

Wind Monitoring and Dust Suppression Plan

Former ASARCO/Encycle Facility

5500 Up River Road, Corpus Christi,
TX

Asbestos Abatement, Waste Removal,
and Demolition

March 1, 2011

Amended April 29, 2011



**Wind Monitoring and Dust
Suppression Plan**

Former ASARCO/Encycle
Facility

Asbestos Abatement,
Hazardous Waste Removal,
and Demolition



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Prepared for:
ASARCO – Encycle Facility Asbestos Abatement, Waste
Removal, and Demolition Project
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Date:

March 1, 2011



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Former ASARCO-Encycle Facility Demolition

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1.0 Objective

This Plan identifies the steps that will be taken to reduce particulate matter emissions (dust) during demolition of existing structures and site infrastructure and includes site specific dust suppression and monitoring requirements. Best management practices (BMPs) are required to be implemented throughout the project. These may include wetting active demolition areas, minimizing or ceasing activity during periods of high wind, sweeping paved areas, covering trucks, etc.

2.0 Background

The Encycle Facility is located at 5500 Up River Road in Corpus Christi, Texas (Site [Figure 1]). The facility was formerly a large hydrometallurgical complex, originally operated by the American Smelting and Refining Company (ASARCO). ASARCO operated the facility as a zinc smelter from 1942 through 1985. Encycle Texas Inc (Encycle) subsequently operated the facility as a metals recycling facility until operations ceased in 2003.

The project requires asbestos abatement, waste removal, and demolition of numerous buildings and associated aboveground piping and ancillary equipment. The Site is comprised of 52 above grade buildings, a 315-foot smoke stack, a water tower, approximately 11 metal silos, cooling towers, numerous aboveground storage tanks, and additional ancillary piping, conduit and equipment. The project will disturb approximately 12 acres including demolition/abatement areas, equipment staging areas, and material storage areas

3.0 Potential Sources of Fugitive Dust

Planned site activities have the potential to generate emissions in the form of fugitive dust during demolition activities. Possible emissions sources include:

- Demolition Activities – Shearing, moving or dismantling of any load supporting structural member, or portion of a building and any related cutting, disjoints, stripping or removal of structural elements is capable of producing fugitive dust.
- Traffic – Movement of equipment and vehicular traffic on paved or unpaved roads and parking lots around the demolition area is capable of creating fugitive dust.
- Material Stockpiles – Stockpiles of demolition materials may create windborne dust emissions.
- Cleanup and Grading – Grading and revegetating of disturbed areas may produce fugitive dust.

4.0 Fugitive Dust Control Methods

Dust control methods will vary based on the activities occurring at the site. Dust control methods are summarized by source below

Demolition Activities - Dust control measures will include water spraying/misting to control dust during demolition activities. Water to be utilized for dust suppression will be clean municipal water supplied by a fire hydrant located on Up River Road. Water to the hydrant is supplied through the City of Corpus Christi municipal water system. Water from the hydrant is routed from Up River Road onto the property to a water loading area which is located southwest of Building 16. Water trucks are filled at the loading area and sent to active demolition work locations for dust suppression. Work activities that are capable of generating dust are not permitted to continue when the water truck is cycling for additional water.

No wrecking balls or explosives are permitted to demolish any portion of the buildings, smokestack, or structures to be demolished.

A 10-foot tall heavy duty polyethylene mesh tarp will be installed on the southern side of building or structure undergoing active asbestos abatement, hazardous waste removal, and building demolition activities. The purpose of the tarp is to capture low to mid-level dust generated from equipment, vehicular traffic, and demolition activities.

If the wind direction has a northerly component and if sustained wind speed (averaged over 1-minute) exceeds 15 miles per hour, all building and structure demolition work will cease until sustained wind speed declines to 15 miles per hour or lower.

Bulk load out of loose salvage or waste material will be monitored for fugitive dust emissions. Load out activities may require the material to be pre-wetted or sprayed as loaded to inhibit fugitive dust emissions.

Traffic – Material Track Out - Track-out of loose materials will be controlled using stabilized construction entrances (gravel pads) installed at the primary project access point from Up River Road to prevent tracking of sediment and mud on to public roadways. The gravel pads will be installed according to the specifications provided in the Erosion and Sediment Control provisions of the Storm Water Pollution Prevention Plan (SWP3) for the site. Any visible track-out on a paved public road at any location where vehicles exit the work site must be removed. Removal must be done using brooms, wet sweeping, a vacuum device or a combination of these BMPS as needed.

Traffic – Dust Emissions From Equipment and Vehicular Traffic on Driving Surfaces - All project vehicles will enter the construction site through gravel pads that will be located at the primary construction entrance roadway. Traffic will follow marked traffic routes to and from the designated work area(s). No off-road travel is permitted unless approved by project management. Project personnel are to obey posted speed limits to prevent wind turbulence and associated dust generated at higher vehicle and equipment velocities. Project road ways at the site will be wetted each working day to further minimize dust generation from vehicle travel.

Traffic – Off-Site Transport - All vehicles that are used to transport solid bulk material and that have the potential to cause visible emissions from the load will either be equipped or provided with a tarp cover.

Prior to exiting the site, vehicles will be checked to ensure that they are tarped and to remove any excess material on exterior surfaces of the cargo compartment. All off-site haul trucks will access the sites via paved access roads and established gravel pads. Site personnel will be stationed at the primary project access point to monitor inflow/outflow to and from the site as necessary and will be responsible for inspecting all vehicles entering and exiting the site.

Material Stockpiