-site. Atlantic Richfield Company (ARCO) purchased Anaconda in 1977, as the Yerington Mine was shutting down. In 1978, the mine was sold to a private entrepreneur who leased the portions of the site to other companies for salvaging activities. Arimetco purchased the property in 1988 and continued site operations until 1997, when they filed for bankruptcy, and continued to operate the mine until January, 2000. The Nevada Division of Environmental Protection (NDEP) has been managing the site since January, 2000 and in 2004, the state requested USEPA assistance.

This DQO will focus on the approximate 8,000-square foot mine office building which is scheduled for demolition. Based on an asbestos survey performed on September 21, 2009 at the mine office building by Lisa Monroe & Associates, Inc. (LMA), asbestos containing materials (ACMs) were identified in the building. The survey consisted of 28 bulk samples from wall texture, joint compound, floor tiles, black mastic, ceiling tile, ceiling tile glue, vent duct tape, exterior siding and roofing materials.

The laboratory analysis indicated that the wall texture contains 1-5 percent (%) Chrysotile asbestos, the joint compound contains 1-5% Chrysotile asbestos, the 9x9 floor tiles contain 1-5% Chrysotile asbestos, the black mastic under all of the floor tiles contains 1-5% Chrysotile asbestos, the vent duct tape on the HVAC ducting contains 60-70% Chrysotile asbestos and the exterior siding contains 20-

30% Chrysotile asbestos. Also noted to be present is a transite flue pipe on the hot water heater. Recent asbestos survey indicates that the following regulated friable and Category II non-friable asbestos containing materials must be removed by an asbestos abatement contractor prior to the demolition of the facility:

1. All Walls/Wall Texture/1-5% Chrysotile Asbestos/Friable
2. HVAC Vents/Vent Duct Tape/60-70% Chrysotile Asbestos/Friable
3. All 9x9 Floor Tiles on Concrete & Under Carpets/1-5% Chrysotile Asbestos/Non-friable
4. All Black Mastic under Floor Tiles/1-5% Chrysotile asbestos/Non-friable
5. All Exterior Siding/20-30% Chrysotile Asbestos/Non-friable
6. Flue Pipe on Hot Water Heater/Chrysotile Asbestos/Non-friable

Although not all of the walls that were tested show the wall texture as containing 1-5% Chrysotile asbestos, they still contain a trace of asbestos and a defining line can't be drawn as the where the asbestos content above 1% stops or starts. Therefore, all of the walls with wall texture will need to be abated. The asbestos containing floor tiles and black mastic are on concrete and are also present under the carpets. The vent duct tape on the HVAC ducting is visible in the attic area and may also be present on the vents that are not visible, but must be abated. The asbestos containing flue pipe on the hot water heater also extends into the attic and must be totally removed. The exterior siding has some areas that have been damaged and visible siding debris is in the dirt and will need to be picked up during the abatement process.

The Environmental Protection Agency's National Emission Standards for Hazardous Air Pollutants (NESHAPS-40 CFR 61 Subpart A & M) requires that all regulated friable and non-friable asbestos containing materials be removed from a facility prior the demolition process. The removal of the regulated asbestos containing materials must be performed by an asbestos abatement contractor. All regulated friable and non-friable asbestos containing materials must be disposed of at an E.P.A. approved landfill that accepts asbestos waste, and all waste must have waste manifest documentation. Notifications for the asbestos abatement and the demolition must also be filed with the E.P.A. Region 9 and Nevada OSHA.

Non asbestos containing debris from the planned demolition and tires abandoned on-site will be deposited in excavation pits located on the Anaconda Site. During the pit excavation and back-filling effort dust from the activities need to be monitored, concentration documented and decision need to be made concerning dust control.

Planning Team

Primary Decision Maker
and Plan Approval:

Tom Dunkelman EPA On-Scene Coordinator (OSC)

Plan Development:

START personnel, Emergency Rapid Response Services (ERRS) contractor, START analytical service provider,

Conceptual Site Model

Building Asbestos Abatement and Demolition

- The medium of concern is air. This medium will include ambient and indoor air.
- The principal Contaminants of Primary Concern (COPCs) is asbestos above the action level of 0.01 fiber per cubic centimeter (fiber/cc).
- Residential communities within the City of Yerington, Nevada are potential located down-wind of abatement/ demolition caused airborne asbestos fibers.
- On-site workers and vehicle occupants on the road adjacent to building are potential located down-wind of abatement/ demolition caused airborne asbestos fibers.
- Demolition workers may be working in areas of elevated airborne asbestos if the abatement does not remove all asbestos containing materials.

Burial Pit Excavation and Backfilling Activities

- The medium of concern is ambient air.
- The principal Contaminants of Primary Concern (COPCs) is dust with a particle size that is less than 10 microns in diameter.
- Residential communities within the City of Yerington, Nevada are potential located down-wind of activities.
- On-site workers and vehicle occupants in the areas are potentially located down-wind of activities.

Exposure Scenario

Building Asbestos Abatement and Demolition

- Concerns include direct exposure of airborne asbestos to human and environmental receptors; migration of airborne asbestos throughout a localized area; and, to a lesser degree, migration of asbestos from the air source to surface soil or water.
- The identified asbestos containing materials are considered to be regulated asbestos containing materials (RACM). RACM is defined as (A) friable (friable-able to crush, pulverize or reduce to powder by hand pressure) materials, (B) Category I non-friable asbestos containing materials that have become friable, (C) Category I non-friable asbestos containing materials that will be subjected to sanding, cutting, grinding or abrading, (D) Category II non-friable asbestos containing materials that have a high potential of becoming friable by the demolition process.

Burial Pit Excavation and Backfilling activities

- Concerns include inhalation of airborne particulate materials by human and environmental receptors.

Resources

The total available budget currently allocated to the START for all removal associated work is \$75,723.21.

START and the US EPA have appropriate air sampling equipment and supplies for asbestos sampling. US EPA has appropriate air monitoring instrument for particulate matter monitoring

START has analytical sub-contract for the appropriate asbestos analysis.

Other Considerations and Constraints Related to Problem and Resources

There are no effective and available real-time analytical instruments for determination of asbestos concentration in air.

Real-time data on particulate matter concentrations are needed.

2. THE DECISION

Principal Study Questions

Building Asbestos Abatement and Demolition

Principal Question: Has asbestos been released into the air during abatement and demolition activities? If asbestos was released, at what concentrations?

Questions that need to be answered to support the principle study question

Building Asbestos Abatement and Demolition

Secondary Question #1: What are the ambient airborne asbestos concentrations and airborne asbestos background level inside outside the building prior to abatement and demolition activities?

Secondary Question #2: What are the wind direction and speed during abatement and demolition activities?

Actions that could result from resolution of the study question for *Building Asbestos Abatement and Demolition*

If it is determined that concentrations of airborne asbestos are greater than the action level, then the information will be used to document the levels of airborne asbestos generated during abatement and may be used to initiate more aggressive control measures.

If it is determined that concentrations of airborne asbestos are less than the action level, then the information will be used to document that no significant levels of airborne asbestos were generated during abatement and may be used to establish that no further action regarding control measures is needed.

Principal Study Questions

Burial Pit Excavation and Backfilling activities

Principal Question: What is PM-10 concentration in ambient air during activities?

Actions that could result from resolution of the study question *Burial Pit Excavation and Backfilling activities*

If it is determined that concentrations of PM-10 are greater than the action level, then the information will be used to document the levels of PM-10 generated during activities and may be used to initiate more aggressive dust control measures.

If it is determined that concentrations of PM-10 are less than the action level, then the information will be used to document that no significant levels of PM-10 were generated during abatement and may be used to establish that no further action regarding control measures is needed.

Decision Statements (Directives)

Building Asbestos Abatement and Demolition

Determine and document whether airborne asbestos are present in the air in-order to determine whether appropriate control measures are/were in place.

Burial Pit Excavation and Backfilling Activities

Determine and document whether PM-10 concentration in the air exceed action levels in-order to determine whether appropriate control measures are/were in place.

3. DECISION INPUTS

Specific Data Required

- Asbestos in air concentration data for the times that correspond with the abatement/demolition activities.
- Ambient and indoor asbestos in air concentration data for the times prior abatement/demolition activities.
- PM-10 data
- Wind speed.
- Wind direction.

Sources for Study Information

- Analytical data from proposed on-site air sampling data.
- Instruments capable on detecting particulate matter in air.
- On-site weather station.

Information Needed to Establish Action Level

Building Asbestos Abatement and Demolition

US Asbestos Hazard Emergency Response Act (AHERA) established a clearance level for asbestos in buildings. The American Conference of Industrial Hygienists (ACGIH), National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA) have established regulatory and advisory benchmarks for occupational situation.

Burial Pit Excavation and Backfilling Activities

The National Ambient Air Quality Standards (NAAQS) include a PM-10 standards established by the United States Environmental Protection Agency under authority of the Clean Air Act.

Confirm that Measurement Methods Exist to Provide Data

Building Asbestos Abatement and Demolition

Two primary measurements methods are used: Phase Contrast Microscopes (PCM) and Transmission Electron Microscopy (TEM).

Both methods have sufficient sensitivity, accuracy, precision to generate necessary data provided sufficient air volumes have been sampled. However, the TEM methods provide more definitive identification data.

Burial Pit Excavation and Backfilling Activities

Several real-time instruments are commonly in use that can generate PM-10 data.

The best method is the Beta Attenuation monitoring instrument that generates data comparable to US EPA Clean Air Act methods. The MEI DataRam® and the MIE personal DataRam® (PDR) are also capable of generating real-time PM-10 data.

4. STUDY BOUNDARIES

Specific Characteristics that Define the Population Being Studied

Building Asbestos Abatement and Demolition

The asbestos concentrations in air within the area of concern (AOC).

Burial Pit Excavation and Backfilling Activities

The PM-10 concentrations in air within the area of concern (AOC).

Geographic Boundary of Investigation

Building Asbestos Abatement and Demolition

Sampling will be restricted to within a perimeter that surrounds the building planned for abatement and demolition. The eastern investigation perimeter is Burch Drive, with the southern, western, and eastern perimeter being at 50 to 100 feet radius around the building.

Burial Pit Excavation and Backfilling Activities

Sampling will be restricted to outside a perimeter of 100 feet around the excavation area.

Temporal Boundary of Investigation

Building Asbestos Abatement and Demolition

- Sample collection must take place during abatement and demolition activities.
- In order to generate data that can affect on-site control methods, some data must be generated within 24 to 48 hours after samples are collected.

Burial Pit Excavation and Backfilling Activities

- Sample collection must take place during excavation and backfilling activities.
- In order to generate data that can affect on-site control methods, data must be generated immediately.

Other Constraints on Data Collection

Building Asbestos Abatement and Demolition

- The turn-around times for data are always estimated and cannot be ensured. Sample and system problems may indiscriminately increase data turn-around times.
- TEM analysis methods are expensive and not amenable to fast turn-around requirements.

Burial Pit Excavation and Backfilling Activities

Real-time PM-10 methods may not generate data that is directly comparable to US EPA Clean Air Act methods.

5. DECISION RULE

Statistical Parameter

Building Asbestos Abatement and Demolition

The average concentration at directly down wind of abatement and demolition activities is the statistical parameter that is needed to answer the principle study question. The worst case concentration is also of value to determine potential exposure.

Burial Pit Excavation and Backfilling Activities

The average concentration at directly down wind of excavation and backfilling activities is the statistical parameter that is needed to answer the principle study question.

Action Levels

Building Asbestos Abatement and Demolition

National Institute of Occupational Safety and Health (NIOSH)/OSHA work group concluded that there was no level of exposure to asbestos below which clinical effects did not occur. They recommended a Permissible Exposure Limit (PEL) based on the lowest measurable airborne fiber level, 0.01 f/cc. The US EPA has accepted this conclusion and recommends that 0.01 fibers per cubic centimeter be used to define the successful completion of asbestos abatement work. Thus the action level for perimeter monitoring for asbestos is 0.01 fiber/cc over a 6 to 12 hour activity period.

Burial Pit Excavation and Backfilling Activities

Construction Zone Action Level Criteria and Air Monitoring Parameters			
Parameter	Action Level 1	Action Level 2	Action Level 3
PM10 Dust Monitor	500 µg/m³	1,000 µg/m³	2,500 µg/m³
Construction Work Action	<p><u>Notify earthwork Crew;</u></p> <p>Increase dust control measures – visually monitor display to ensure levels fall below Action Level 1</p>	<p><u>Notify ERRS Response Manager and EPA OSC;</u></p> <p>Notify earthwork Crew – increase dust control measures – visually monitor display to ensure levels fall below Action Level 1</p>	<p><u>Stop work – Notify site manager and EPA;</u></p> <p>Notify earthwork Crew – increase dust control measures – visually monitor display to ensure levels fall below Action Level 2 and approval from site manager and EPA required to resume work</p>

Decision Rules

Decisions for modification of site controls

1. If the new data indicates asbestos concentrations are above the action-level, then site controls will be modified.
2. If the new data indicates asbestos concentrations are below the action-level, then no further action concerning site controls are needed.

For Documentation

3. If the new data indicates asbestos concentrations are above the action-level, then it will be concluded in documentation that the action levels were exceed.
4. If the new data indicates asbestos concentrations are below the action-level, then it will be concluded in documentation that the action levels were not exceed.

6. LIMITS ON DECISION ERRORS

Range of the Parameters of Interest

Building Asbestos Abatement and Demolition

The range of interest for asbestos in air is from the action level to 20 times the action level or 0.01 to 0.2 fibers per cubic centimeter of air.

Burial Pit Excavation and Backfilling Activities

The range of interest for PM-10 in air is from the ½ the action level to 2 times the action level or 250 to 5,000 µg/m³ of air.

The Null Hypothesis or Baseline Condition

The asbestos and PM-10 concentrations in air do not exceed the action level.

Alternative Hypothesis

The asbestos and PM-10 concentration in air is greater than the action level.

Decision Error

A discussion of decision error is presented in Table 2.

<p align="center">Table 2 DECISION ERRORS Anaconda Removal Project TDD No.: TO-02 09-10-03-0003 Job No.: 002693.2080.01RP</p>		
Decision Error	Deciding that asbestos and/or PM-10 concentrations in air <u>exceed</u> the action level when they do not.	Deciding that asbestos and/or PM-10 concentrations in air <u>do not exceed</u> the action level when they do.
True Nature of Decision Error	The sample concentration does not exceed the action level.	The sample concentration does exceed the action level.
The Consequence of Error	The information will either undergo initiate additional control efforts or it will cause documentation to indicate that levels at the perimeter exceed the action level. Each situation would cost the EPA, Region 9, additional resources of time, money, and manpower.	The information would cause no additional control efforts or it will cause documentation to indicate that levels at the perimeter did not exceed the action level. The asbestos concentrations in air could indicate a potential for direct exposure to worker and community.
Which Decision Error Has More Severe Consequences near the Action Level?	LESS SEVERE	MORE SEVERE because the contaminated air may pose risks to human health and/or the environment.
Error Type Based on Consequences	False Positive Decision Decision that the air contaminant concentrations are greater than the action level when they actually are not.	False Negative Decision Decision that the air contaminant concentrations are less than the action level when they actually are not.
<p>Definitions False Negative Decision = A false negative decision error occurs when the null hypothesis is not rejected when it is false. False Positive Decision = A false positive decision error occurs when the null hypothesis is rejected when it is true. See the EPA document titled, <i>Guidance for the Data Quality Objective Process</i>, Chapter 6, (EPA QA/G-4) for additional guidance regarding decision error.</p>		

Decision Error Limits Goals

For this project, the decisions error is only important when it effects control decisions. Decision Error Limits goals stated in Table 3.

Table 3 Decision Error Limits Goals Anaconda Removal Project TDD No.: TO-02 09-10-03-0003 Job No.: 002693.2080.01RP		
True Concentration of Sample (fibers per cubic centimeter)	Typical Decision Error Probability Goals (Based on Professional Judgment)	Type of Decision Error
0B.005	Less than 0.01 (1%)	False positive
.005B0.01	Gray area ¹	False positive
0.01B0.10	0.10 (10%)	False negative
0.10B1.0	0.01 (1%)	False negative
>1.0.	Less than 1%	False negative
The goals in this table are based on professional judgment.		
¹ <i>Gray area</i> is where relatively large decision errors are acceptable.		

7. DESIGN FOR OBTAINING DATA

All activities and documentation related to the project should proceed under a Quality Management Plan (QMP). All sampling, analytical and quality assurance activities will proceed under a U.S. EPA-approved sampling plan. A record of sampling activities and deviations from the sampling plan must be documented in a bound field log book. Prior to sample collection, all project sampling personnel will review relevant sampling procedures and relevant quality assurance and control (QA/QC) requirements for selected analytical methods.

Decision Error Minimization

Since the weather and wind conditions have great influence on air sampling there is no way to determine the confidence of data from any single sampling location. Thus the decision-maker should consider wind speed and direction and sampler location when evaluating data.

For all locations, field co-located and all downwind sampling and analysis data will be used to estimate whether decision error goals were met.

To minimize decision errors around the action level, all data for samples that is qualified due to duplicate variability and that have a reported concentration between 75% and 99% of the action level should be treated as potentially exceeding the action level.

Design

Building Asbestos Abatement and Demolition

Prior to sampling, the site should be characterized by identifying on-site as well as off-site sources of airborne asbestos. It is important to establish background levels of contaminants in order to develop a reference point from which to evaluate the source data. Field blanks and lot blanks can be utilized to determine other sources.

During a site investigation, sampling locations should be arranged to distinguish spatial trends in airborne asbestos concentrations. Sampling schedules should be fashioned to establish temporal trends. The sampling strategy typically requires that the concentration of asbestos at the source (worst case) or area of concern (downwind), crosswind, as well as background (upwind) contributions be quantified (see Table 4).

Table 4
Sample Locations for Asbestos Sampling
Anaconda Removal Project
TDD No.: TO-02 09-10-03-0003
Job No.: 002693.2080.01RP

Sample Location	Sample Numbers	Rationale
Upwind/Background	Minimum of two simultaneous upwind/background samples 30 degrees apart from the prevailing windlines.	Establishes background fiber levels.
Downwind	Minimum of three in a 180 degree arc downwind from the source.	Indicates if asbestos is leaving the perimeter.
Site Representative/or Worst Case	Obtain one site representative sample which shows average condition on-site or obtain worst case sample (optional).	Verify and continually confirm and document selection of proper levels of worker protection.

The asbestos air samples will be analyzed by the National Institute for Occupational Safety and Health (NIOSH) Method 7400. Data review independent of the laboratory shall be performed on all analytical data that may be used in decision making.

Burial Pit Excavation and Backfilling Activities

During a site investigation, sampling locations should be arranged to distinguish spatial trends in PM-10 concentrations. Sampling schedules should be fashioned to establish temporal trends. The sampling strategy typically requires that the determination of PM-10 concentrations of downwind, crosswind, and upwind contributions be quantified (see Table 5).

Table 5
Sample Locations for PM-10 Sampling
Anaconda Removal Project
TDD No.: TO-02 09-10-03-0003
Job No.: 002693.2080.01RP

Sample Location	Sample Numbers	Rationale
Upwind/Background	One upwind monitor that is moved based upon actual prevailing wind-lines.	Establishes background levels.
Downwind	One downwind monitor that is moved based upon actual prevailing wind-lines.	Indicates if PM-10 is leaving the perimeter.
Site Representative/or Worst Case	Obtain one site representative sample which shows average condition on-site or obtain worst case sample (optional).	Verify and continually confirm and document selection of proper levels of worker protection.

The PM-10 concentrations will be monitored with a MEI DataRam®. Data review independent of the instrument operator shall be performed on all analytical data that may be used in decision making.

Appendix C

Site Specific Health and Safety Plan

ECOLOGY AND ENVIRONMENT, INC.

**SITE-SPECIFIC
HEALTH AND SAFETY PLAN**

Project: Anaconda Removal

Project No.: 002693.2080.01RP

TDD/PAN No.: TO-02 09-10-03-0003

Project Location: 102 Burch Drive, Yerington, Nevada

Proposed Date of Field Activities: May 12 – May 26, 2010

Project Director: Howard Edwards

Project Manager: Howard Edwards

Prepared by: Maggie Tymkow

Date Prepared: 05/06/2010

Approved by: Mike Folan

Mike Folan

Date Approved: 05/10/2010

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1. INTRODUCTION

1.1 POLICY

It is E & E's policy to ensure the health and safety of its employees, the public, and the environment during the performance of work it conducts. This site-specific health and safety plan (SHASP) establishes the procedures and requirements to ensure the health and safety of E & E employees for the above-named project. E & E's overall safety and health program is described in *Corporate Health and Safety Program* (CHSP). After reading this plan, applicable E & E employees shall read and sign E & E's Site-Specific Health and Safety Plan Acceptance form.

This SHASP has been developed for the sole use of E & E employees and is not intended for use by firms not participating in E & E's training and health and safety programs. Subcontractors are responsible for developing and providing their own safety plans.

This SHASP has been prepared to meet the following applicable regulatory requirements and guidance:

Applicable Regulation/Guidance
29 CFR 1910.120: Hazardous Waste Operations and Emergency Response (HAZWOPER); 29 CFR 1910.134: Resp. Std., 29 CFR 1910.120(f): Medical Surveillance Participation
Other: 8-Hour General Radiation Health and Safety, Radiation Exposure Surveillance - External Dosimetry (TLD Badge and/or electronic dosimeters)

1.2 SCOPE OF WORK

Description of Work: The START will provide H&S air monitoring and collect air samples during a U.S. EPA-asbestos removal at Anaconda Mine Site near the City of Yerington, Nevada. The purpose of the removal is to demolish an office building. Naturally occurring radioactive materials including uranium, thorium, and radium are present at the Site and have become concentrated in some areas due to mining processes. Demolition of the building will be performed by the U.S. EPA ERRS contractor. The Site preparation work is to commence on May 11, 2010. Additionally, dust monitoring will be performed during disposal pit excavation and back-fill.

Equipment/Supplies: Attachment 1 contains a checklist of equipment and supplies that will be needed for this work.

The following is a description of each numbered task:

Task Number	Task Description
1	Site documentation (photo documentation, written documentation, meteorological data and GPS data collection)
2	Air sample collection during asbestos abatement and building demolition in a no radiation area
3	Air monitoring for dust (PM-10) during excavation in areas of low level radiation

Task Number	Task Description
4	Radiation screening of materials with low level radiation in no radiation areas

1.3 SITE DESCRIPTION

Site Map: See Figures 1 and 2 attached to this HASP.

Site History/Description (see project Sampling and Analysis Plan for detailed description): The Anaconda Mine Site is located at 102 Burch Drive near the City of Yerington, Nevada. The Site is bordered to the north by open agricultural fields, to the west and southwest by the Singatse Mountain Range and the town of Weed Heights, to the south by Bureau of Land Management (BLM) land, and to the east by Highway 95A, which separates the site from the City of Yerington. The approximate 8,000-square foot Anaconda Mine office building that is scheduled for demolition is located on the southeastern portion of the Site.

Is the site currently in operation? Yes No

Locations of Contaminants/Wastes:

1) An asbestos survey was performed on September 21, 2009 at the Anaconda Mine office building by Lisa Monroe & Associates, Inc. (LMA), and ACMs were identified in the building. The survey consisted of 28 bulk samples from wall texture, joint compound, floor tiles, black mastic, ceiling tile, ceiling tile glue, vent duct tape, exterior siding and roofing materials. Based on the asbestos survey, the following regulated friable and Category II non-friable ACMs must be removed by an asbestos abatement contractor prior to the demolition of the facility:

- All walls and wall texture; 1-5% chrysotile asbestos/friable; approximately 6,300 square feet.
- Heating, ventilating, and air conditioning (HVAC) vents and vent duct tape; 60-70% chrysotile asbestos/friable; approximately 30-50 linear feet.
- All 9- by 9-inch floor tiles on concrete and under carpets; 1-5% chrysotile asbestos/non-friable; approximately 6,800 square feet.
- All black mastic under floor tiles; 1-5% chrysotile asbestos/non-friable; approximately 6,800 square feet.
- All exterior siding; 20-30% chrysotile asbestos/non-friable; approximately 5,300 square feet.
- Flue pipe on hot water heater; chrysotile asbestos/non-friable; approximately 25 linear feet.

2) Ore material from the Anaconda Mine contained naturally occurring radioactive materials (NORM). When the ore was processed at the mine for its copper content, it produced technologically enhanced naturally occurring radioactive materials (TENORM), in which radioactive minerals were concentrated above natural levels or materials have been moved from their natural location which may cause an increase in exposure.

Types and Characteristics of Contaminants/Wastes:

Liquid Solid Sludge Gas/Vapor
 Flammable/Ignitable Volatile Corrosive Acutely Toxic

Explosive Reactive Carcinogenic Radioactive
 Medical/Pathogenic Other: _____

2. ORGANIZATION AND RESPONSIBILITIES

E & E team personnel shall have on-site responsibilities as described in E & E's standard operating procedure (SOP) for Site Entry Procedures (GENTECH 2.2). The project team, including qualified alternates, is identified below.

Name	Site Role/Responsibility
Howard Edwards	Project/Task Manager/Sample Collection
Howard Edwards	Site Safety Officer
Maggie Tymkow	Sampler
Adam Smith	Sampler

3. TRAINING

Prior to work, E & E team personnel shall have received training as indicated below. As applicable, personnel shall have read the project work plan, sampling and analysis plan, and/or quality assurance project plan prior to project work.

Training	Required
40-Hour OSHA HAZWOPER Initial Training and Annual Refresher (29 CFR 1910.120)	X

Training	Required
Annual First Aid/CPR	X
Hazard Communication (29 CFR 1910.1200)	X
40-Hour Radiation Protection Procedures and Investigative Methods	X
8-Hour General Radiation Health and Safety	X
Radiation Refresher	X
DOT and Biannual Refresher	
Other: _____	

4. MEDICAL SURVEILLANCE

4.1 MEDICAL SURVEILLANCE PROGRAM

E & E field personnel shall actively participate in E & E's medical surveillance program as described in the CHSP and shall have received, within the past year, an appropriate physical examination and health rating.

E & E's health and safety record (HSR) form will be maintained on site by each E & E employee for the duration of his or her work. E & E employees should inform the site safety officer (SSO) of any allergies, medical conditions, or similar situations that are relevant to the safe conduct of the work to which this SHASP applies.

Is there a concern for radiation at the site? Yes No

If no, go to 5.1.

4.2 RADIATION EXPOSURE

4.2.1 External Dosimetry

Thermoluminescent Dosimeter (TLD) Badges: TLD badges are to be worn by all E & E field personnel who work on this site.

Pocket Dosimeters: _____

Other: _____

4.2.2 Internal Dosimetry

Whole body count Bioassay Other

Requirements: Not required

4.2.3 Radiation Dose

Dose Limits: E & E's radiation dose limits are stated in the CHSP and presented in the table below.

E & E Radiation Dose Limits			
Part of Body	Quarterly Limit (rems)	Annual Limit (rems)	Dost Limit Description
Whole body ^a	1	4	Total effective dose equivalent
Any individual organ or tissue other than the lens of the eye ^a	10	40	Sum of deep-dose equivalent ^c and committed dose equivalent ^d
Lens of the eye	3	12	Lens dose equivalent ^e
Skin of whole body or skin of any extremity	10	40	Shallow-dose equivalent ^f
Notes:			
a Precedence given to the more limiting dose.			
b The sum of the deep-dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposure).			
c The dose equivalent at a tissue depth of 1 cm; applies to external whole-body exposure and must be for the part of the body receiving the highest exposure.			
d The dose equivalent to organs or tissues that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.			
e The external exposure of the lens of the eye, taken as the dose equivalent at a tissue depth of 0.3 cm.			
f The external exposure of the skin of the whole body or the skin of an extremity; taken as the dose equivalent at a tissue depth of 0.007 cm averaged over the contiguous 10 square centimeters of skin receiving the highest exposure.			

Site-Specific Dose Limits: As a general guidance, if site work will continue for more than one quarter, limit weekly doses to approximately 80 mrem to ensure that quarterly dose limits are not exceeded.

ALARA Policy: Radiation doses to E & E personnel shall be maintained as low as reasonably achievable (ALARA), taking into account the work objective, state of technology available, economics of improvements in dose reduction with respect to overall health and safety, and other societal and socioeconomic considerations.

5. SITE CONTROL

5.1 SITE LAYOUT AND WORK ZONES

Site Work Zones: Site maps and work zones will be generated on Site and added to site log.

Site Access Requirements and Special Considerations: Site access to be arranged by EPA .

Illumination Requirements: The START assessment activities will be performed during daylight hours. Portable light towers and flashlights will be available for use as needed inside the buildings.

Sanitary Facilities (e.g., toilet, shower, potable water): The U.S. EPA ERRS contractor will provide sanitary facilities

On-Site Communications: Primary method: verbal; Secondary method: cell phones

Other Site-Control Requirements: _____

5.2 SAFE WORK PRACTICES

Daily Safety Meeting: A daily safety meeting will be conducted for all E & E personnel and documented on the Daily Safety Meeting Record form or in the field logbook. The information and data obtained from applicable site characterization and analysis will be addressed in the safety meetings and also used to update this SHASP, as necessary.

Work Limitations: Work shall be limited to a maximum of 12 hours per day. If 12 consecutive days are worked, at least one day off shall be provided before work is resumed. Work will be conducted in daylight hours unless prior approval is obtained and the illumination requirements in 29 CFR 1910.120(m) are satisfied.

Weather Limitations: Work shall not be conducted during electrical storms. Work conducted in other inclement weather (e.g., rain, snow) will be approved by project management and the regional safety coordinator or designee.

Other Work Limitations: _____

Buddy System: Field work will be conducted in pairs of team members according to the buddy system.

Line of Sight: Each field team member shall remain in the line of sight and within verbal communication of at least one other team member.

Eating, Drinking, and Smoking: Eating, drinking, smoking, and the use of tobacco products shall be prohibited in the exclusion and contamination reduction areas, at a minimum, and shall only be permitted in designated areas.

Contamination Avoidance: Field personnel shall avoid unnecessary contamination of personnel, equipment, and materials to the extent practicable.

Sample Handling: Protective gloves of a type designated in Section 7 will be worn when containerized samples are handled for labeling, packaging, transportation, and other purposes.

Other Safe Work Practices: _____

6. HAZARD EVALUATION AND CONTROL

6.1 PHYSICAL HAZARD EVALUATION AND CONTROL

Potential physical hazards and their applicable control measures are described in the following table for each task.

Hazard	Task Number	Hazard Control Measures
Biological (flora, fauna, etc.)	1-4	<ul style="list-style-type: none">■ Potential hazard:■ Establish site-specific procedures for working around identified hazards.■ Other:

Hazard	Task Number	Hazard Control Measures
Cold Stress		<ul style="list-style-type: none"> ■ Provide warm break area and adequate breaks. ■ Provide warm noncaffeinated beverages. ■ Promote cold stress awareness. ■ See <i>Cold Stress Prevention and Treatment</i> (attached at the end of this plan if cold stress is a potential hazard).
Compressed Gas Cylinders		<ul style="list-style-type: none"> ■ Use caution when moving or storing cylinders. ■ A cylinder is a projectile hazard if it is damaged or its neck is broken. ■ Store cylinders upright and secure them by chains or other means. ■ Other:
Confined Space		<ul style="list-style-type: none"> ■ Ensure compliance with 29 CFR 1910.146. ■ See SOP for Confined Space Entry. Additional documentation is required. ■ Other:
Drilling		<ul style="list-style-type: none"> ■ See SOP for Health and Safety on Drilling Rig Operations. Additional documentation may be required. ■ Landfill caps will not be penetrated without prior discussions with corporate health and safety staff. ■ Other:
Drums and Containers		<ul style="list-style-type: none"> ■ Ensure compliance with 29 CFR 1910.120(j). ■ Consider unlabeled drums or containers to contain hazardous substances and handle accordingly until the contents are identified. ■ Inspect drums or containers and assure integrity prior to handling. ■ Move drums or containers only as necessary; use caution and warn nearby personnel of potential hazards. ■ Open, sample, and/or move drums or containers in accordance with established procedures; use approved drum/container-handling equipment. ■ Other:
Electrical		<ul style="list-style-type: none"> ■ Ensure compliance with 29 CFR 1910 Subparts J and S. ■ Locate and mark energized lines.

Hazard	Task Number	Hazard Control Measures
		<ul style="list-style-type: none"> ■ De-energize lines as necessary. ■ Ground all electrical circuits. ■ Guard or isolate temporary wiring to prevent accidental contact. ■ Evaluate potential areas of high moisture or standing water and define special electrical needs. ■ Other:
Excavation and Trenching		<ul style="list-style-type: none"> ■ Ensure that excavations comply with and personnel are informed of the requirements of 29 CFR 1926 Subpart P. ■ Ensure that any required sloping or shoring systems are approved as per 29 CFR 1926 Subpart P. ■ Identify special personal protective equipment (PPE) (see Section 7) and monitoring (see Section 8) needs if personnel are required to enter approved excavated areas or trenches. ■ Maintain line of sight between equipment operators and personnel in excavations/trenches. Such personnel are prohibited from working in close proximity to operating machinery. ■ Suspend or shut down operations at signs of cave in, excessive water, defective shoring, changing weather, or unacceptable monitoring results. ■ Other:
Excavation and Trenching (continued)		
Fire and Explosion		<ul style="list-style-type: none"> ■ Inform personnel of the location(s) of potential fire/explosion hazards. ■ Establish site-specific procedures for working around flammables. ■ Ensure that appropriate fire suppression equipment and systems are available and in good working order. ■ Define requirements for intrinsically safe equipment. ■ Identify special monitoring needs (see Section 8). ■ Remove ignition sources from flammable atmospheres. ■ Coordinate with local fire-fighting groups regarding potential fire/explosion situations. ■ Establish contingency plans and review daily with team members. ■ Other:

Hazard	Task Number	Hazard Control Measures
Heat Stress	1-4	<ul style="list-style-type: none"> ■ Provide cool break area and adequate breaks. ■ Provide cool noncaffeinated beverages. ■ Promote heat stress awareness. ■ Use active cooling devices (e.g., cooling vests) where specified. ■ See <i>Heat Stress Prevention and Treatment</i>
Heavy Equipment Operation	2 and 3	<ul style="list-style-type: none"> ■ Define equipment routes, traffic patterns, and site-specific safety measures. ■ Ensure that operators are properly trained and equipment has been properly inspected and maintained. Verify back-up alarms. ■ Ensure that ground spotters are assigned and informed of proper hand signals and communication protocols. ■ Identify special PPE (Section 7) and monitoring (Section 8) needs. ■ Ensure that field personnel do not work in close proximity to operating equipment. ■ Ensure that lifting capacities, load limits, etc., are not exceeded. ■ Other: Site personnel to wear reflective safety vests
Heights (Scaffolding, Ladders, etc.)		<ul style="list-style-type: none"> ■ Ensure compliance with applicable subparts of 29 CFR 1910. ■ Identify special PPE needs (e.g., lanyards, safety nets, etc.) ■ Other: Use of fall protection: body harness and lanyard
Noise	2 and 3	<ul style="list-style-type: none"> ■ Establish noise level standards for on-site equipment/operations. ■ Inform personnel of hearing protection requirements (Section 7). ■ Define site-specific requirements for noise monitoring (Section 8). ■ Other:
Overhead Obstructions	2 and 3	<ul style="list-style-type: none"> ■ Wear hard hat. ■ Other:
Power Tools	2 and 3	<ul style="list-style-type: none"> ■ Ensure compliance with 29 CFR 1910 Subpart P. ■ Other:
Sunburn	1-4	<ul style="list-style-type: none"> ■ Apply sunscreen. ■ Wear hats/caps and long sleeves.

Hazard	Task Number	Hazard Control Measures
		<ul style="list-style-type: none"> ■ Other:
Utility Lines		<ul style="list-style-type: none"> ■ Identify/locate existing utilities prior to work. ■ Ensure that overhead utility lines are at least 25 feet away from project activities. ■ Contact utilities to confirm locations, as necessary. ■ Other:
Weather Extremes		<ul style="list-style-type: none"> ■ Potential hazards: ■ Establish site-specific contingencies for severe weather situations. ■ Provide for frequent weather broadcasts. ■ Weatherize safety gear, as necessary (e.g., ensure eye wash units cannot freeze, etc.). ■ Identify special PPE (Section 7) needs. ■ Discontinue work during severe weather. ■ Other: Work to be conducted during the SoCal rainy season. Periods of potentially heavy rain could be encountered

6.2 CHEMICAL HAZARD EVALUATION AND CONTROL

6.2.1 Chemical Hazard Evaluation

Potential chemical hazards are described by task number in Table 6-1. Hazard Evaluation Sheets for major known contaminants are attached at the end of this plan.

6.2.2 Chemical Hazard Control

An appropriate combination of engineering/administrative controls, work practices, and PPE shall be used to reduce and maintain employee exposures to a level at or below published exposure levels (see Section 6.2.1).

Applicable Engineering/Administrative Control Measures: Work upwind if possible. Wear PPE appropriate for each task.

PPE: See Section 7.

6.3 RADIOLOGICAL HAZARD EVALUATION AND CONTROL

6.3.1 Radiological Hazard Evaluation

Potential radiological hazards are described below by task number. Hazard Evaluation Sheets for major known contaminants are attached at the end of this plan.

Task Number	Radionuclide	DAC (μCi/ml)	Route(s) of Exposure	Major Radiation(s)	Energy(s) (MeV)	Half-Life
3-4	Uranium, natural (primarily U-238) and daughter radionuclides	Various (most conservative is 3E-12 for Th-230)	INH, ING, external radiation exposure	Alpha, beta, gamma, depending on the radionuclide	Various	Various (from seconds to 4.5E09 yrs for U-238)
3-4	Radium-226 (a key U-238 daughter) Ra-226 daughters	3E-10 Various	INH, ING, external radiation exposure	Alpha Gamma Alpha, beta, gamma	4.8 0.186 Various	1,600 yrs Various
3-4	Radon-222 (direct daughter of Ra-226)	4E-06 (daughters removed) 3E-08 or 0.33 WL (daughters present)	INH	Alpha	5.49	3.8 days
3-4	Thorium, natural (primarily Th-232) and daughter radionuclides	Various (most conservative is 5E-13 for Th-232)	INH, ING, external radiation exposure	Alpha, beta, gamma, depending on the radionuclide	Various	Various (from seconds to 1.4E10 yrs for Th-232)

6.3.2 Radiological Hazard Control

Engineering/administrative controls and work practices shall be instituted to reduce and maintain employee exposures to a level at or below the permissible exposure/dose limits (see sections 4.2.3 and 6.3.1). Whenever engineering/administrative controls and work practices are not feasible or effective, any reasonable combination of engineering/administrative controls, work practices, and PPE shall be used to reduce and maintain employee exposures to a level at or below permissible exposure/dose limits.

Applicable Engineering/Administrative Control Measures: Ensure support zone is in an uncontaminated background radiation area. Decrease time in radiation areas; increase distance; increase shielding as needed. Avoid unprotected contact with site materials. Use dust suppression during capping/sealing activities as required. Radiation monitoring

equipment will be protected from contamination by placing it in plastic bags (leaving probe areas uncovered). Ventilate indoor areas (open windows and doors) prior to and while performing Task 1 in order to dissipate any radon buildup.

Radiation Surveying: (This section is intended to apply work-area radiation surveying for worker health and safety purposes. The surveying being conducted for work Task 1 in this safety plan will also suffice to be work-area radiation surveying for worker health and safety purposes.) The work area will be continually surveyed as appropriate to determine radiation exposure rates, areas of elevated radiation, and the location and magnitude of radioactive contamination, in order to ensure and guide worker health and safety. Surveys for gamma exposure will be conducted using a micro R meter (or ion chamber, if the micro R meter goes off-scale [5 mR/hr]) and a survey ratemeter with an attached 3-inch by 3-inch sodium iodide (NaI) (gamma) probe in accordance with established procedures. Off-site background measurements for portable survey instruments will be obtained from locations previously identified by EPA. Radiation levels exceeding approximately 2 times background will indicate radiation contamination and/or radiation areas and will be marked using surveying flags or equivalent. Previous investigations indicate that levels are expected to be low and marking will likely not be required. A corporate health physicist will be consulted if exposure rates > 2 mR/hr are encountered.

Radiation Contamination Monitoring — Personnel: Personnel will be monitored for radioactive contamination at each homesite if radiation levels exceeding the site action level (greater than approximately two times background) are measured. The monitoring will be performed using a survey ratemeter with an attached detector such as a pancake GM detector in accordance with E&E's procedure *Radiation Contamination Monitoring of Personnel*. The relative response of the different detectors to site materials will be determined during initial phases of the work in order to select the best detector for contamination monitoring. Radiation contamination monitoring will be performed of protective clothing and respirators as necessary to help with waste disposition decisions and if there is a suspicion of gross contamination that should be controlled before the protective clothing/respirator is removed (to ensure that loose contamination is not transferred to personnel). Otherwise, the protective clothing/respirator can be carefully removed without being monitored and the monitoring will focus on the person in his/her street clothes. Contamination results exceeding approximately 2 to 3 times background indicate contamination and that decontamination or disposal as a contaminated waste must be performed (see Section 9).

Radiation Contamination Monitoring — Personal and Work-Related Items, Equipment, and Materials: (This section refers to radiation contamination monitoring of personal and work-related items for health and safety purposes. Examples include monitoring instruments, personal gear, tools, and laptop computers. This does not apply to the free release of non-E & E items.) Radiation contamination monitoring will be performed for personal and work-related items, equipment, and materials as they cross the hotline into the contamination reduction area. The monitoring will be performed using a survey ratemeter with an attached detector such as a pancake GM detector in accordance with established procedures. The relative response of the different detectors to site materials will be determined during initial phases of the work in order to select the best detector for contamination monitoring. Swipe testing will be used for contamination monitoring when direct monitoring is not effective (e.g., small surface areas, nooks and crannies). Swipes will be counted by instruments suitable for the contaminant (typically, fixed-geometry, thin-window counters for uranium and its daughters). Contamination results exceeding approximately 2 to 3 times background indicate contamination and that decontamination or disposal as a contaminated waste must be performed (see Section 9).

Air Monitoring and Sampling: In conjunction with structure removal, work areas will be sampled for general radioactive particulates and possibly other radioactive constituents before work begins and periodically during removal as necessary to characterize airborne radiation levels. Respiratory protection will be required if airborne levels exceed approximately 25% of the applicable derived air concentration (DAC). Radon levels are not considered a health risk.

PPE: See Section 7.

TABLE 6-1
CHEMICAL HAZARD EVALUATION

Task Number	Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure	Acute Symptoms	Odor Threshold/Description	FID/PID	
		PEL/EL	REL	TLV					Relative Response	Ioniz. Poten. (eV)
2	Asbestos*	0.1 fibers per cubic centimeter (f/cc) over 8-hour work shift. 1 f/cc, averaged over 30 minutes.	0.1 fiber/cc	There is no safe level of asbestos exposure.	Y	Inhalation, ingestion, skin and/or eye contact	Asbestosis (chronic exposure): dyspnea (breathing difficulty), interstitial fibrosis, restricted pulmonary function, finger clubbing; irritation eyes; [potential occupational carcinogen]	None	NA	NA
2,3	Nuisance Dust	15 mg/m3	NA	10 mg/m3	Y	Inh, Skin/eye contact	Irritation of eyes, skin, throat	None	NA	NA

Note: Use an asterisk (*) to indicate known or suspected carcinogens.

See Attachment 2 for Chemical Data Sheets

7. LEVEL OF PROTECTION AND PERSONAL PROTECTIVE EQUIPMENT

7.1 LEVEL OF PROTECTION

The following levels of protection (LOPs) have been selected for each work task based on an evaluation of the potential or known hazards, the routes of potential hazard, and the performance specifications of the PPE. On-site monitoring results and other information obtained from on-site activities will be used to modify these LOPs and the PPE, as necessary, to ensure sufficient personnel protection. The authorized LOP and PPE shall only be changed with the approval of the regional safety coordinator or designee. Level A is not included below because Level A activities, which are performed infrequently, will require special planning and addenda to this SHASP.

Task Number	B	C	D	Modifications Allowed
1			X	
2		(X)	X	May require level C if activities occur in areas where asbestos removal activities are taking place or personnel are downwind of airborne dust and exposure limit is determined to be exceeded.
3		(X)	X	May require level C if activities occur in areas where dirt moving activities are taking place or personnel are downwind of airborne dust and a DAC is determined to be exceeded.
4			X	

Note: Use "X" for initial levels of protection. Use "(X)" to indicate levels of protection that may be used as site conditions warrant.

7.2 PERSONAL PROTECTIVE EQUIPMENT

The PPE selected for each task is indicated below. E & E's PPE program complies with 29 CFR 1910.120 and 29 CFR 1910 Subpart I and is described in detail in the CHSP. Refer to 29 CFR 1910 for the minimum PPE required for each LOP.

PPE	Task Number/LOP					
	1	2	3	4		
Full-face APR		(X)	(X)	(X)		
PAPR						
Cartridges:						
P100		(X)	(X)	(X)		

PPE	Task Number/LOP					
	1	2	3	4		
GMC-P100						
GME-P100		(X)	(X)	(X)		
Other:						
Positive-pressure, full-face SCBA						
Spare air tanks (Grade D air)						
Positive-pressure, full-face, supplied-air system						
Cascade system (Grade D air)						
Manifold system						
5-Minute escape mask						
Safety glasses						
Monogoggles						
Coveralls/clothing						
Protective clothing:						
Tyvek		(X)	(X)	(X)		
Saranex						
Other:						
Splash apron						
Inner gloves:						
Cotton						
Nitrile		X	X	X		
Latex						
Other:						
Outer gloves:						
Viton						
Rubber						
Neoprene						
Nitrile		(X)	(X)	(X)		
Other:						
Work gloves						
Safety boots (as per ANSI Z41)		X	X	X		
Neoprene safety boots (as per ANSI Z41)						
Boot covers (type: poly)		(X)	(X)	(X)		

PPE	Task Number/LOP					
	1	2	3	4		
Hearing protection (type: _____)						
Hard hat		X	X	X		
Face shield						
Other: Safety Vest		X	X			
Other:						

8. HEALTH AND SAFETY MONITORING

Health and safety monitoring will be conducted to ensure proper selection of engineering/administrative controls, work practices, and/or PPE so that employees are not exposed to hazardous substances at levels that exceed permissible exposure/dose limits or published exposure levels. Health and safety monitoring will be conducted using the instruments, frequency, and action levels described in Table 8-1. Health and safety monitoring instruments shall have been appropriately calibrated and/or performance-checked prior to use.

9. DECONTAMINATION PROCEDURES

All equipment, materials, and personnel will be evaluated for contamination upon leaving the exclusion area. Equipment and materials will be decontaminated and/or disposed and personnel will be decontaminated, as necessary. Decontamination will be performed in the contamination reduction area or any designated area such that the exposure of uncontaminated employees, equipment, and materials will be minimized. Specific procedures are described below.

Equipment/Material Decontamination Procedures (specified by work plan): Every effort will be made to prevent radiation survey instruments from contacting contaminated materials. When appropriate, instruments, probe handles (not probe faces), and other personal and work-related items will be covered in plastic to prevent surficial contamination. Nondisposable items that are radioactively contaminated as determined by direct and indirect monitoring (Sections 6.3.2 and 8) will be decontaminated using controlled dry or damp methods (e.g., Radiacwash towelettes or wet wipes) and remonitored when dry to ensure the contamination was removed. Disposable items that are contaminated will be directed to the proper waste stream.

Ventilation: All decontamination procedures will be conducted in a well-ventilated area.

Personnel Decontamination Procedures: Personnel radiation contamination monitoring will be performed in accordance with Sections 6.3.2 and 8. Disposable protective clothing will be directed to the proper waste stream and respirators will be directed to a respirator washing station. Contaminated areas on the skin or body will be decontaminated using controlled dry or damp methods and re-monitored when dry to ensure the contamination was removed. Significant or stubborn contamination will be decontaminated under the guidance of a health physicist. Contaminated areas on personal apparel will be decontaminated if possible; otherwise, the apparel will be directed to the proper waste stream. "Hot spot" decon is recommended to minimize the volume of waste generated. Practices such as cutting the hot spot out of the protective clothing or using duct tape to remove the contaminant will be employed as appropriate.

PPE Requirements for Personnel Performing Decontamination: At a minimum — nitrile gloves.

Personnel Decontamination in General: Following appropriate decontamination procedures, all field personnel will wash their hands

and face with soap and potable water. Personnel should shower at the end of each work shift.

Disposition of Disposable PPE: Disposable PPE must be rendered unusable and disposed on site by removal contractor.

Disposition of Decontamination Wastes (e.g., dry wastes, decontamination fluids, etc.): Disposed on site by removal contractor

TABLE 8-1

HEALTH AND SAFETY MONITORING

Instrument	Task Number	Contaminant(s)	Monitoring Location	Monitoring Frequency	Action Levels ^a	
<input type="checkbox"/> PID (e.g., RAE mini RAE) <input type="checkbox"/> FID (e.g., OVA 128-) <input type="checkbox"/> TVA 1000					Unknown Vapors Background to 1 ppm above background: Level D 1 to 5 ppm above background: Level C 5 to 500 ppm above background: Level B >500 ppm above background: Level A	Contaminant-Specific
Oxygen Meter/Explosimeter					Oxygen <19.5% or >22.0%: Evacuate area; eliminate ignition sources; reassess conditions. 19.5 to 22.0%: Continue work in accordance with action levels for other instruments.	Explosivity ≤10% LEL: Continue work in accordance with action levels for other instruments; monitor continuously for combustible atmospheres. >10% LEL: Evacuate area; eliminate ignition sources; reassess conditions.
Radiation Alert Monitor (Rad-mini or RAM-4)					<0.1 mR/hr: Continue work in accordance with action levels for other instruments. ≥0.1 mR/hr: Evacuate area; reassess work plan and contact radiation safety specialist.	
Mini-Ram Particulate Monitor	3,4	PM-10	Perimeter of work zone and within work zone	Continuous	General/Unknown 500 µg/m³ 1,000 µg/m³ 2,500 µg/m³	Contaminant-Specific <u>Notify earthwork Crew;</u> Increase dust control measures – visually monitor display to ensure levels fall below Action Level 1 <u>Notify ERRS Response Manager and EPA OSC;</u> Notify earthwork Crew – increase dust control measures – visually monitor display to ensure levels fall below Action Level 1 <u>Stop work – Notify site manager and EPA;</u> Notify earthwork Crew – increase dust control measures – visually monitor display to ensure levels fall below Action Level 2 and approval from site manager and EPA required to resume work
HCN/H ₂ S (Monitox)					≥4 ppm: Leave area and consult with SSO.	
Draeger Colorimetric Tubes					Tube	Action Level Action

25

TABLE 8-1

HEALTH AND SAFETY MONITORING

Instrument	Task Number	Contaminant(s)	Monitoring Location	Monitoring Frequency	Action Levels^a
Other: Dosimeter	1-4	External gamma exposure	Work area	continuous	See section 4.2.3. Exposure rates should be logged daily to ensure quarterly exposure rates are not exceeded.
Other:					

^a Unless stated otherwise, airborne contaminant concentrations are measured as a time-weighted average in the worker's breathing zone. Acceptable concentrations for known airborne contaminants will be determined based on OSHA/NIOSH/ACGIH and/or NRC exposure limits. As a guideline, 1/2 the PEL/REL/TLV, whichever is lower should be used.

10. EMERGENCY RESPONSE

This section contains additional information pertaining to on-site emergency response and does not duplicate pertinent emergency response information contained in earlier sections of this plan (e.g., site layout, monitoring equipment, etc.). Emergency response procedures will be rehearsed regularly, as applicable, during project activities.

10.1 EMERGENCY RESPONSIBILITIES

All Personnel: All personnel shall be alert to the possibility of an on-site emergency; report potential or actual emergency situations to the team leader and SSO; and notify appropriate emergency resources, as necessary.

Team Leader: The team leader will determine the emergency actions to be performed by E & E personnel and will direct these actions. The team leader also will ensure that applicable incidents are reported to appropriate E & E and client project personnel and government agencies.

SSO: The SSO will recommend health/safety and protective measures appropriate to the emergency.

Other: _____

10.2 LOCAL AND SITE RESOURCES (including phone numbers)

Ambulance: 911

Hospital: South Lyon Medical Center; 213 South Whitacre Street, Yerington, NV; Phone (775) 463-2301

Directions to Hospital (map attached at the end of this plan): See attachment 3

Poison Control: 800-222-1222

Police Department: 911

Fire Department: 911

Client Contact: Tom Dunkelman, EPA FOOSC (mobile: 775-721-4712)

Site Contact: Tom Dunkelman, EPA FOOSC (mobile: 775-721-4712)

On-Site Telephone Number: NA

Cellular Telephone Number: NA

Radios Available: NA

Other: _____

10.3 E & E EMERGENCY CONTACTS

E & E Emergency Operations Center (24 Hours): 716/684-8060

Corporate Health and Safety Director, Dr. Paul Jonmaire: 716/684-8060 (office)
716/655-1260 (home)

Regional Office Contact: Cindy McLeod, START Program Manager 510/893-6700 (office)
415/238-3379 (cell)
510/654-6250 (home)

Other: START Long Beach Office 562/997-1200 (office)

- a. E & E Emergency Response Center: 716/684-8060
- b. Corporate Health and Safety Director, Dr. Paul Jonmaire: 716/684-8060 (office)
716/655-1260 (home)
- c. Assistant Corporate Safety Director, Tom Siener, CIH: 716/684-8060 (office)
716/662-4740 (home)
716/597-5868 (Cell)

10.4 OTHER EMERGENCY RESPONSE PROCEDURES

On-Site Evacuation Signal/Alarm (must be audible and perceptible above ambient noise and light levels): Three long blasts on car horn or air horn

On-Site Assembly Area: An upwind location to be determined at the first Daily Safety Meeting

Emergency Egress Route to Get Off Site: To be determined at the first Daily Safety Meeting

Off-Site Assembly Area: To be determined at the first Daily Safety Meeting

Preferred Means of Reporting Emergencies: Report to FOOSC and Call 911

Site Security and Control: In an emergency situation, personnel will attempt to secure the affected area and control site access.

Spill Control Procedures: Bring all spills to the attention of the FOOSC. Spill response equipment will be available on site

Emergency Decontamination Procedures: Remove and secure any contaminated PPE or clothing. Perform additional gross decontamination or any localized decontamination as needed. Inform medical personnel of any known or suspected contamination or exposure.

PPE: Personnel will don appropriate PPE when responding to an emergency situation. The SSO and Section 7 of this plan will provide guidance regarding appropriate PPE.

Emergency Equipment: Appropriate emergency equipment is listed in Attachment 1. Adequate supplies of this equipment shall be maintained in the support area or other approved work location.

Incident Reporting Procedures: Report all injuries and/or exposures to the FOOSC and the E&E Regional Safety Coordinator (RSC) immediately. The SSO or PM must complete and Injury/Exposure Report as soon as possible for submission to the RSC and Corporate Health & Safety.

ATTACHMENT 1

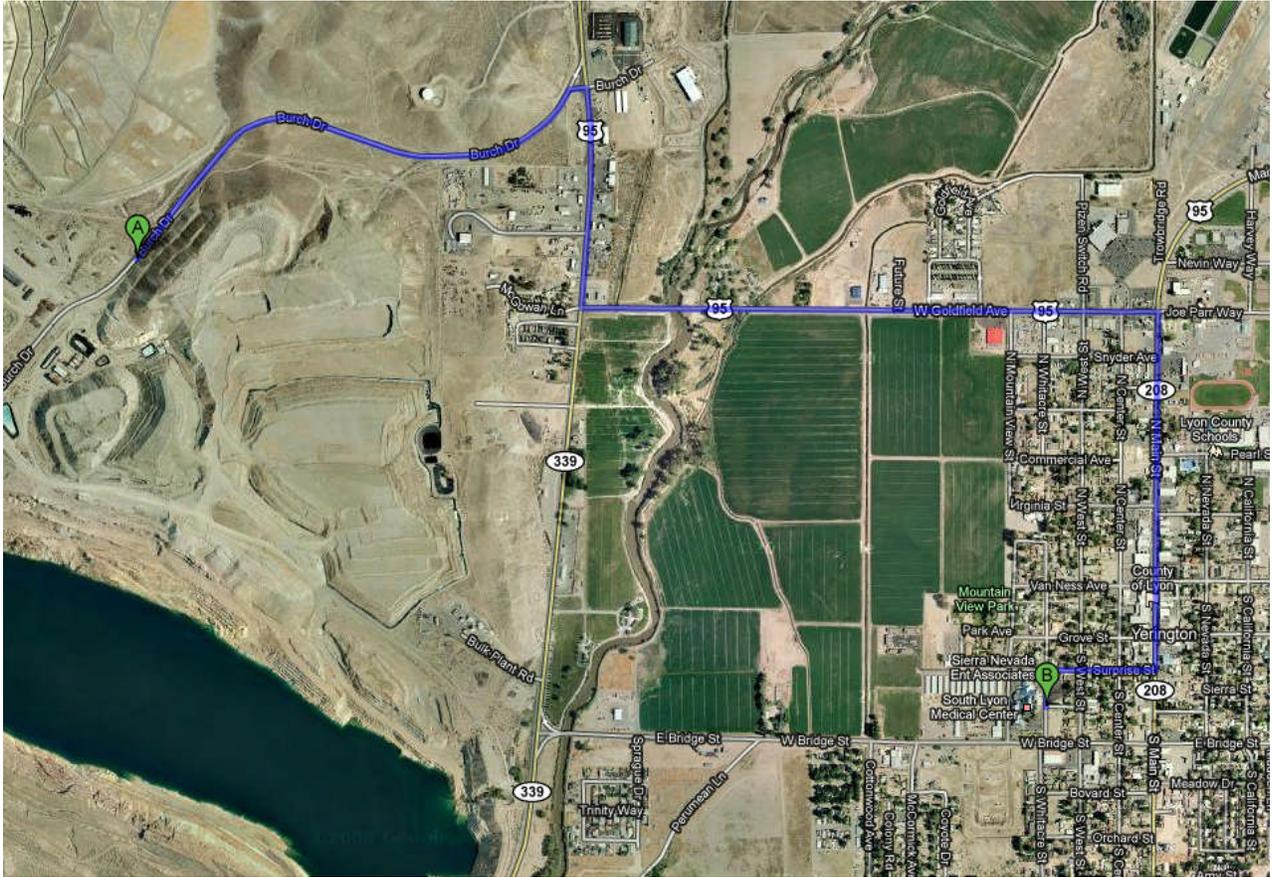
EQUIPMENT/SUPPLIES CHECKLIST

	No.
INSTRUMENTATION	
FID	
Thermal desorber	
O ₂ /explosimeter w/cal. Kit	
Photovac tip	
PID (probe: _____ eV)	
Magnetometer	
Pipe locator	
Weather station	
Draeger tube kit (tubes: _____)	
Brunton compass	
Real-time cyanide monitor	
Real-time H ₂ S monitor	
Heat stress monitor	
Noise equipment	
Personal sampling pumps and supplies	
MiniRam dust monitor	X
Mercury monitor	
Spare batteries (type: D)	X
RADIATION EQUIPMENT/SUPPLIES	
Documentation forms	
Portable ratemeter	X
Scaler/ratemeter	
1" NaI gamma probe	
2" NaI gamma probe	
ZnS alpha probe	X
GM pancake probe	
Tungsten-shielded GM probe	
Micro R meter	X
Ion chamber	
Alert monitor	
Pocket dosimeter	
Dosimeter charger	
Radiation warning tape	

	No.
Radiation decon supplies	
Spare batteries (type: D)	X
SAMPLING EQUIPMENT	
8-oz. bottles	
Half-gallon bottles	
VOA bottles	
String	
Hand bailers	
Thieving rods with bulbs	
Spoons	
Knives	
Filter paper	X
Bottle labels	
MISCELLANEOUS	
Pump	
Surveyor's tape	
100' Fiberglass tape	
300' Nylon rope	
Nylon string	
Surveying flags	
Camera	X
Film	
Bung wrench	
Soil auger	
Pick	
Shovel	
Catalytic heater	
Propane gas	
Banner tape	
Surveying meter stick	
Chaining pins and ring	
Logbooks (____ large, ____ small)	

ATTACHMENT 2
CHEMICAL DATA SHEETS

ATTACHMENT 3
DIRECTIONS TO HOSPITAL



- | | |
|---|---------------------------|
| 1. Head northeast on Burch Dr
About 2 mins | go 0.9 mi
total 0.9 mi |
| 2. Take the 1st right to stay on Burch Dr | go 161 ft
total 1.0 mi |
| 3. Take the 1st right onto US-95 Alt S
About 1 min | go 0.4 mi
total 1.3 mi |
| 4. Take the 1st left to stay on US-95 Alt S
About 2 mins | go 1.0 mi
total 2.3 mi |
| 5. Turn right at N Main St
About 1 min | go 0.6 mi
total 3.0 mi |
| 6. Turn right at Surprise St
About 1 min | go 0.2 mi
total 3.2 mi |
| 7. Take the 3rd left onto S Whitacre St | go 331 ft
total 3.2 mi |

Appendix D

Standard Operating Procedures



ASBESTOS SAMPLING

SOP#: 2015
DATE: 11/17/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

Asbestos has been used in many commercial products including building materials such as flooring tiles and sheet goods, paints and coatings, insulation, and roofing asphalts. These products and others may be found at hazardous waste sites hanging on overhead pipes, contained in drums, abandoned in piles, or as part of a structure. Asbestos tailing piles from mining operations can also be a source of ambient asbestos fibers. Asbestos is a known carcinogen and requires air sampling to assess airborne exposure to human health. This Standard Operating Procedure (SOP) provides procedures for asbestos air sampling by drawing a known volume of air through a mixed cellulose ester (MCE) filter. The filter is then sent to a laboratory for analysis. The U.S. Environmental Protection Agency/Environmental Response Team (U.S. EPA/ERT) uses one of four analytical methods for determining asbestos in air. These include: U.S. EPA's Environmental Asbestos Assessment Manual, Superfund Method for the Determination of Asbestos in Ambient Air for Transmission Electron Microscopy (TEM)⁽¹⁾; U.S. EPA's Modified Yamate Method for TEM⁽²⁾; National Institute for Occupational Safety and Health (NIOSH) Method 7402 (direct method only) for TEM; and NIOSH Method 7400 for Phase Contrast Microscopy (PCM)⁽³⁾. Each method has specific sampling and analytical requirements (i.e., sample volume and flow rate) for determining asbestos in air.

The U.S. EPA/ERT typically follows procedures outlined in the TEM methods for determining mineralogical types of asbestos in air and for distinguishing asbestos from non-asbestos minerals. The Phase Contrast Microscopy (PCM) method is used by U.S. EPA/ERT as a screening tool since it is less costly than TEM. PCM cannot distinguish asbestos from non-asbestos fibers, therefore the TEM method may be necessary to confirm analytical results. For example, if an action level for the presence of fibers has been set and PCM analysis indicates that the action level has been exceeded, then

TEM analysis can be used to quantify and identify asbestos structures through examination of their morphology crystal structures (through electron diffraction), and elemental composition (through energy dispersive X-ray analysis). In this instance samples should be collected for both analyses in side by side sampling trains (some laboratories are able to perform PCM and TEM analysis from the same filter). The Superfund method is designed specifically to provide results suitable for supporting risk assessments at Superfund sites, it is applicable to a wide range of ambient air situations at hazardous waste sites. U.S. EPA's Modified Yamate Method for TEM is also used for ambient air sampling due to high volume requirements. The PCM and TEM NIOSH analytical methods require lower sample volumes and are typically used indoors; however, ERT will increase the volume requirement for outdoor application.

Other Regulations pertaining to asbestos have been promulgated by U.S. EPA and OSHA. U.S. EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) regulates asbestos-containing waste materials. NESHAP establishes management practices and standards for the handling of asbestos and emissions from waste disposal operations (40 CFR Part 61, Subparts A and M). U.S. EPA's 40 CFR 763 (July 1, 1987)⁽⁴⁾ and its addendum 40 CFR 763 (October 30, 1987)⁽⁴⁾ provide comprehensive rules for the asbestos abatement industry. State and local regulations on these issues vary and may be more stringent than federal requirements. The OSHA regulations in 29 CFR 1910.1001 and 29 CFR 1926.58 specify work practices and safety equipment such as respiratory protection and protective clothing when handling asbestos. The OSHA standard for an 8-hour, time-weighted average (TWA) is 0.2 fibers/cubic centimeters of air. This standard pertains to fibers with a length-to-width ratio of 3 to 1 with a fiber length $>5 \mu\text{m}$ ^(5,6). An action level of 0.1 fiber/cc (one-half the OSHA standard) is the level U.S. EPA has established in which employers must initiate such activities as air monitoring, employee training, and

medical surveillance^(5,6).

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Prior to sampling, the site should be characterized by identifying on-site as well as off-site sources of airborne asbestos. The array of sampling locations and the schedule for sample collection, is critical to the success of an investigation. Generally, sampling strategies to characterize a single point source are fairly straightforward, while multiple point sources and area sources increase the complexity of the sampling strategy. It is not within the scope of this SOP to provide a generic asbestos air sampling plan. Experience, objectives, and site characteristics will dictate the sampling strategy.

During a site investigation, sampling stations should be arranged to distinguish spatial trends in airborne asbestos concentrations. Sampling schedules should be fashioned to establish temporal trends. The sampling strategy typically requires that the concentration of asbestos at the source (worst case) or area of concern (downwind), crosswind, as well as background (upwind) contributions be quantified. See Table 1 (Appendix A) for U.S. EPA/ERT recommended sampling set up for ambient air. Indoor asbestos sampling requires a different type of strategy which is identified in Table 2 (Appendix A). It is important to establish background levels of contaminants in order to develop a reference point from which to evaluate the source data. Field blanks and lot blanks can be utilized to determine other sources.

Much information can be derived from each analytical method previously mentioned. Each analytical method has specific sampling requirements and produce results which may or may not be applicable to a specific sampling effort. The site sampling

objectives should be carefully identified so as to select the most appropriate analytical method. Additionally, some preparation (i.e., lot blanks results) prior to site sampling may be required, these requirements are specified in the analytical methods.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

3.1 Sample Preservation

No preservation is required for asbestos samples.

3.2 Sample Handling, Container and Storage Procedures

1. Place a sample label on the cassette indicating a unique sampling number. Do not put sampling cassettes in shirt or coat pockets as the filter can pick up fibers. The original cassette box is used to hold the samples.
2. Wrap the cassette individually in a plastic sample bag. Each bag should be marked indicating sample identification number, total volume, and date.
3. The wrapped sampling cassettes should be placed upright in a rigid container so that the cassette cap is on top and cassette base is on bottom. Use enough packing material to prevent jostling or damage. Do not use vermiculite as packing material for samples. If possible, hand carry to lab.
4. Provide appropriate documentation with samples (i.e., chain of custody and requested analytical methodology).

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Flow rates exceeding 16 liters/minute (L/min) which could result in filter destruction due to (a) failure of its physical support under force from the increased pressure drop; (b) leakage of air around the filter mount so that the filter is bypassed, or (c) damage to the asbestos structures due to increased impact velocities.

4.1 U.S. EPA's Superfund Method

4.1.1 Direct-transfer TEM Specimen Preparation Methods

Direct-Transfer TEM specimen preparation methods have the following significant interferences:

- C The achievable detection limit is restricted by the particulate density on the filter, which in turn is controlled by the sampled air volume and the total suspended particulate concentration in the atmosphere being sampled.
- C The precision of the result is dependent on the uniformity of the deposit of asbestos structures on the sample collection filter.
- C Air samples must be collected so that they have particulate and fiber loadings within narrow ranges. If too high a particulate loading occurs on the filter, it is not possible to prepare satisfactory TEM specimens by a direct-transfer method. If too high a fiber loading occurs on the filter, even if satisfactory TEM specimens can be prepared, accurate fiber counting will not be possible.

4.1.2 Indirect TEM Specimen Preparation Methods

Indirect TEM specimen preparation methods have the following interferences:

- C The size distribution of asbestos structures is modified.
- C There is increased opportunity for fiber loss or introduction of extraneous contamination.
- C When sample collection filters are ashed, any fiber contamination in the filter medium is concentrated on the TEM specimen grid.

It can be argued that direct methods yield an under-estimate of the asbestos structure concentration because many of the asbestos fibers present are concealed by other particulate material with which they are associated. Conversely, indirect methods can be considered to yield an over-estimate because some types of complex asbestos structures disintegrate

during the preparation, resulting in an increase in the numbers of structures counted.

4.2 U.S. EPA's Modified Yamate Method for TEM

High concentrations of background dust interfere with fiber identification.

4.3 NIOSH Method for TEM

Other amphibole particles that have aspect ratios greater than 3:1 and elemental compositions similar to the asbestos minerals may interfere in the TEM analysis. Some non-amphibole minerals may give electron diffraction patterns similar to amphiboles. High concentrations of background dust interfere with fiber identification.

4.4 NIOSH Method for PCM

PCM cannot distinguish asbestos from non-asbestos fibers; therefore, all particles meeting the counting criteria are counted as total asbestos fibers. Fiber less than 0.25 μm in length will not be detected by this method. High levels of non-fibrous dust particles may obscure fibers in the field of view and increase the detection limit.

5.0 EQUIPMENT/MATERIALS

5.1 Sampling Pump

The constant flow or critical orifice controlled sampling pump should be capable of a flow-rate and pumping time sufficient to achieve the desired volume of air sampled.

The lower flow personal sampling pumps generally provide a flow rate of 20 cubic centimeters/minute (cc/min) to 4 L/min. These pumps are usually battery powered. High flow pumps are utilized when flow rates between 2 L/min to 20 L/min are required. High flow pumps are used for short sampling periods so as to obtain the desired sample volume. High flow pumps usually run on AC power and can be plugged into a nearby outlet. If an outlet is not available then a generator should be obtained. The generator should be positioned downwind from the sampling pump. Additional voltage may be required if more than one pump is plugged into the same generator. Several

electrical extension cords may be required if sampling locations are remote.

The recommended volume for the Superfund method (Phase I) requires approximately 20 hours to collect. Such pumps typically draw 6 amps at full power so that 2 lead/acid batteries should provide sufficient power to collect a full sample. The use of line voltage, where available, eliminates the difficulties associated with transporting stored electrical energy.

A stand should be used to hold the filter cassette at the desired height for sampling and the filter cassette shall be isolated from the vibrations of the pump.

5.2 Filter Cassette

The cassettes are purchased with the required filters in position, or can be assembled in a laminar flow hood or clean area. When the filters are in position, a shrink cellulose band or adhesive tape should be applied to cassette joints to prevent air leakage.

5.2.1 TEM Cassette Requirements

Commercially available field monitors, comprising 25 mm diameter three-piece cassettes, with conductive extension cowls shall be used for sample collection. The cassette must be new and not previously used. The cassette shall be loaded with an MCE filter of pore size 0.45 μm , and supplied from a lot number which has been qualified as low background for asbestos determination. The cowls should be constructed of electrically conducting material to minimize electrostatic effects. The filter shall be backed by a 5 μm pore size MCE filter (Figure 1, Appendix B).

5.2.2 PCM Cassette Requirements

NIOSH Method 7400, PCM involves using a 0.8 to 1.2 μm mixed cellulose ester membrane, 25 mm diameter, 50 mm conductive cowl on cassette (Figure 2, Appendix B). Some labs are able to perform PCM and TEM analysis on the same filter; however, this should be discussed with the laboratory prior to sampling.

5.3 Other Equipment

- C Inert tubing with glass cyclone and hose barb
- C Whirlbags (plastic bags) for cassettes

- C Tools - small screw drivers
- C Container - to keep samples upright
- C Generator or electrical outlet (may not be required)
- C Extension cords (may not be required)
- C Multiple plug outlet
- C Sample labels
- C Air data sheets
- C Chain of Custody records

6.0 REAGENTS

Reagents are not required for the preservation of asbestos samples.

7.0 PROCEDURES

7.1 Air Volumes and Flow Rates

Sampling volumes are determined on the basis of how many fibers need to be collected for reliable measurements. Therefore, one must estimate how many airborne fibers may be in the sampling location.

Since the concentration of airborne aerosol contaminants will have some effect on the sample, the following is a suggested criteria to assist in selecting a flow rate based on real-time aerosol monitor (RAM) readings in milligrams/cubic meter (mg/m^3).

	<u>Concentration</u>	<u>Flow Rate</u>
C Low RAM readings:	<6.0 mg/m^3	11-15. L/min
C Medium RAM readings:	>6.0 mg/m^3	7.5 L/min
C High RAM readings:	>10. mg/m^3	2.5 L/min

In practice, pumps that are available for environmental sampling at remote locations operate under a maximum load of approximately 12 L/min.

7.1.1 U.S. EPA's Superfund Method

The Superfund Method incorporates an indirect preparation procedure to provide flexibility in the amount of deposit that be can be tolerated on the sample filter and to allow for the selective concentration of asbestos prior to analysis. To minimize contributions to background contamination from asbestos present in the plastic matrices of membrane filters while allowing for sufficient quantities of asbestos to be collected, this method also requires the collection of a larger volume of air per unit area of filter than has traditionally been collected

for asbestos analysis. Due to the need to collect large volumes of air, higher sampling flow rates are recommended in this method than have generally been employed for asbestos sampling in the past. As an alternative, samples may be collected over longer time intervals. However, this restricts the flexibility required to allow samples to be collected while uniform meteorological conditions prevail.

The sampling rate and the period of sampling should be selected to yield as high a sampled volume as possible, which will minimize the influence of filter contamination. Wherever possible, a volume of 15 cubic meters (15,000 L) shall be sampled for those samples intended for analysis only by the indirect TEM preparation method (Phase 1 samples). For those samples to be prepared by both the indirect and the direct specimen preparation methods (Phase 2 samples), the volumes must be adjusted so as to provide a suitably-loaded filter for the direct TEM preparation method. One option is to collect filters at several loadings to bracket the estimated optimum loading for a particular site. Such filters can be screened in the laboratory so that only those filters closest to optimal loading are analyzed. It has been found that the volume cannot normally exceed 5 cubic meters (5000 L) in an urban or agricultural area, and 10 cubic meters (10,000 L) in a rural area for samples collected on a 25 mm filter and prepared by a direct-transfer technique.

An upper limit to the range of acceptable flow rates for this method is 15 L/min. At many locations, wind patterns exhibit strong diurnal variations. Therefore, intermittent sampling (sampling over a fixed time interval repeated over several days) may be necessary to accumulate 20 hours of sampling time over constant wind conditions. Other sampling objectives also may necessitate intermittent sampling. The objective is to design a sampling schedule so that samples are collected under uniform conditions throughout the sampling interval. This method provides for such options. Air volumes collected on Phase I samples are maximized (<16 L/min). Air volumes collected on Phase 2 samples are limited to provide optimum loading for filters to be prepared by a direct-transfer procedure.

7.1.2 U.S. EPA's Modified Yamate Method for TEM

U.S. EPA's TEM method requires a minimum volume

of 560 L and a maximum volume of 3,800 L in order to obtain an analytical sensitivity of 0.005 structures/cc. The optimal volume for TEM is 1200 L to 1800 L. These volumes are determined using a 200 mesh EM grid opening with a 25-mm filter cassette. Changes in volume would be necessary if a 37-mm filter cassette is used since the effective area of a 25 mm (385 sq mm) and 37 mm (855 sq m) differ.

7.1.3 NIOSH Method for TEM and PCM

The minimum recommended volume for TEM and PCM is 400 L at 0.1 fiber/cc. Sampling time is adjusted to obtain optimum fiber loading on the filter. A sampling rate of 1 to 4 L/min for eight hours (700 to 2800 L) is appropriate in non-dusty atmospheres containing 0.1 fiber/cc. Dusty atmospheres i.e., areas with high levels of asbestos, require smaller sample volumes (<400 L) to obtain countable samples.

In such cases, take short, consecutive samples and average the results over the total collection time. For documenting episodic exposures, use high flow rates (7 to 16 L/min) over shorter sampling times. In relatively clean atmospheres where targeted fiber concentrations are much less than 0.1 fiber/cc, use larger sample volumes (3,000 to 10,000 L) to achieve quantifiable loadings. Take care, however, not to overload the filter with background dust. If > 50% of the filter surface is covered with particles, the filter may be too overloaded to count and will bias the measured fiber concentration. Do not exceed 0.5 mg total dust loading on the filter.

7.2 Calibration Procedures

In order to determine if a sampling pump is measuring the flow rate or volume of air correctly, it is necessary to calibrate the instrument. Sampling pumps should be calibrated immediately before and after each use. Preliminary calibration should be conducted using a primary calibrator such as a soap bubble type calibrator, (e.g., a Buck Calibrator, Gilibrator, or equivalent primary calibrator) with a representative filter cassette installed between the pump and the calibrator. The representative sampling cassette can be reused for calibrating other pumps that will be used for asbestos sampling. The same cassette lot used for sampling should also be used for the calibration. A sticker should be affixed to the outside of the extension cowl marked "Calibration Cassette."

A rotameter can be used provided it has been recently precalibrated with a primary calibrator. Three separate constant flow calibration readings should be obtained both before sampling and after sampling. Should the flow rate change by more than 5% during the sampling period, the average of the pre- and post-calibration rates will be used to calculate the total sample volume. The sampling pump used shall provide a non-fluctuating air-flow through the filter, and shall maintain the initial volume flow-rate to within $\pm 10\%$ throughout the sampling period. The mean value of these flow-rate measurements shall be used to calculate the total air volume sampled. A constant flow or critical orifice controlled pump meets these requirements. If at any time the measurement indicates that the flow-rate has decreased by more than 30%, the sampling shall be terminated. Flexible tubing is used to connect the filter cassette to the sampling pump. Sampling pumps can be calibrated prior to coming on-site so that time is saved when performing on-site calibration.

7.2.1 Calibrating a Personal Sampling Pump with an Electronic Calibrator

1. See Manufacturer's manual for operational instructions.
2. Set up the calibration train as shown in (Figure 3, Appendix B) using a sampling pump, electronic calibrator, and a representative filter cassette. The same lot sampling cassette used for sampling should also be used for calibrating.
3. To set up the calibration train, attach one end of the PVC tubing (approx. 2 foot) to the cassette base; attach the other end of the tubing to the inlet plug on the pump. Another piece of tubing is attached from the cassette cap to the electronic calibrator.
4. Turn the electronic calibrator and sampling pump on. Create a bubble at the bottom of the flow chamber by pressing the bubble initiate button. The bubble should rise to the top of the flow chamber. After the bubble runs its course, the flow rate is shown on the LED display.
5. Turn the flow adjust screw or knob on the pump until the desired flow rate is attained.

6. Perform the calibration three times until the desired flow rate of $\pm 5\%$ is attained.

7.2.2 Calibrating a Rotameter with an Electronic Calibrator

1. See manufacturer's manual for operational instructions.
2. Set up the calibration train as shown in (Figure 4, Appendix B) using a sampling pump, rotameter, and electronic calibrator.
3. Assemble the base of the flow meter with the screw provided and tighten in place. The flow meter should be mounted within 6° vertical.
4. Turn the electronic calibrator and sampling pump on.
5. Create a bubble at the bottom of the flow chamber by pressing the bubble initiate button. The bubble should rise to the top of the flow chamber. After the bubble runs its course, the flow rate is shown on the LED display.
6. Turn the flow adjust screw or knob on the pump until the desired flow rate is attained.
7. Record the electronic calibrator flow rate reading and the corresponding rotameter reading. Indicate these values on the rotameter (sticker). The rotameter should be able to work within the desired flow range. Readings can also be calibrated for 10 cm³ increments for Low Flow rotameters, 500 cm³ increments for medium flow rotameters and 1 liter increments for high flow rotameters.
8. Perform the calibration three times until the desired flow rate of $\pm 5\%$ is attained. Once on site, a secondary calibrator, i.e., rotameter may be used to calibrate sampling pumps.

7.2.3 Calibrating a Personal Sampling Pump with a Rotameter

1. See manufacturer's manual for Rotameter's Operational Instructions.

2. Set up the calibration train as shown in (Figure 5, Appendix B) using a rotameter, sampling pump, and a representative sampling cassette.
 3. To set up the calibration train, attach one end of the PVC tubing (approx. 2 ft) to the cassette base; attach the other end of the tubing to the inlet plug on the pump. Another piece of tubing is attached from the cassette cap to the rotameter.
 4. Assemble the base of the flow meter with the screw provided and tighten in place. The flow meter should be mounted within 6° vertical.
 5. Turn the sampling pump on.
 6. Turn the flow adjust screw (or knob) on the personal sampling pump until the float ball on the rotameter is lined up with the precalibrated flow rate value. A sticker on the rotameter should indicate this value.
 7. A verification of calibration is generally performed on-site in the clean zone immediately prior to the sampling.
3. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety plan.
 4. Once on-site the calibration is performed in the clean zone. The calibration procedures are listed in Section 7.2.
 5. After calibrating the sampling pump, mobilize to the sampling location.

7.4.2 Site Sampling

1. To set up the sampling train, attach the air intake hose to the cassette base. Remove the cassette cap (Figure 6 and 7, Appendix B). The cassette should be positioned downward, perpendicular to the wind
2. If AC or DC electricity is required then turn it on. If used, the generator should be placed 10 ft. downwind from the sampling pump.
3. Record the following in a field logbook: date, time, location, sample identification number, pump number, flow rate, and cumulative time.
4. Turn the pump on. Should intermittent sampling be required, sampling filters must be covered between active periods of sampling. To cover the sample filter: turn the cassette to face upward, place the cassette cap on the cassette, remove the inlet plug from the cassette cap, attach a rotameter to the inlet opening of the cassette cap to measure the flow rate, turn off the sampling pump, place the inlet plug into the inlet opening on the cassette cap. To resume sampling: remove the inlet plug, turn on the sampling pump, attach a rotameter to measure the flow rate, remove the cassette cap, replace the inlet plug in the cassette cap and invert the cassette, face downward and perpendicular to the wind.
5. Check the pump at sampling midpoint if sampling is longer than 4 hours. The generators may need to be regassed depending on tank size. If a filter darkens in appearance or if loose dust is seen in the filter, a second sample should be started.

7.3. Meteorology

It is recommended that a meteorological station be established. If possible, sample after two to three days of dry weather and when the wind conditions are at 10 mph or greater. Record wind speed, wind direction, temperature, and pressure in a field logbook. Wind direction is particularly important when monitoring for asbestos downwind from a fixed source.

7.4 Ambient Sampling Procedures

7.4.1 Pre-site Sampling Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.
2. Obtain necessary sampling equipment and ensure it is in working order and fully charged (if necessary).

6. At the end of the sampling period, orient the cassette up, turn the pump off.
7. Check the flow rate as shown in Section 7.2.3. When sampling open-faced, the sampling cap should be replaced before post calibrating. Use the same cassette used for sampling for post calibration (increase dust/fiber loading may have altered the flow rate).
8. Record the post flow rate.
9. Record the cumulative time or run.
10. Remove the tubing from the sampling cassette. Still holding the cassette upright, replace the inlet plug on the cassette cap and the outlet plug on the cassette base.

7.4.3. Post Site Sampling

1. Follow handling procedures in Section 3.2, steps 1-4.
2. Obtain an electronic or hard copy of meteorological data which occurred during the sampling event. Record weather: wind speed, ambient temperature, wind direction, and precipitation. Obtaining weather data several days prior to the sampling event can also be useful.

7.5 Indoor Sampling Procedures

PCM analysis is used for indoor air samples. When analysis shows total fiber count above the OSHA action level 0.1 f/cc then TEM (U.S. EPA's Modified Yamate Method) is used to identify asbestos from non-asbestos fibers.

Sampling pumps should be placed four to five feet above ground level away from obstructions that may influence air flow. The pump can be placed on a table or counter. Refer to Table 2 (Appendix A) for a summary of indoor sampling locations and rationale for selection.

Indoor sampling utilizes high flow rates to increased sample volumes (2000 L for PCM and 2800 to 4200 L for TEM) in order to obtain lower detection limits below the standard, (i.e., 0.01 f/cc or lower [PCM]

and 0.005 structures/cc or lower [TEM]).

7.5.1 Aggressive Sampling Procedures

Sampling equipment at fixed locations may fail to detect the presence of asbestos fibers. Due to limited air movement, many fibers may settle out of the air onto the floor and other surfaces and may not be captured on the filter. In the past, an 8-hour sampling period was recommended to cover various air circulation conditions. A quicker and more effective way to capture asbestos fibers is to circulate the air artificially so that the fibers remain airborne during sampling. The results from this sampling option typifies worst case condition. This is referred to as aggressive air sampling for asbestos. Refer to Table 2 for sample station locations.

1. Before starting the sampling pumps, direct forced air (such as a 1-horsepower leaf blower or large fan) against walls, ceilings, floors, ledges, and other surfaces in the room to initially dislodge fibers from surfaces. This should take at least 5 minutes per 1000 sq. ft. of floor.
2. Place a 20-inch fan in the center of the room. (Use one fan per 10,000 cubic feet of room space.) Place the fan on slow speed and point it toward the ceiling.
3. Follow procedures in Section 7.4.1 and 7.4.2 (Turn off the pump and then the fan(s) when sampling is complete.).
4. Follow handling procedures in Section 3.2, steps 1-4.

8.0 CALCULATIONS

The sample volume is calculated from the average flow rate of the pump multiplied by the number of minutes the pump was running (volume = flow rate X time in minutes). The sample volume should be submitted to the laboratory and identified on the chain of custody for each sample (zero for lot, field and trip blanks).

The concentration result is calculated using the sample volume and the numbers of asbestos structures reported after the application of the cluster and matrix counting criteria.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

Follow all QA/QC requirements from the laboratories as well as the analytical methods.

9.1 TEM Requirements

1. Examine lot blanks to determine the background asbestos structure concentration.
2. Examine field blanks to determine whether there is contamination by extraneous asbestos structures during specimen preparation.
3. Examine of laboratory blanks to determine if contamination is being introduced during critical phases of the laboratory program.
4. To determine if the laboratory can satisfactorily analyze samples of known asbestos structure concentrations, reference filters shall be examined. Reference filters should be maintained as part of the laboratory's Quality Assurance program.
5. To minimize subjective effects, some specimens should be recounted by a different microscopist.
6. Asbestos laboratories shall be accredited by the National Voluntary Laboratory Accreditation Program.
7. At this time, performance evaluation samples for asbestos in air are not available for Removal Program Activities.

9.2 PCM Requirements

1. Examine reference slides of known concentration to determine the analyst's ability to satisfactorily count fibers. Reference slides should be maintained as part of the laboratory's quality assurance program.
2. Examine field blanks to determine if there is contamination by extraneous structures during sample handling.

3. Some samples should be relabeled then submitted for counting by the same analyst to determine possible bias by the analyst.
4. Participation in a proficiency testing program such as the AIHA-NIOSH proficiency analytical testing (PAT) program.

10.0 DATA VALIDATION

Results of quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results accordingly with the project's data quality objectives.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety procedures. More specifically, when entering an unknown situation involving asbestos, a powered air purifying respirator (PAPR) (full face-piece) is necessary in conjunction with HEPA filter cartridges. See applicable regulations for action level, PEL, TLV, etc. If previous sampling indicates asbestos concentrations are below personal health and safety levels, then Level D personal protection is adequate.

12.0 REFERENCES

- (1) Environmental Asbestos Assessment Manual, Superfund Method for the Determination of Asbestos in Ambient Air, Part 1: Method, EPA/540/2-90/005a, May 1990, and Part 2: Technical Background Document, EPA/540/2-90/005b, May 1990.
- (2) Methodology for the Measurement of Airborne Asbestos by Electron Microscopy, EPA's Report No. 68-02-3266, 1984, G. Yamate, S.C. Agarwal, and R. D. Gibbons.
- (3) National Institute for Occupational Safety and Health. NIOSH Manual of Analytical Method. Third Edition. 1987.
- (4) U.S. Environmental Protection Agency. Code of Federal Regulations 40 CFR 763. July 1, 1987. Code of Federal Regulations 40 CFR 763 Addendum. October 30, 1987.

(5) U.S. Environmental Protection Agency.
Asbestos-Containing Materials in Schools;
Final Rule and Notice. 52 FR 41826.

(6) Occupational Safety and Health
Administration. Code of Federal Regulations
29 CFR 1910.1001. Washington, D.C.
1987.

APPENDIX A

Tables

TABLE 1. SAMPLE STATIONS FOR OUTDOOR SAMPLING		
Sample Station Location	Sample Numbers	Rationale
Upwind/Background ⁽¹⁾	Collect a minimum of two simultaneous upwind/background samples 30° apart from the prevailing windlines.	Establishes background fiber levels.
Downwind	Deploy a minimum of 3 sampling stations in a 180 degree arc downwind from the source.	Indicates if asbestos is leaving the site.
Site Representative and/or Worst Case	Obtain one site representative sample which shows average condition on-site or obtain worst case sample (optional).	Verify and continually confirm and document selection of proper levels of worker protection.

⁽¹⁾ More than one background station may be required if the asbestos originates from different sources.

APPENDIX A (Cont'd)

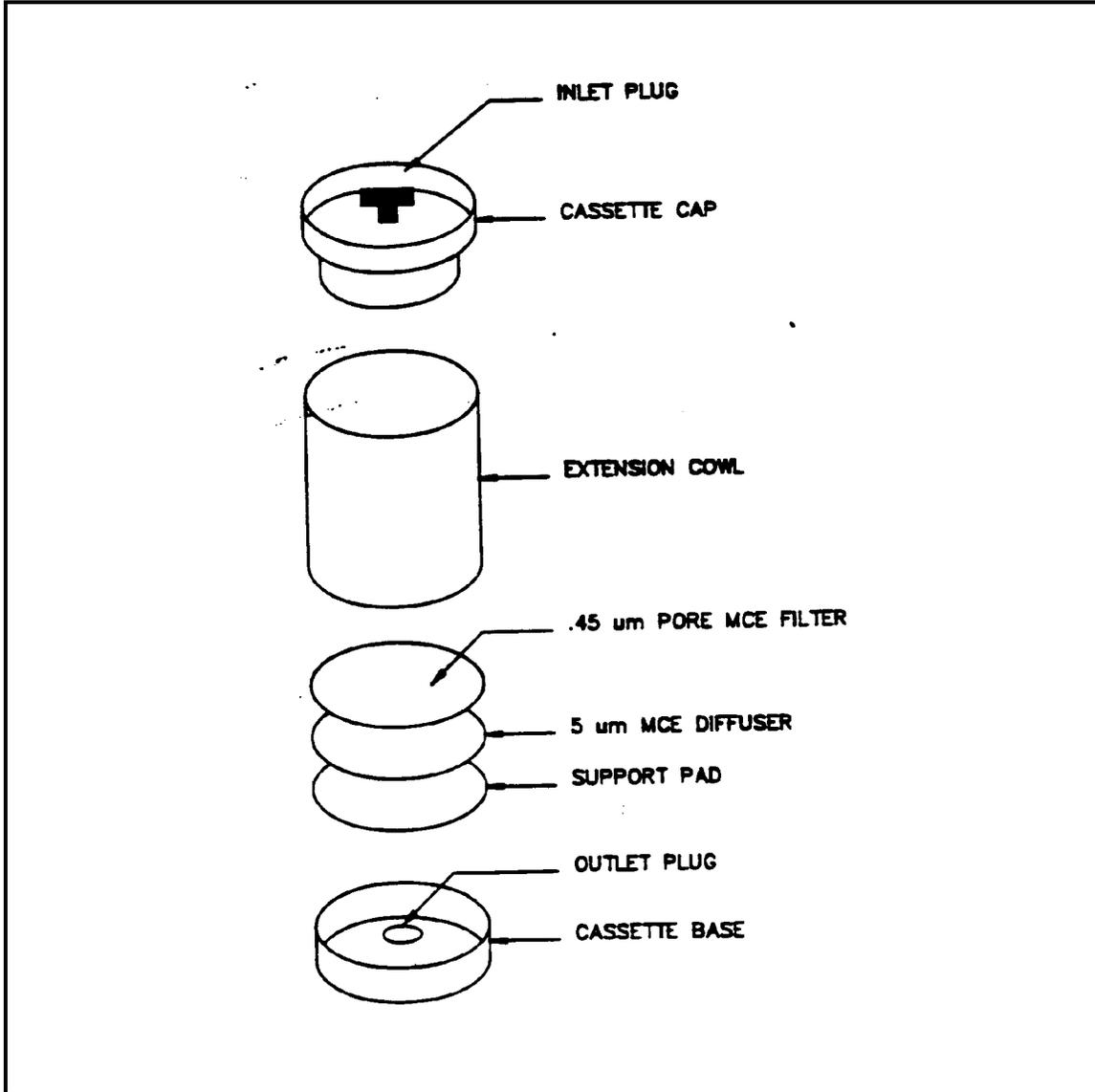
Tables

TABLE 2 SAMPLE STATIONS FOR INDOOR SAMPLING		
Sample Station Location	Sample Numbers	Rationale
Indoor Sampling	<p>If a work site is a single room, disperse 5 samplers throughout the room.</p> <p>If the work site contains up to 5 rooms, place at least one sampler in each room.</p> <p>If the work site contains more than 5 rooms, select a representative sample of the rooms.</p>	Establishes representative samples from a homogeneous area.
Upwind/Background	If outside sources are suspected, deploy a minimum of two simultaneous upwind/background samples 30° apart from the prevailing windlines.	Establish whether indoor asbestos concentrations are coming from an outside source.
Worst Case	Obtain one worst case sample, i.e., aggressive sampling (optional).	Verify and continually confirm and document selection of proper levels of worker protection.

APPENDIX B

Figures

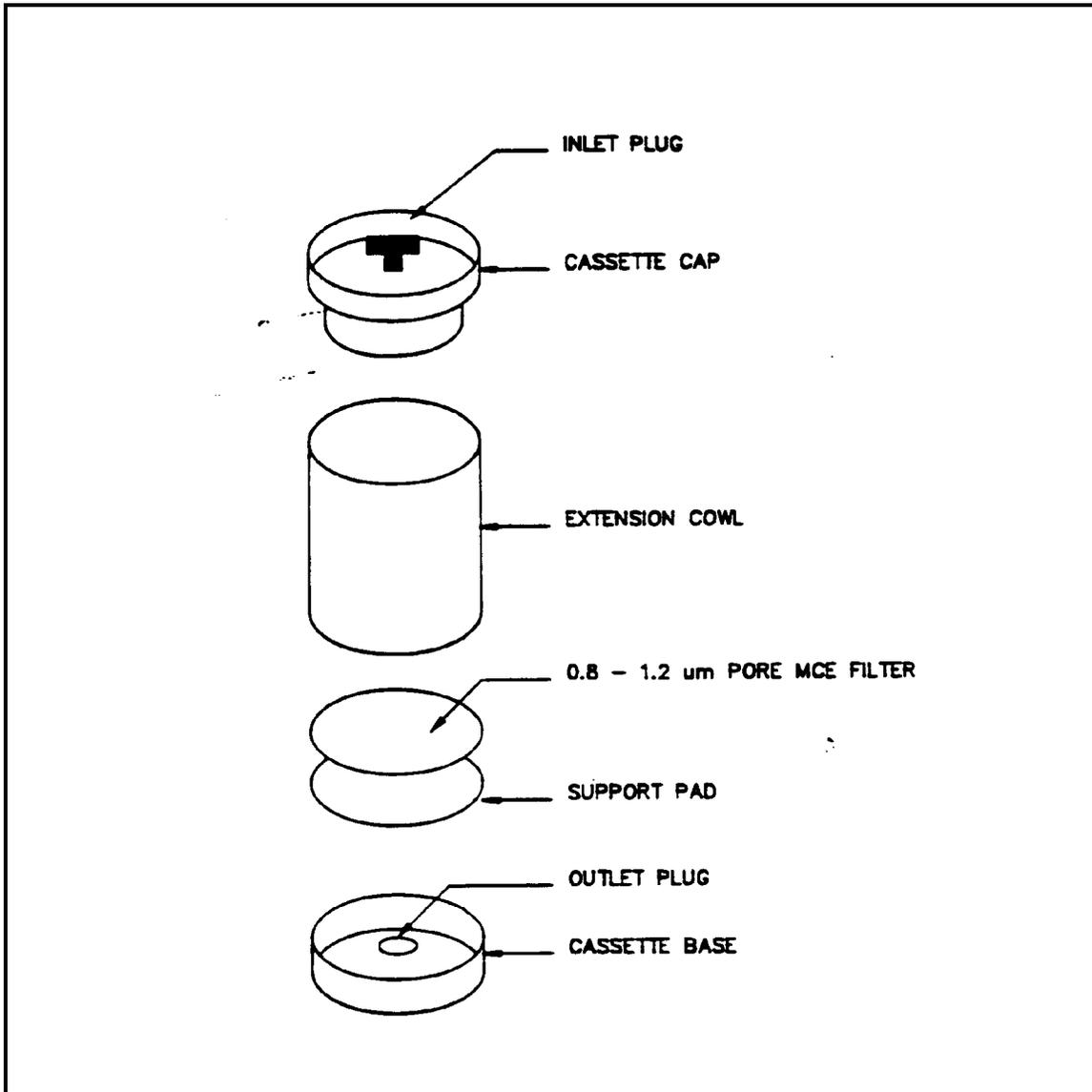
FIGURE 1. Transmission Electron Microscopy Filter Cassette



APPENDIX B (Cont'd)

Figures

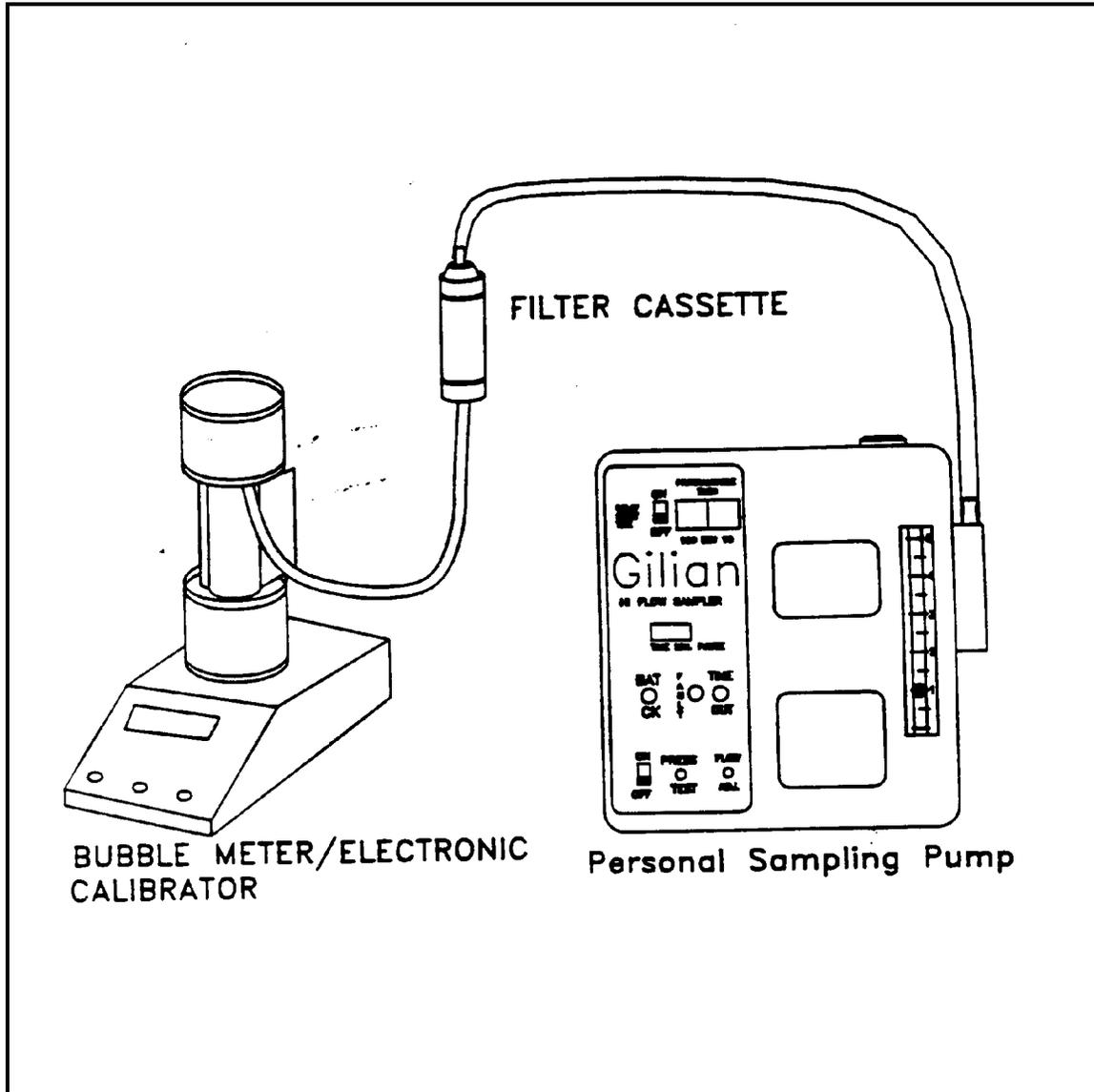
FIGURE 2. Phase Contrast Microscopy Filter Cassette



APPENDIX B (Cont'd)

Figures

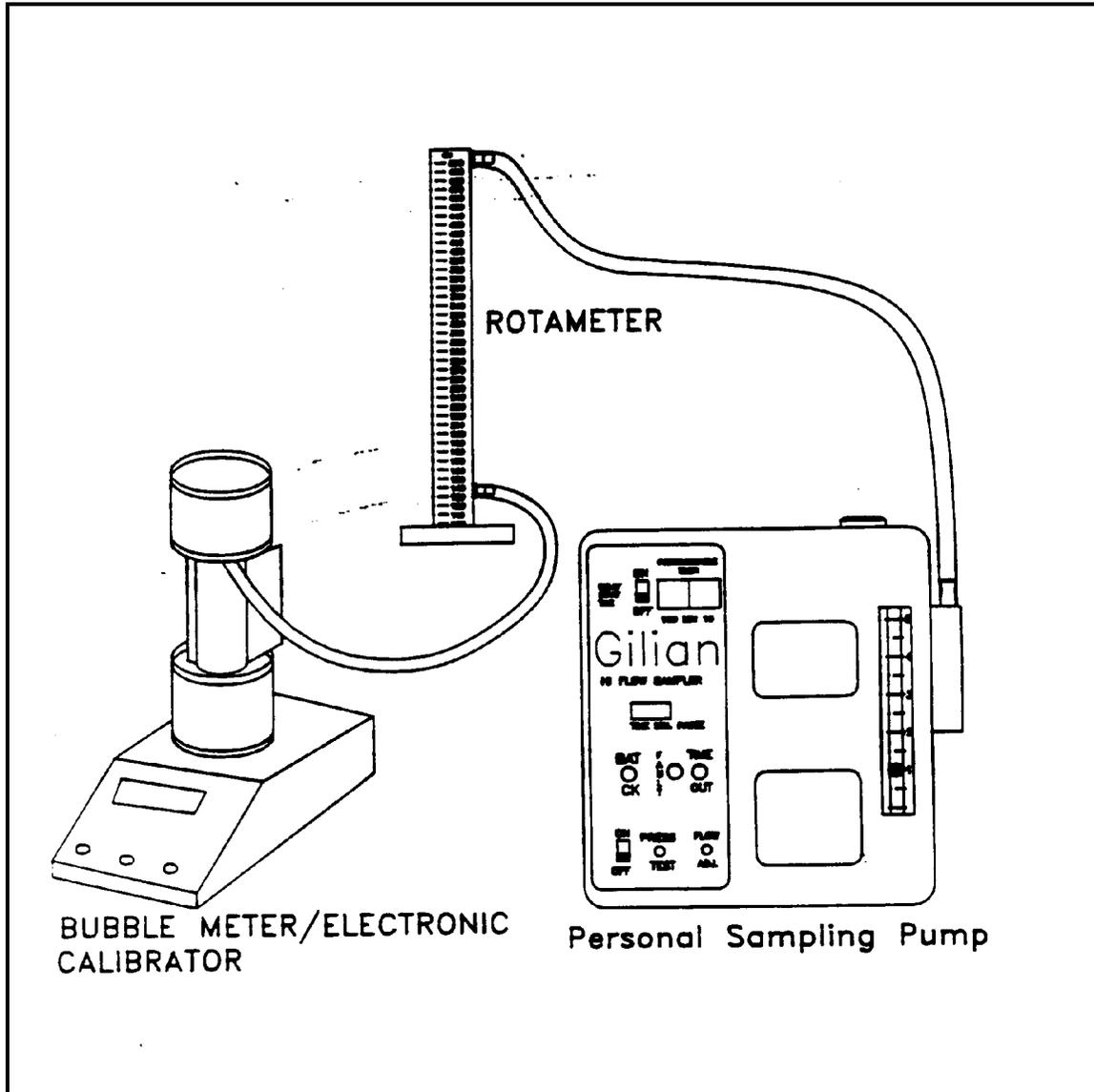
FIGURE 3. Calibrating a Personal Sampling Pump with a Bubble Meter



APPENDIX B (Cont'd)

Figures

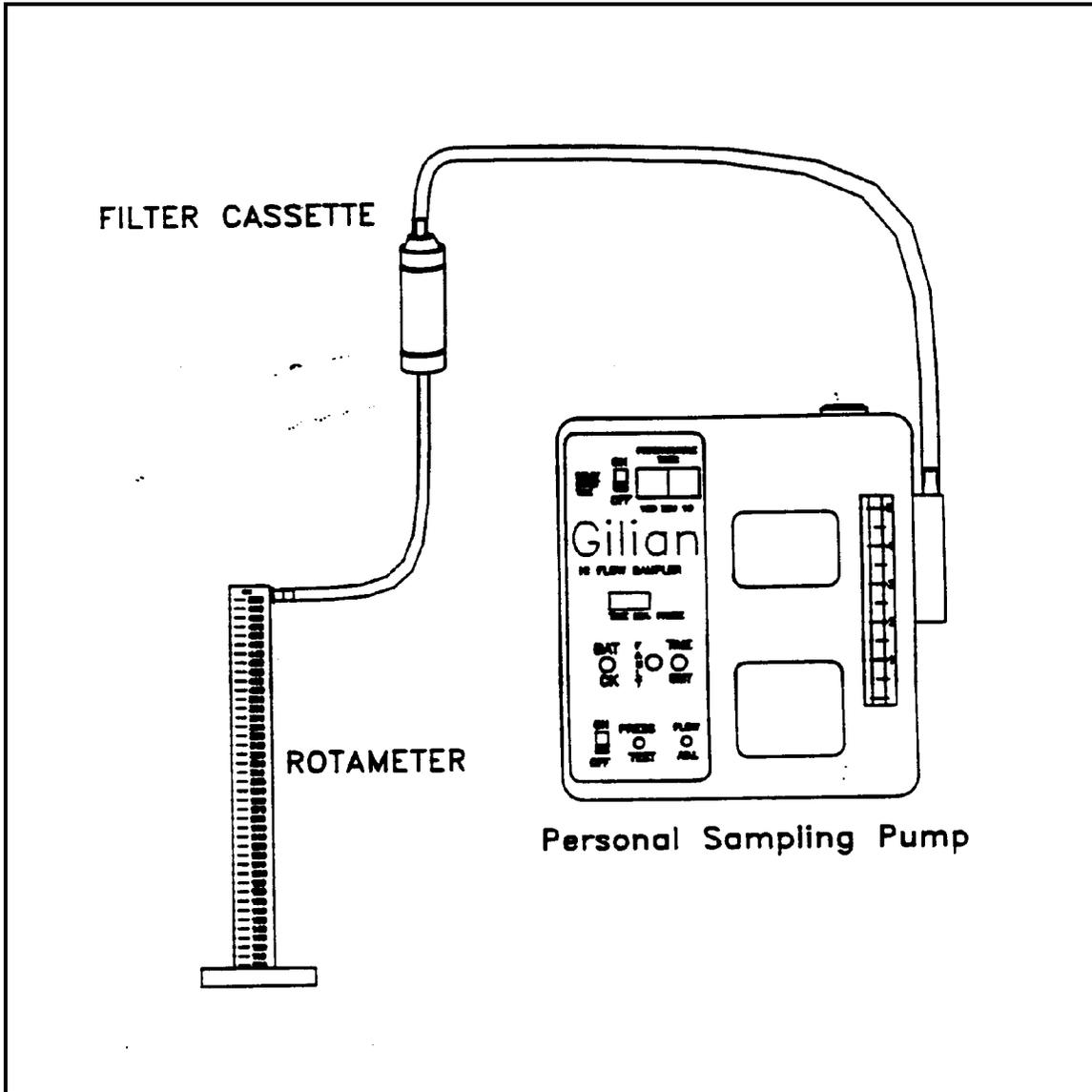
FIGURE 4. Calibrating a Rotameter with a Bubble Meter



APPENDIX B (Cont'd)

Figures

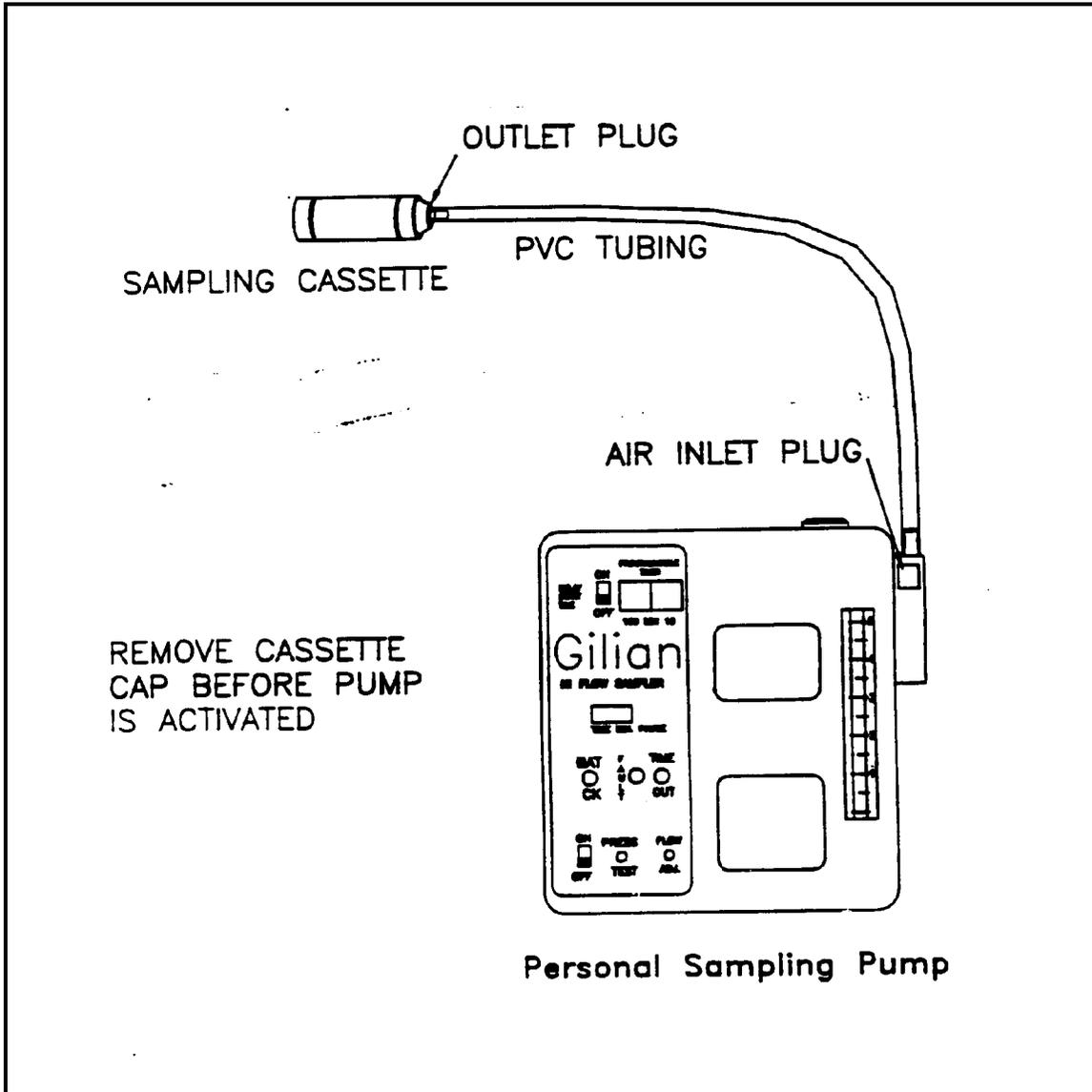
FIGURE 5. Calibrating a Sampling Pump with a Rotameter



APPENDIX B (Cont'd)

Figures

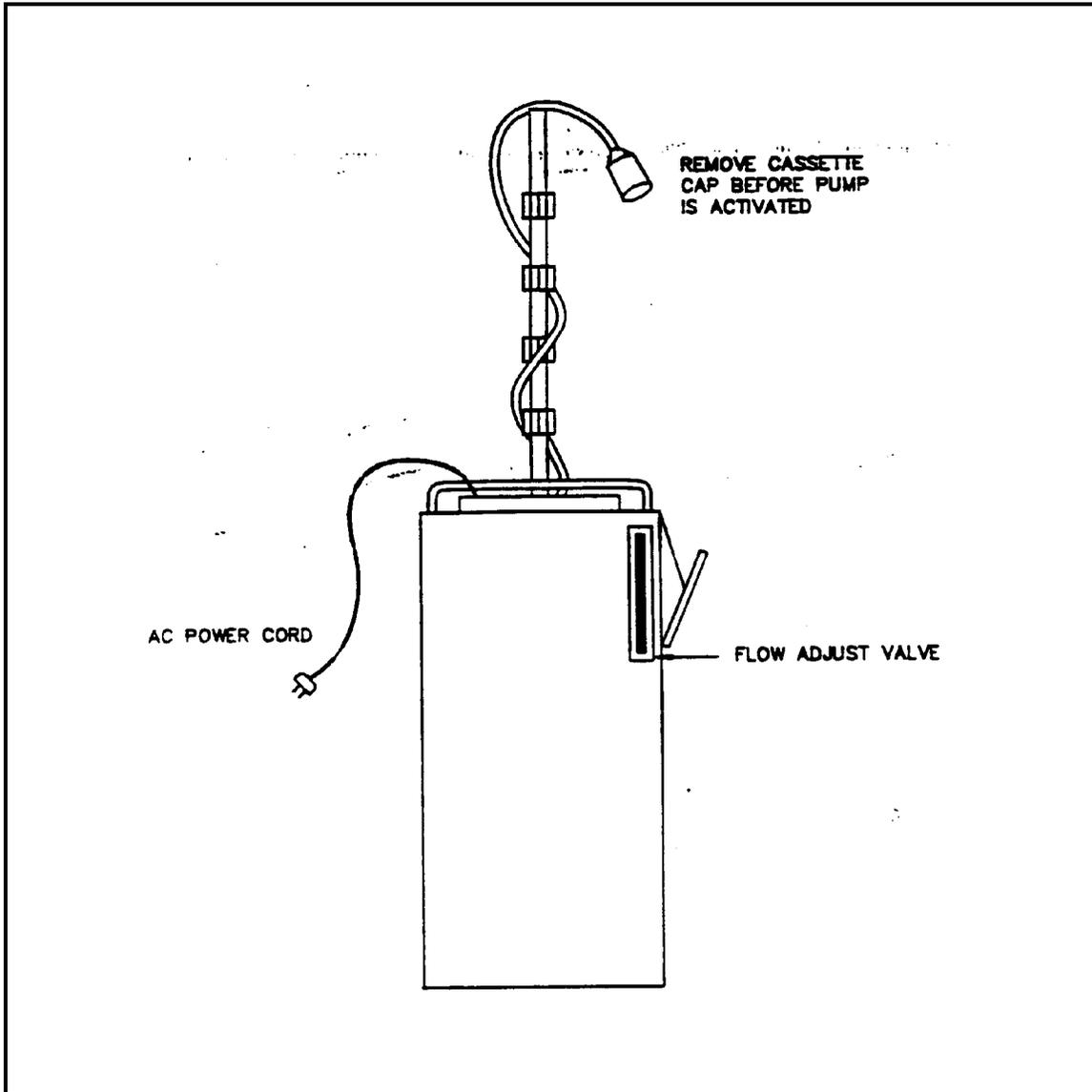
FIGURE 6. Personal Sampling Train for Asbestos



APPENDIX B (Cont'd)

Figures

FIGURE 7. High Flow Sampling Train for Asbestos





GENERAL AIR SAMPLING GUIDELINES

SOP#: 2008
DATE: 11/16/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) provides guidance in developing and implementing sampling plans to assess the impact of hazardous waste sites on ambient air. It presents the United States Environmental Protection Agency/Environmental Response Team's (U.S. EPA/ERT's) approach to air sampling and monitoring and identifies equipment requirements. It is not within the scope of this SOP to provide a generic air sampling plan. Experience, objectives, site characteristics, and chemical characteristics will dictate sampling strategy. This SOP does not address indoor air sampling.

Two basic approaches can be used to assess ambient air (also referred to as air pathway assessments): modeling and measurements. The modeling approach initially estimates or measures the overall site emission rate(s) and pattern(s). These data are input into an appropriate air dispersion model, which predicts either the maximum or average air concentrations at selected locations or distances during the time period of concern. This overall modeling strategy is presented in the first three volumes of the Air Superfund National Technical Guidance Series on Air Pathway Assessments^(1,2,3). Specific applications of this strategy are presented in several additional Air Superfund Technical Guidance documents⁽⁴⁾.

The measurement approach involves actually measuring the air impact at selected locations during specific time periods. These measurements can be used to document actual air impacts during specific time intervals (i.e., during cleanup operations) or to extrapolate the probable "worst case" concentrations at that and similar locations over a longer time period than was sampled.

This SOP addresses issues associated with this second assessment strategy. This SOP also discusses the U.S. EPA/ERT's monitoring instruments, air sampling

kits, and approach to air sampling and monitoring at hazardous waste sites.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, depending on site conditions, equipment limitations, or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Air monitoring is defined as the use of direct-reading instruments and other screening or monitoring equipment and techniques that provide instantaneous (real-time) data on the levels of airborne contaminants. The U.S. EPA/ERT maintains numerous monitors for real-time measurements. Examples of air monitoring equipment are hand-held photoionization detectors (PID), flame ionization detectors (FID), oxygen/combustible gas detectors, and remote optical sensors.

Air sampling is defined as those sampling and analytical techniques that require either off- or on-site laboratory analysis and therefore do not provide immediate results. Typically, air sampling occurs after use of real-time air monitoring equipment has narrowed the number of possible contaminants and has provided some qualitative measurement of contaminant concentration. Air sampling techniques are used to more accurately detect, identify and quantify specific chemical compounds relative to the majority of air monitoring technologies.

In the Superfund Removal Program, On-Scene Coordinators (OSCs) may request the U.S. EPA/ERT to conduct air monitoring and sampling during the

following situations: emergency responses, site assessments, and removal activities. Each of these activities has a related air monitoring/sampling objective that is used to determine the potential hazards to workers and/or the community.

C **Emergency Response**

Emergency responses are immediate responses to a release or threatened release of hazardous substances presenting an imminent danger to public health, welfare, or the environment (i.e., chemical spills, fires, or chemical process failures resulting in a controlled release of hazardous substances). Generally these situations require rapid on-site investigation and response. A major part of this investigation consists of assessing the air impact of these releases.

C **Removal Site Assessment**

Removal site assessments (referred to as site assessments) are defined as any of several activities undertaken to determine the extent of contamination at a site and which help to formulate the appropriate response to a release or threatened release of hazardous substances. These activities may include a site inspection, multimedia sampling, and other data collection.

C **Removal Actions**

Removal actions clean up or remove hazardous substances released into the environment. Removal actions include any activity conducted to abate, prevent, minimize, stabilize, or eliminate a threat to public health or welfare, or to the environment.

Personal risk from airborne contaminants can be determined by comparing the results of on-site monitoring and sampling to health-based action levels such as the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) and the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs). Residential risk can be determined by comparing the results of off-site monitoring or sampling to health-based action levels such as those developed by the Agency for Toxic Substance and

Disease Registry (ATSDR).

The extent to which valid inferences can be drawn from air monitoring/sampling depends on the degree to which the monitoring/sampling effort conforms to the objectives of the event. Meeting the project's objectives requires thorough planning of the monitoring/sampling activities, and implementation of the most appropriate monitoring/sampling and analytical procedures. These issues will be discussed in this SOP.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Preservation, containers, handling and storage for air samples are discussed in the specific SOPs for the technique selected. In addition, the analytical method (i.e., U.S. EPA, National Institute for Occupational Safety and Health [NIOSH], and OSHA Methods) may be consulted for storage temperature, holding times and packaging requirements. After sample collection, the sampling media (i.e., cassettes or tubes) are immediately sealed. The samples are then placed into suitable containers (i.e., whirl bags, resealable bags or culture tubes) which are then placed into a shipping container.

Use bubble wrap or styrofoam peanuts when packing air samples for shipment. **DO NOT USE VERMICULITE.**

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Upwind sources can contribute to sample concentration. Natural sources, such as biological waste, can produce hydrogen sulfide and methane which may contribute to the overall contaminant level. Extraneous anthropogenic contaminants (i.e., burning of fossil fuels; emissions from vehicular traffic, especially diesel; volatile compounds from petrochemical facilities; and effluvia from smoke stacks) may also contribute. Air sampling stations should be strategically placed to identify contributing sources.

Photoreactivity or reaction of the parameters of concern may occur with nonrelated compounds [i.e., nitrogen compounds and polyaromatic hydrocarbons

(PAHs)]. Some sorbent media/samples should not be exposed to light during or after sampling due to photochemical effects (i.e., PAHs).

Various environmental factors, including humidity, temperature and pressure, also impact the air sampling methodology, collection efficiency and detection limit. Since the determination of air contaminants is specifically dependent on the collection parameters and efficiencies, the collection procedure is an integral part of the analytical method.

Detection limits depend on the contaminants being investigated and the particular site situation. It is important to know why the data are needed and how the data will be used. Care should be taken to ensure the detection limits are adequate for the intended use of the final results.

Some equipment may be sensitive to humidity and temperature extremes.

5.0 EQUIPMENT/APPARATUS

5.1 Direct Reading Instruments (Air Monitoring Instruments)

There are two general types of direct reading instruments: portable screening devices and specialized analytical instruments. Generally all these techniques involve acquiring, for a specific location or area, continuous or sequential direct air concentrations in either a real-time or semi-real-time mode. None of these instruments acquires true time-weighted average concentrations. In addition, these instruments are not capable of acquiring simultaneous concentration readings at multiple locations, although several are able to sequentially analyze samples taken remotely from different locations. The document, "Guide to Portable Instruments for Assessing Airborne Pollutants Arising from Hazardous Waste Sites⁽⁵⁾," provides additional information about air sampling and monitoring. The hazard levels for airborne contaminants vary. See the ACGIH TLVs and the OSHA PELs for safe working levels. Common screening devices and analytical instruments are described in Appendix A.

5.2 Air Sampling Equipment and Media/Devices

The U.S. EPA/ERT uses the following analytical

methods for sampling: *NIOSH Manual of Analytical Methods*⁽⁶⁾, *American Society for Testing and Materials (ASTM) Methods*⁽⁷⁾, *U.S. EPA Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air*^(8,9), and *OSHA Methods*⁽¹⁰⁾. Additional air sampling references include *Industrial Hygiene and Toxicology* (3rd Ed.)⁽¹¹⁾ and *Air Sampling Instruments for Evaluation of Atmospheric Contaminants*⁽¹²⁾. These methods typically specify equipment requirements for sampling. Since air sampling is such a diverse technology, no single method or reference is best for all applications. Common sampling equipment and media/devices are described in Appendix B.

5.3 Tools/Material and Equipment List

In addition to equipment and materials identified in Appendices A and B, the following equipment and materials may be required to conduct air sampling and monitoring at hazardous waste sites:

- C Camera
- C Site logbook
- C Clipboard
- C Chain of custody records
- C Custody seals
- C Air sampling worksheets
- C Sample labels
- C Small screwdriver set
- C Aluminum foil
- C Extension cords
- C Glass cracker
- C Multiple plug outlet
- C Whirl bags or culture tubes
- C Teflon tape
- C Calibration devices
- C Tygon and/or Teflon^R tubing
- C Surgical gloves
- C Lint-free gloves
- C Ice
- C Sample container

Use the following additional equipment when decontaminating glassware on site:

- C Protective equipment (i.e., gloves, splash goggles, etc.)
- C Appropriate solvent(s)
- C Spray bottles
- C Liquinox (soap)
- C Paper towels

- C Distilled/deionized water
- C Five-gallon buckets
- C Scrub brushes and bottle brushes

6.0 REAGENTS

Impinger sampling involves using reagents contained in a glass vial to absorb contaminants of concern (for example, NIOSH Method 3500 for formaldehyde uses 1% sodium bisulfite solution). Impinger solutions vary and are method-dependent.

Reagents such as acetone and hexane are required to decontaminate glassware and some air sampling equipment. Decontamination solutions are specified in the Sampling Equipment Decontamination SOP.

7.0 PROCEDURES

7.1 Air Monitoring Design

7.1.1 Initial Surveys

In general, the initial survey is considered to be a relatively rapid screening process for collecting preliminary data at hazardous waste sites. However, initial surveys may require many hours to complete and may consist of more than one entry.

Some information is generally known about the site; therefore, real-time instrumentation for specific compounds (i.e., detector tubes and electrochemical sensors) can be used to identify hot spots. Sufficient data should be obtained with real-time instruments during the initial entry to screen the site for various contaminants. When warranted, intrinsically safe or explosion-proof instruments should be used. An organic vapor analyzer (OVA) is typically used during this survey. These gross measurements may be used on a preliminary basis to (1) determine levels of personal protection, (2) establish site work zones, and (3) map candidate areas for more thorough qualitative and quantitative studies involving air sampling.

In some situations, the information obtained may be sufficient to preclude additional monitoring. Materials detected during the initial survey may call for a more comprehensive evaluation of hazards and analyses for specific compounds. Since site activities and weather conditions change, a continuous program to monitor the ambient atmosphere must be established.

7.1.2 Off-Site Monitoring

Typically, perimeter monitoring with the same instruments employed for on-site monitoring is utilized to determine site boundaries. Because air is a dynamic matrix, physical boundaries like property lines and fences do not necessarily delineate the site boundary or area influenced by a release. Whenever possible, atmospheric hazards in the areas adjacent to the on-site zone should be monitored with direct-reading instruments. Monitoring at the fenceline or at varying locations off site provides useful information regarding pollutant migration. Three to four locations downwind of the source (i.e., plume) at breathing-zone height, provide a basic fingerprint of the plume. Negative instrument readings off site should not be interpreted as the complete absence of airborne toxic substances; rather, they should be considered another piece of information to assist in the preliminary evaluation. The interpretation of negative readings is instrument-dependent. The lack of instrument readings off site should not be interpreted as the complete absence of all airborne toxic substances; rather, it is possible that the particular compound or class of compounds to which the monitoring instrument responds is not present or that the concentration of the compound(s) is below the instrument's detection limit.

7.2 Air Sampling Design

7.2.1 Sampling Plan Design

The goal of air sampling is to accurately assess the impact of a contaminant source(s) on ambient air quality. This impact is expressed in terms of overall average and/or maximum air concentrations for the time period of concern and may be affected by the transport and release of pollutants from both on- and off-site sources. The location of these sources must be taken into account as they impact the selection of sampling locations. Unlike soil and groundwater concentrations, air concentrations at points of interest can easily vary by orders of magnitude over the period of concern. This variability plays a major role in designing an air sampling plan.

Downwind air concentration is determined by the amount of material being released from the site into the air (the emission rate) and by the degree that the contamination is diluted as it is transported. Local

meteorology and topography govern downwind dilution. Contaminant emission rates can also be heavily influenced by on-site meteorology and on-site activities. All of these concerns must be incorporated into an air sampling plan.

A sampling strategy can be simple or complex, depending on the sampling program objectives. Programs involving characterization of the pollutant contribution from a single point source tend to be simple, whereas sampling programs investigating fate and transport characteristics of components from diverse sources require a more complex sampling strategy. In addition, resource constraints may affect the complexity of the sampling design.

An optimal sampling strategy accounts for the following site parameters:

- C Location of stationary as well as mobile sources
- C Analytes of concern
- C Analytical detection limit to be achieved
- C Rate of release and transport of pollutants from sources
- C Availability of space and utilities for operating sampling equipment
- C Meteorological monitoring data
- C Meteorological conditions in which sampling is to be conducted

The sampling strategy typically requires that the concentration of contaminants at the source or area of concern as well as background contributions be quantified. It is important to establish background levels of contaminants in order to develop a reference point from which to evaluate the source data. Field blanks and lot blanks, as well as various other types of QA/QC samples, can be utilized to determine other sources. The impact of extraneous sources on sampling results can frequently be accounted for by placing samplers upwind, downwind and crosswind from the subject source. The analytical data from these different sampling locations may be compared to determine statistical differences.

7.2.2 Sampling Objectives

The objectives of the sampling must be determined prior to developing the sampling plan. Does the sampling plan verify adequate levels of protection for on-site personnel, or address potential off-site impacts

associated with the site or with site activities? In addition, the assumptions associated with the sampling program must be defined. These assumptions include whether the sampling is to take place under "typical," "worst case," or "one-time" conditions. If the conditions present at the time of sampling are different from those assumed during the development of the sampling plan, then quality of the data collected may be affected. The following definitions have been established:

- C Typical: routine daily sampling or routine scheduled sampling at pre-established locations.
- C Worst case: sampling conducted under the worst meteorological and/or site conditions which would result in elevated ambient concentrations.
- C One-time: only one chance is given to collect a sample without regard to time or conditions.

Qualitative data acquired under these conditions are usually applicable only to the time period during which the data were collected and may not provide accurate information to be used in estimating the magnitude of an air impact during other periods or over a long time interval.

The sampling objectives also dictate the detection limits. Sampling methods for airborne contaminants will depend upon the nature and state (solid, liquid or gas) of the contaminant. Gases and vapors may be collected in aqueous media or adsorbents, in molecular sieves, or in suitable containers. Particulates are collected by filters or impactors. The volume of sample to be collected is dependent upon an estimate of the contaminant concentration in the air, the sensitivity of the analytical method, and the standard or desired detection limit. A sufficient amount of sample must be collected to achieve the desired detection limit without interference from other contaminants. In addition, the selected method must be able to detect the target compound(s).

7.2.3 Location and Number of Individual Sampling Points

Choose the number and location of sampling points according to the variability, or sensitivity, of the

sampling and analytical methods being utilized, the variability of contaminant concentration over time at the site, the level of precision required and cost limitations. In addition, determine the number of locations and placement of samplers by considering the nature of the response, local terrain, meteorological conditions, location of the site (with respect to other conflicting background sources), size of the site, and the number, size, and relative proximity of separate on-site emission sources and upwind sources. The following are several considerations for sampler placement:

- C Location of potential on-site emission sources, as identified from the review of site background information or from preliminary on-site inspections.
- C Location of potential off-site emission sources upwind of the sampling location(s). Review local wind patterns to determine the location of off-site sources relative to wind direction.
- C Topographic features that affect the dispersion and transport of airborne toxic constituents.

Avoid natural obstructions when choosing air sampling station locations, and account for channelization around those obstructions.

- C Large water bodies, which affect atmospheric stability and the dispersion of air contaminants.
- C Roadways (dirt or paved), which may generate dust that could mask site contaminants.
- C Vegetation, such as trees and shrubs, which stabilizes soil and retards subsurface contaminants from becoming airborne. It also affects air flow and scrubs some contaminants from the air. Sometimes thick vegetation can make an otherwise ideal air monitoring location inaccessible.

Consider the duration of sampling activities when choosing the location and number of samples to be collected. For example, if the sampling period is limited to a few hours, one or two upwind and several downwind samples would typically be adequate,

especially around major emission sources.

A short-term monitoring program ranges from several days to a few weeks and generally includes gathering data for site assessments, removal actions, and source determination data (for further modeling). Activities involved in a short-term sampling strategy must make the most of the limited possibilities for data collection. Consider moving upwind/downwind locations daily based on National Oceanic and Atmospheric Administration (NOAA) weather forecasts. Weather monitoring becomes critical where complex terrain and local meteorological effects frequently change wind direction. Often, a number of alternatives can fulfill the same objective.

Prevailing winds running the length of a valley usually require a minimum number of sampler locations; however, a complex valley may require more sampler locations to account for the wide variety of winds. Ocean/lake effects may require a radical plan to collect enough samples to reach a low detection limit. Two sets of samplers may be placed next to each other: one set would be activated during the sea breeze while the other set is turned off, and vice versa when there is no sea breeze. After the sampling event, the respective upwind and downwind samples would be combined. Another alternative for sampling near a large body of water may be to use automatic, wind-vector-operated samplers, which turn the sampler on only when the wind comes from a specified vector. At sites located on hillsides, wind will move down a valley and produce an upward fetch at the same time. Sampling locations may have to ring the site to measure the wind's impact.

Off-site sources may affect on-site monitoring. In this case, on-site meteorological data, concurrent with sampling data, is essential to interpreting the acquired data. Also, additional upwind sampling sites may be needed to fully characterize ambient background contaminant levels. Multiple off-site sources may require several monitoring locations, but if the sources are at a sufficient distance, only one monitoring location is needed.

Topography and weather are not the only factors in sampler location; the sampling sites must be secure from vandals and mishap. Secure all sampling locations to maintain chain of custody, and to prevent tampering with samples or loss of sampling units. High-volume sampling methods often require the use of 110 VAC electric power. When portable

generators are used, the power quality may affect sampler operation. Also, be aware that the generators themselves could be a potential pollution source if their placement is not carefully considered.

Air quality dispersion models can be used to place samplers. The models incorporate source information, surrounding topography, and meteorological data to predict the general distance and directions of maximum ambient concentrations. Modeling results should be used to select sampling locations in areas of maximum pollutant concentrations.

7.2.4 Time, Duration and Frequency of Sampling Events

After choosing appropriate sampling or monitoring locations, determine the sampling frequency and the number of samples to be collected. The time of day, duration and frequency of sampling events is governed by:

- C The effects of site activities and meteorology on emission rates
- C The diurnal effect of the meteorology on downwind dispersion
- C The time period(s) of concern as defined by the objective
- C The variability in the impact from other non-site-related sources
- C If defined, the degree of confidence needed for either the mean or maximum downwind concentrations observed
- C The precision requirements for single measurements
- C Cost and other logistical considerations

The duration of the removal action and the number of hours per day that site work is conducted determine the time, duration, and frequency of samples. Short-term sampling programs may require daily sampling, while long-term programs may require 24-hour sampling every sixth or twelfth day. If the site will be undergoing removal activities 24 hours a day, continuous air sampling may be warranted. However, if the site activities will be conducted for only eight hours a day, and there are no emissions likely to occur during the remaining 16 hours, then sampling would be appropriate prior to the start of daily activities, would continue during operations, and end at the conclusion of the daily activities. An off-peak sample collection can ensure that emissions are not persisting

after the conclusion of daily cleanup activities. For some sites, emissions are still a factor several hours after daily site activities have been completed. Because of the typically decreased downwind dispersion in the evening, higher downwind concentrations than were present during daytime site activities may be detected. For sites where this is possible, the sampling duration needs to be lengthened accordingly.

Sampling duration and flow rate dictate the volume of air collected, and to a major degree, the detection limit. The analytical method selected will provide a reference to flow rate and volume. Flow rates are limited to the capacity of the pumps being employed and the contact time required by the collection media.

The duration or period of air sampling is commonly divided into two categories (1) samples collected over a brief time period are referred to as "instantaneous" or "grab" samples and are usually collected in less than five minutes and (2) average or integrated samples are collected over a significantly longer period of time. Integrated samples provide an average concentration over the entire sampling period. Integrated samples are not suited to determining cyclical releases of contaminants because periodic or cyclical events are averaged out by the proportionally long sampling duration.

Air quality dispersion models can predict the maximum air contaminant concentration expected from a source. The meteorological and site conditions expected to cause the highest concentration are known as worst-case conditions and can be identified by analyzing the modeling results. Depending upon the objective, one may sample when the model predicts worst-case conditions will exist.

7.2.5 Meteorological and Physical/Chemical Considerations

A meteorological monitoring program is an integral part of site monitoring activities. Meteorological data, which define local terrain impacts on air flow paths, are needed to interpret air concentration data. Meteorological data may be available from an existing station located near the site (i.e., at a local airport), otherwise a station should be set up at the site. This data will document the degree that samples actually were downwind and verify whether other worst-case assumptions were met. Meteorological parameters to

be monitored are, at a minimum, wind speed, wind direction, and sigma theta (which is the horizontal wind direction standard deviation and an indicator of atmospheric stability). The remaining parameters primarily affect the amount of a contaminant available in the air.

C Wind Speed

When the contaminant of concern is a particulate, wind speed is critical in determining whether the particulate will become airborne, the quantity of the particulate that becomes airborne, and the distance the particulate will travel from the source. Wind speed also contributes to the volatilization of contaminants from liquid sources.

C Wind Direction

Wind direction highly influences the path of airborne contaminants. In addition, variations in wind direction increase the dispersion of pollutants from a given source.

C Atmospheric Stability

Atmospheric stability refers to the degree to which the atmosphere tends to dampen vertical and horizontal motion. Stable atmospheric conditions (i.e., evenings) result in low dispersion, and unstable atmospheric conditions (i.e., hot sunny days) result in higher dispersion.

C Temperature

Higher temperatures increase the rate of volatilization of organic and some inorganic compounds and affect the initial rise of gaseous or vapor contaminants. Therefore, worst-case emission of volatiles and semivolatiles occurs at the hottest time of day, or on the hottest day.

C Humidity

High humidity affects water-soluble chemicals and particulates. Humid conditions may dictate the sampling media used to collect the air sample, or limit the volume of air sampled and thereby increase

the detection limit.

C Atmospheric Pressure

Migration of landfill gases through the landfill surface and through surrounding soils are governed by changes in atmospheric pressure. Atmospheric pressure will influence upward migration of gaseous contaminants from shallow aquifers into the basements of overlying structures.

In many cases, the transport and dispersion of air pollutants is complicated by local meteorology. Normal diurnal variations (i.e., temperature inversions) affect dispersion of airborne contaminants. Terrain features can enhance or create air inversions and can also influence the path and speed of air flow, complicating transport and dispersion patterns.

The chemical characteristics of a contaminant (i.e., molecular weight, physical state, vapor pressure, aerodynamic size, temperature, reactive compounds, and photodegradation) affects its behavior and can influence the method used to sample and analyze it.

8.0 CALCULATIONS

Volume is obtained by multiplying the sample time in minutes by the flow rate. Sample volume should be indicated on the chain of custody record. Adjustments for temperature and pressure differences may be required.

Results are usually provided in parts per million (ppm), parts per billion (ppb), milligrams per cubic meter (mg/m³) or micrograms per cubic meter (µg/m³).

Refer to the analytical method or regulatory guidelines for other applicable calculations.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

The manufacturer's instructions should be reviewed prior to instrument use. Instruments must be utilized in accordance with manufacturer's instructions. Equipment checkout and calibration activities must

occur prior to and after monitoring and sampling and must be documented.

9.1 QA/QC Samples

QA/QC samples provide information on the variability and usability of environmental sample results. Various QA/QC samples may be collected to detect error. QA/QC samples are submitted with the field samples for analysis to aid in identifying the origin of analytical discrepancies; then a determination can be made as to how the analytical results should be used. Collocated samples, background samples, field blanks, and lot blanks are the most commonly collected QA/QC field samples. Performance evaluation (PE) samples and matrix spikes provide additional measures of data QA/QC control. QA/QC results may suggest the need for modifying sample collection, preparation, handling, or analytical procedures if the resultant data do not meet site-specific QA or data quality objectives.

9.2 Sample Documentation

All sample and monitoring activities should be documented legibly, in ink. Any corrections or revisions should be made by lining through the incorrect entry and by initialing the error. All samples must be recorded on an Air Sampling Worksheet. A chain of custody record must be maintained from the time a sample is taken to the final deposition of the sample. Custody seals demonstrate that a sample container has not been opened or tampered with during transport or storage of samples.

10.0 DATA VALIDATION

Results for QA/QC samples should be evaluated for contamination. This information should be utilized to qualify the environmental sample results accordingly with data quality objectives.

11.0 HEALTH AND SAFETY

Personal protection equipment (PPE) requirements identified in federal and/or state regulations and 29 Code of Federal Regulations (CFR) 1910.120 for hazardous waste site work must be followed.

The majority of physical precautions involved in air sampling are related to the contaminant sampled. Attention should be given when sampling in

potentially explosive, flammable or acidic atmospheres. On rare occasions, the collection media may be hazardous; for example, in the instance where an acidic or basic solution is utilized in an impinger.

When working with potentially hazardous materials, follow U.S. EPA, OSHA and corporate health and safety procedures.

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APPENDIX A

Portable Screening Devices and Specialized Analytical Instruments

PORTABLE SCREENING DEVICES

Where possible, a datalogger should be used to minimize the length of time required for site personnel to be in a potentially contaminated area. Datalogger cable is available from manufacturers for linear output instruments and some nonlinear output instruments. U.S. EPA ERT/REAC has output cables for organic vapor analyzers (i.e., HNU and OVA), toxic gas analyzers (i.e., monitox) and real-time aerosol monitors (i.e., RAM and miniram).

C Total Hydrocarbon Analyzers

Total hydrocarbon analyzers used to detect a variety of volatile organic compounds (VOCs) at hazardous waste sites principally employ either a photoionization detector (PID) or a flame ionization detector (FID). Compounds are ionized by a flame or an ultraviolet lamp. PIDs depend on the ionization potential of the compounds. PIDs are sensitive to aromatic and olefinic (unsaturated) compounds such as benzene, toluene, styrene, xylenes, and acetylene. Greater selectivity is possible by using low-voltage lamps. The ionization potential of individual compounds can be found in the NIOSH Pocket Guide to Chemical Hazards. These instruments are not compound-specific and are typically used as screening instruments. FIDs are sensitive to volatile organic vapor compounds such as methane, propanol, benzene and toluene. They respond poorly to organic compounds lacking hydrocarbon characteristics.

C Oxygen and Combustible Gas Indicators

Combustible Gas Indicators (CGIs) provide efficient and reliable methods to test for potentially explosive atmospheres. CGI meters measure the concentration of a flammable vapor or gas in air and present these measurements as a percentage of the

lower explosive limit (LEL).

The measurements are temperature-dependent. The property of the calibration gas determines sensitivity.

LELs for individual compounds can be found in the NIOSH Pocket Guide to Chemical Hazards. If readings approach or exceed 10% of the LEL, extreme caution should be exercised in continuing the investigation. If readings approach or exceed 25% LEL, personnel should be withdrawn immediately.

CGIs typically house an electrochemical sensor to determine the oxygen concentration in ambient air. Normally, air contains approximately 20.9% oxygen by volume. Oxygen measurements are of particular importance for work in enclosed spaces, low-lying areas, or in the vicinity of accidents that have produced heavier-than-air vapors which could displace ambient air. The meters are calibrated for sea level and may indicate a false negative (i.e., O₂ content) at higher altitudes. Since the air has been displaced by other substances, these oxygen-deficient areas are also prime locations for taking additional organic vapor and combustible gas measurements. Oxygen-enriched atmospheres increase the potential for fires by their ability to contribute to combustion or to chemically react with flammable compounds and promote auto-ignition.

C Toxic Atmosphere Analyzers

The toxic atmosphere analyzer is a compound-specific instrument, designed and calibrated to identify and quantify a specific compound or class of compounds in either gaseous or vapor form. Cross-sensitivity to air pollutants not of interest may be lead to erroneous results.

U.S. EPA/ERT has the following toxic atmosphere analyzers: carbon monoxide, phosgene, nitrous oxide, hydrogen cyanide, sulfur dioxide, hydrogen sulfide, and chlorine gas.

C Aerosol/Particulate Monitors

A Real-Time Aerosol/Particulate Monitor (RAM) displays readings for total particulates. The instrument employs a pulse light emitting diode which generates a narrow band emission in conjunction with a photovoltaic cell to detect light scattered from particulates.

The U.S. EPA/ERT uses the RAM when the contaminant of concern is associated with particulates, and when responding to fires involving hazardous materials, to identify plume levels. The instrument is very useful in determining the presence of a plume when it is not visible. The U.S. EPA/ERT typically uses RAMs on tripods to obtain particulate concentrations at the breathing zone level. Personal dataloggers are used with the RAMs to document minimum, average and maximum concentrations. This provides real-time data without requiring those in personal protective equipment to be constantly present in the plume.

C Chemical Detector Tubes (Colorimetric Tubes)

A chemical detector tube is a hollow, tube-shaped, glass body containing one or more layers of chemically impregnated inert material. To use, the fused ends are broken off and a manufacturer-specified volume of air is drawn through the tube with a pump to achieve a given detection limit. The chemicals contained within the packing material undergo a chemical reaction with the airborne pollutant present, producing a color change during the intake of each pump stroke. The concentration of a pollutant is indicated by the length of discoloration on a calibrated scale printed on the detector tube.

C Radiation Meters

Radiation meters determine the presence and level of radiation. The meters use a gas or solid ion detection media which becomes ionized when radiation is present. The meters are normally calibrated to one probe. Meters that detect alpha, beta, and gamma radiation are available.

C Gold Film (Hydrogen Sulfide and Mercury Vapor) Monitors

Hydrogen sulfide (H₂S) and Mercury (Hg) monitors operate on the principle that electric resistivity increases across a gold film as a function of H₂S and Hg concentration. The monitors provide rapid and relatively low detection limits for H₂S and Hg in air. After extensive sampling periods or high concentrations of H₂S and Hg, the gold film must be heated to remove contamination and return the monitor to its original sensitivity.

C Infrared Detectors

Infrared detectors such as the Miniature Infrared Analyzer (MIRAN) use infrared (IR) absorption as a function of specific compounds. MIRAN instruments apply to situations where the contaminants are identified but concentrations are not. MIRAN instruments generally require AC power.

SPECIALIZED ANALYTICAL INSTRUMENTS

The continuous monitors described above provide qualitative measurement of air contaminants. Quantitative measurements in the field can be obtained using more sophisticated instruments, such as portable Gas Chromatographs, to analyze grab samples.

C Direct Air Sampling Portable Gas Chromatographs (GCs)

Portable GCs use gas chromatography to identify and quantify compounds. The time it takes for a compound to move through a chromatographic column is a function of that specific compound or group of compounds. A trained technician with knowledge of the range of expected concentrations of compounds can utilize a portable GC in the field to analyze grab samples. GCs generally require AC power and shelter to operate. This method is limited by its reliance on a short-term grab sample to be representative of the air quality at a site.

C Remote Optical Sensing

This technique, also referred to as long-path or open-path monitoring, involves transmitting either an infrared or ultraviolet light beam across a long open path and measuring the absorbance at specific wavelengths. The technique is capable of analyzing any preselected organic or inorganic volatile compound that can be resolved from compounds naturally occurring in ambient air. Current projected removal applications include perimeter monitoring during site cleanups and measurement of emission source strengths during site assessments.

C TAGA Direct Air Sampling Mass Spectrometer/Mass Spectrometer

The Trace Atmospheric Gas Analyzer (TAGA), which is operated by the U.S. EPA/ERT, is capable of real-time detection of preselected organic compounds at low parts-per-billion concentrations. The instrument has been successfully used by the U.S. EPA/ERT for isolating individual emission plumes and tracking those plumes back to their sources.

APPENDIX B

Air Sampling Equipment and Media/Devices

AIR SAMPLING EQUIPMENT

C High-Volume, Total Suspended Particulate (TSP) Samplers

High-volume TSP samplers collect all suspended particles by drawing air across an 8- by 10-inch glass-quartz filter. The sample rate is adjusted to 40 cubic feet per minute (CFM), or 1134 liters per minute (L/min), and it is held constant by a flow controller over the sample period. The mass of TSPs can be determined by weighing the filter before and after sampling. The composition of the filter varies according to the analytical method and the detection limit required.

C PM-10 Samplers

PM-10 samplers collect particulates with a diameter of 10 microns or less from ambient air. Particulates of this size represent the respirable fraction, and thus are of special significance. PM-10 samplers can be high-volume or low-volume. The high-volume sampler operates in the same manner as the TSP sampler at a constant flow rate of 40 CFM; it draws the sample through a special impactor head which collects particulates of 10 microns or less. The particulate is collected on an 8- by 10-inch filter. The low-volume sampler operates at a rate of approximately 17 L/min. The flow must remain constant through the impactor head to maintain the 10-micron cut-off point. The low-volume PM-10 collects the sample on 37-mm Teflon filters.

C High-Volume PS-1 Samplers

High-volume PS-1 samplers draw a sample through polyurethane foam (PUF) or a combination foam and XAD-2 resin plug, and a glass quartz filter at a rate of 5-10 CFM (144 to 282 L/min). This system is

excellent for measuring low concentrations of semivolatiles, PCBs, pesticides, or chlorinated dioxins in ambient air.

C Area Sampling Pumps

These pumps provide flow-rate ranges of 2-20 L/min and have a telescopic sampling mast with the sampling train. Because of the higher volume, this pump is suitable for sampling low concentrations of airborne contaminants (i.e., asbestos sampling). These pumps are also used for metals, pesticides and PAH sampling which require large sample volumes.

C Personal Sampling Pumps

Personal sampling pumps are reliable portable sampling devices that draw air samples through a number of sampling media including resin tubes, impingers, and filters. Flow rates are usually adjustable from 0.1 to 4 L/min (or 0.01 to .75 L/min with a restrictive orifice) and can remain constant for up to 8 hours on one battery charge or continuously with an AC charger/converter.

C Canister Samplers

Evacuated canister sampling systems use the pressure differential between the evacuated canister and ambient pressure to bleed air into the canister. The sample is bled into the canister at a constant rate over the sampling period using a critical orifice, a mechanically compensated regulator, or a mass flow control device until the canister is near atmospheric pressure.

Pressure canister sampling systems use a pump to push air into the canister. To maintain a higher, more controlled flow, the pump typically controls the pressure differential across a critical orifice at the

inlet of the canister, resulting in a pressurized canister at the completion of sampling.

AIR SAMPLING MEDIA/DEVICES

If possible, before employing a specific sampling method, consult the laboratory that will conduct the analyses. Many of the methods can be modified to provide better results or a wider range of results.

C Summa^R Canisters

Summa canisters are highly polished passivated stainless steel cylinders. The Summa polishing process brings chrome and nickel to the surface of the canisters, which results in an inert surface. This surface restricts adsorption or reactions that occur on the canister's inner surface after collection. At the site, the canister is either placed in a sampler to control sample collection rate, or opened to collect a grab sample. Samples can be collected by allowing air to bleed into or be pumped into the canister. U.S. EPA/ERT uses 6-liter Summa canisters for VOC and permanent gas analysis.

C Passive Dosimeters

Passive dosimeters are clip-on vapor monitors (samplers) in which the diffused contaminants are absorbed on specially prepared active surfaces. Industrial hygienists commonly use dosimeters to obtain time-weighted averages or concentrations of chemical vapors, as they can trap over 130 organic compounds. Selective dosimeters have also been developed for a number of chemicals including formaldehyde, ethylene oxide, hydrogen sulfide, mercury vapor, nitrogen dioxide, sulfur dioxide, and ozone. Dosimeters must be sent to a laboratory for analysis.

C Polyurethane Foam (PUF)

PUF is a sorbent used with a glass filter for the collection of semivolatile organic compounds such as pesticides, PCBs, chlorinated dioxins and furans, and PAHs. Fewer artifacts (chemical changes that occur

to collected compounds) are produced than with some other solid sorbents. PUF is used with the PS-1 sampler and U.S. EPA Method TO13. PUF can also be used with personal sampling pumps when sampling for PAHs using the Lewis/McCloud method. Breakthrough of the more volatile PCBs and PAHs may occur when using PUF.

C Sampling Bags (Tedlar^R)

Sampling bags, like canisters, transport air samples to the laboratory for analysis. Samples are generally pumped into the bags, but sometimes a lung system is used, in which a pump creates a vacuum around the bag in a vacuum box. Then the sample flows from a source into the bag. This method is used for VOCs, fixed gases (CO₂, O₂, and N₂) and methane.

C Impingers

An impinger allows an air sample to be bubbled through a solution, which collects a specific contaminant by either chemical reaction or absorption. For long sampling periods, the impinger may need to be kept in an ice bath to prevent the solution from evaporating during sampling. The sample is drawn through the impinger by using a sampling pump or more elaborate sampling trains with multiple impingers.

C Sorbent Tubes/Cartridges

A variety of sampling media are available in sorbent tubes, which are used primarily for industrial hygiene. A few examples are carbon cartridges, carbon molecular sieves, Tenax tubes and tube containing the XAD-2 polymer. Depending upon the sorbent material, tubes can be analyzed using either a solvent extraction or thermal desorption. The former technique uses standard laboratory equipment and allows for multiple analyses of the same sample. The latter technique requires special, but readily available, laboratory equipment and allows only one analysis per sample. In addition, thermal desorption typically allows for lower detection limits by two or more orders of magnitude. Whenever sorbent tubes are

being used for thermal desorption, they should be certified as "clean" by the laboratory doing the analysis.

Thermally Desorbed Media

During thermal desorption, high-temperature gas streams are used to remove the compounds collected on a sorbent medium. The gas stream is injected and often cryofocused into an analytical instrument, such as a GC, for compound analysis:

C Tenax Tubes

Tenax tubes are made from commercially available polymer (p-phenylene oxide) packed in glass or stainless steel tubes through which air samples are drawn or sometimes pumped. These tubes are used in U.S. EPA Method TO1 and VOST for volatile nonpolar organic, some polar organic, and some of the more volatile semivolatile organics. Tenax is not appropriate for many of the highly volatile organics (with vapor pressure greater than approximately 200 mm Hg).

C Carbonized Polymers

The carbonized molecular sieve (CMS), a carbonized polymer, is a commercially available, carbon sorbent packed in stainless-steel sampling tubes through which air samples are drawn or sometimes pumped. These are used in U.S. EPA Method TO2 for highly volatile nonpolar compounds which have low-breakthrough volumes on other sorbents. When high-thermal desorption temperatures are used with CMS, more variability in analysis may occur than with other sorbents.

C Mixed Sorbent Tubes

Sorbent tubes can contain two type of sorbents. Combining the advantages of each sorbent into one tube increases the possible types of compounds to be sampled. The combination of two sorbents can also reduce the chance that highly volatile compounds will break through the sorbent media. An example of a mixed sorbent tube is the combination of Tenax and charcoal with a

carbonized molecular sieve. A potential problem with mixed sorbent tubes is the breakthrough of a compound from an earlier sorbent to a later sorbent from which it cannot be desorbed.

Solvent-Extracted Media

Solvent-extracted media use the principle of chemical extraction to remove compounds collected on a sorbent media. The chemical solvent is injected into an instrument, such as a GC, for analysis of compounds. Examples of solvent-extracted media follow:

C Chemically Treated Silica Gel

Silica gel is a sorbent which can be treated with various chemicals. The chemically treated silica gel can then be used to sample for specific compounds in air. Examples include the DNPH-coated silica gel cartridge used with U.S. EPA Method TO11.

C XAD-2 Polymers

XAD-2 polymers usually are placed in tubes, custom-packed sandwich-style with polyurethane foam, and prepared for use with U.S. EPA Method TO13 or the semi-VOST method. The polymers are used for the collection of semivolatile polar and nonpolar organic compounds. The compounds collected on the XAD-2 polymer are chemically extracted for analysis.

C Charcoal Cartridges

Charcoal cartridges, consisting of primary and backup sections, trap compounds by adsorption. Ambient air is drawn through them so that the backup section verifies that breakthrough of the analytes on the first section did not occur, and the sample collection was therefore quantitative. Quantitative sample collection is evident by the presence of target chemicals on the first charcoal section and the absence on the second section. Next, the adsorbed compounds must be eluted, usually with a solvent extraction, and analyzed by GC with a detector, such as a Mass Spectrometer (MS).

C Tenax Tubes

Cartridges are used in OSHA and NIOSH methods in a manner similar to charcoal cartridges but typically for less volatile compounds.

Particulate Filters

Particulate filters are used by having a sampling pump pass air through them. The filter collects the particulates present in the air and is then analyzed for particulate mass or chemical or radiological composition. Particulate filters are made from different materials which are described below.

C Mixed Cellulose Ester (MCE)

MCE is manufactured from mixed esters of cellulose which are a blend of nitro-cellulose and cellulose acetate. MCE filters are used often for particulate sampling.

C Glass Fiber

Glass fiber is manufactured from glass fibers without a binder. Particulate filters with glass fiber provide high flow rates, wet strength, and high, solid holding capacity. Generally, the filters are used for gravimetric analysis of particulates.

C Polyvinyl Chloride

Particulate filters with polyvinyl chloride are resistant to concentrated acids and alkalis. Their low moisture pickup and light tare weight make them ideal for gravimetric analysis.

C Teflon

Teflon is manufactured from polytetrafluorethylene (PTFE). Particulate filters with Teflon are easy to handle and exceptionally durable. Teflon filters are used for metal collection.

C Silver

Particulate filters manufactured from pure silver have high collection efficiency and uniform pore size. These filters are used for mercury collection and analysis.

C Cellulose

Particulate filters with cellulose contain less than 0.01% ash. These filters are used to collect particulates.

**EPA Emergency Response Section (ERS)
And Superfund Technical Assessment and Response Team (START)**

**Emergency Response and Time Critical
Quality Assurance Sampling Plan
For
Soil, Water and Miscellaneous Matrix Sampling**

Response Location:
(Site Name and TDD#) **Anaconda Mine US EPA Evaporation Pond**

Date: **May 13, 2010**

Prepared by: **Maggie Tymkow**

Reviewed by: **Howard Edwards**

Approved by:

**This sampling plan was prepared and delivered to the EPA OSC:
Prior to Sampling**

This emergency sampling plan is intended to be used in conjunction with the EPA's Region 9 Emergency Response Section's Generic Data Quality Objectives (DQOs) for Emergency Responses and Time Critical Evaluations. This sampling plan has been designed to assist field responders in their preparation for collecting, analyzing, shipping, storing and handling samples collected during an emergency response. The use of this generic sampling plan will involve forethought and planning that should help direct the sampling and analytical work. It is meant to be used in the case of emergency responses or time-critical responses when sampling teams may not have the opportunity to write a more thorough sampling plan. Sampling teams should always reference standard quality procedures, standard operations procedures, standard methods for sampling and analytical guidance.

The development of this generic plan will improve the documentation, communication, planning, and overall quality associated with the sampling and analysis by:

- 1) encouraging field teams to consider their goals and objectives before the generation of environmental data,
- 2) documenting predetermined information in a standardize format,
- 3) increasing the communication between sampling personnel and decision makers, and
- 4) detailing expectations and objective before samples are collected.

1.0 Introduction and Background. *Describe the site and specify the geographic boundaries for the site and any specific areas of concern. What is the problem, what precipitated the response, which agencies and other entities (e.g., contractors) are on site, who has taken the lead for the response and for environmental clean-up actions?*

The 2008 Anaconda Ponds Assessment Report documented that soil underlying the Old Raffinate Pond was contaminated with kerosene-range petroleum hydrocarbons (TPH) to a depth of at least 23 feet below the pond surface. Based upon that information the US EPA has decided to excavated the pond soil and soil in associated areas that have TPH concentration greater than 1,000 milligram per kilogram.

The US EPA has been to conducting on-site treatment of the excavated petroleum hydrocarbon soil. Time critical analytical data is required to document final contamination levels.

2.0 Objectives. *Brief statement on the general project objective. What is the overall goal or objective? Specific objectives are summarized in Table D.*

Provide data to document the final concentration of contaminants in soil.

2.1 Data Use Objectives

Data that are generated will be used:

- To document with final concentrations of contaminants left in treated soil.

2.2 Sampling Objectives.

- The sampling objective for treated soil is to determine when the treatment reached its completion.

2.3 Sample Matrices

- Surface-Soil

2.4 Data Type

- In general, data type and data needs should be decided prior to data generation. The data can be generally divided into three categories: definitive methodology data (generally data generated using standardized methods), non-definitive methodology data (also referred to as screening data) and screening data with at least 10% definitive confirmation. The generation of definitive data is preferable, however in emergency and time critical situations where definitive data is not available, non-definitive data should be generated. Note that the data type is not an indicator of precision, accuracy or documentation completeness, or quality! Reported data should be verified (by a party other than the laboratory) as meeting specific quality control and data category requirements by following a verification or validation procedure. Refer to the START or ERS Quality Assurance Plans for specific quality parameters and requirements.
- Definitive data will be generated. The sampling must be done on an emergency basis. **Due to the time critical situation, preliminary data must be reported and may be used to make decisions without validation. The generated analytical documentation packages will be reviewed and validated. Qualified data will be reported after validation.**

2.5 Contaminants of Concern

Potential contaminants of potential concern (COPC), proposed analytical method, proposed action levels and available reporting limit are summarized in Table A.

Table A Contaminants of Concern			
Potential COC	Proposed Analytical Method	Proposed Action Level	Available Reporting Limit
Kerosene-range Petroleum Hydrocarbons	EPA 8015	10 mg/kg	10 mg/kg
Benzene, toluene, xylenes	EPA 8260	5 ug/kg	5 ug/kg
Poly Aromatic Hydrocarbons	EPA 8270	0.3 mg/kg	0.3 mg/kg
Metals	EPA 6010	10 mg/kg	10 mg/kg
Other Data Collection Activity (non-chemical)	Visual Photography		

3.0 Approach and Sampling Methodologies

3.1 Sampling Approach

- The sampling approach to be used on Soil Treatment Area soil samples is a random.

3.2 Field Analysis Equipment

Field analysis equipment requirements are summarized in Table B1.

Table B1 Field Analytical Equipment				
Analysis Equipment Specify the field analytical procedures to be used. Select the appropriate boxes.	Model	Analyses	Matrix	Resource/Contractor

3.3 Field Sampling Equipment

Field equipment requirements are summarized in Table B2.

Table B2 Field Sampling and Decontamination Equipment				
Analyses and Matrix	Sampling Equipment	Dedicated or Reusable	Decontamination Solution	Resource/ Contractor
TPH/ Soil	Baggies Glass Jars	Dedicated	Not required	START
TPH/ Soil	Scoops	Dedicated	Not required	START

3.4 Field Methods and Procedures

3.4.1 Sample Locations. Indicate the sampling location name, describe location, and indicate rationale for each sample location chosen.

Soil Treatment Area: Samples will be collected initially and at time interval from the area to monitor the bio-remediation progress of petroleum contaminated soil. The soil treatment area was divided into four sampling zones. A composite of the soil from each zone was collected from five randomly located samples.

Attached at the end of this QASP are maps of the site maps and sampling location maps.

3.4.2 Sample Labeling and Documentation

Sample Jar Labels

Sample labels will clearly identify the particular sample and should include the following:

1. Site name
2. Time and date samples were taken
3. Sample preservation
4. Analysis requested
5. Sample location and/or identification number

Sample labels will be securely affixed to the sample container.

Chain of Custody Record

A chain of custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples (or groups of samples) are not under direct control of the individual

responsible for them, they must be stored in a secured container sealed with a custody seal.

The chain of custody record should include (at minimum) the following:

1. Sample identification number
2. Sample information
3. Sample location
4. Sample date and time
5. Names(s) and signature(s) of sampler(s)
6. Signature(s) of any individual(s) with control over samples

Custody Seals

Custody seals demonstrate that a sample container has not been tampered with or opened. The individual in possession of the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the samples= packaging, should be noted in the field book.

All sample documents will be completed legibly in ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing the error. These include the logbooks, the chain of custody forms, this field QASP and any other tracking forms.

Attached at the end of this QASP are maps of the site and any areas of concern.

3.4.2 Sample Labeling and Documentation

Sample Jar Labels

Sample labels will clearly identify the particular sample and should include the following:

1. Site name
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All sample documents will be completed legibly in ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing the error. These include the logbooks, the chain of custody forms, this field QASP and any other tracking forms.

Field Logbook

The field logbook is essentially a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. All entries will be dated and signed by the individuals making the entries and will include the following:

1. Site name and project number
2. Names of sampling personnel
3. Dates and times of all entries (military time preferred)
4. Descriptions of all site activities, especially sampling start and ending times. Include site entry and exit times
5. Noteworthy events and discussions
6. Weather conditions
7. Site observations
8. Identification and description of samples and locations
9. Subcontractor information and names of on-site personnel
10. Date and time of sample collections, along with chain of custody information
11. Record of photographs
12. Site sketches
13. Exact times of various activities and occurrences related to sampling
14. Deviations from standard procedures or methods and the rational for the deviations.

3.4.3 Sample Containers and Preservatives

Containers and preservatives are summarized in Table C.

Table C Containers and Preservatives			
Analyses and Matrix	Container Type (per sample)	Preservation Method	Holding Time
8015 diesel-MO/ Soil 8015 gasoline/ Soil	4 or 8 ounce Glass Jars	None	14 days
8260 / Soil	4 or 8 ounce Glass Jars	None	14 days
8270/ Soil	4 or 8 ounce Glass Jars	None	14 days
6010/ Soil	4 or 8 ounce Glass Jars	None	6 months

3.5 Analytical Methods and Procedures

The analytical methods per sample and sample location are presented in Table D. General field QC considerations and requirements are presented in Table E.

Table D
Sample Locations and Data Objective Summary

Sampling Locations and Identifiers should correspond to location indicated on Figure A

Sample Location(s) (should match with 3.4.1 and Figure A)	Sample Identifiers	Analytical Method Refer to Table A	Data Use Objective(s) Refer to Section 2.1	Data Category Refer to Section 2.3	Samples Matrix
Soil Treatment Area	<date>-BTA- <zone> <time>	EPA 8015	To be compared with site-specific action level to determine if treatment is completed and/or progressing.	Definitive data will be generated. Full documentation will be required. Analytical data packages will be reviewed and validated prior to reporting.	Soil

3.6 Quality Assurance and Quality Control

General field QA/QC considerations and requirements are presented in Table E.

Table E			
Quality Control Samples and Data Quality Indicator Goals			
QC Sample	Number/Frequency	Data Quality Indicator Goals & Evaluation Criteria	Comments/Exceptions <i>Site specific remarks:</i>
FIELD SPECIFIED QA/QC			
Background or reference sample	At least one sample should be collected from an area believed to be unaffected by source contamination.	Source samples should be at least 3 times background.	SOIL TREATMENT No Needed
Field Blanks	1 per SDG ¹ , per matrix, per method	Source samples should be at least 3 times the blank.	Water only. Not Needed
Travel Blanks	1 per SDG, per matrix, per method	Source samples should be at least 3 times the blank.	Volatile analytes, water only. Not Needed
Equipment Blanks	1 per SDG, per matrix, per method	Source samples should be at least 3 times the blank.	Only when the use of decontaminated non-dedicated equipment is involved. Not Needed
Field Duplicates or Replicates	1 per SDG, per matrix, per method	Water - 25% RPD ² Soil - 35% RPD ² Other - 35%	As needed by sampling objectives. The procedure for collecting duplicate samples can greatly effect the reproducibility. To collect duplicate samples of Post Excavation and Soil Treatment location
Performance Standards	1 per project, per matrix, per method	75 -125 %R ³	If available. Not used
SELECTED LABORATORY QA/AC			
Method Blank	1 per SDG, per matrix, per method	Stds and samples should be at least 3 times the blank.	Mandatory.
Matrix Spike	1 per SDG, per matrix, per method on field designated sample.	75 -125 %R	Designate sample on COC.
Matrix Spike Duplicate or Replicate	1 per SDG, per matrix, per method on field designated sample.	≤50 RPD for organics; ≤20 RPD for metals	Designate sample on COC.
Reference Standards	1 per SDG, per matrix, per method	75 -125 %R	If available.
Internal Standards	All samples	50 -200 %R	All GC/MS and some GC analyses only.
Laboratory Control Standards	1 per SDG, per matrix, per method	75 - 125 %R	Per method for organic analyses.

¹ SDG = Sample Delivery Group (Maximum 20 samples)² RPD = Relative Percent Difference ³ %R = Percent Recovery

4.0 Project Organization and Responsibilities

4.1 Schedule of Sampling Activities

Sampling activities are summarized in Table F.

Table F Proposed Schedule of Work For Sampling Activities		
Activity	Start Date	End Date
Soil Treatment Sampling (as needed)	5-14-2010	5-19-2010

4.2 Project Laboratories

Laboratories used for this project are summarized in Table G.

Table G Laboratories	
Lab Name/ Location	Methods
EPA Region 9 Laboratory	EPA 8015-g 8015-mo, 8260, 8270, and 6010

4.3 Project Personnel and Responsibilities

Personnel and responsibilities are summarized in Table H.

Table H Sample Team(s) Personnel	
Personnel (Agency)	Responsibility
EPA OSC Tom Dunkelman	Project Manager
ERRS Crew and RM Joe Fecek	Removal
Howard Edwards	Analytical QA
Adam Smith	Sampling
Maggie Tymkow	Sampling

4.4 Modification or Additions to the Generic Data Quality Objective for Emergency and Time Critical Sampling

Project specific modification to the generic DQO statements for this are summarized in Table I. Also indicate which DQO step corresponds to the addition or modification.

Table I DQO Modifications and Additions	
Additions or Modifications to the Generic DQO Output Statements	DQO Step
None	All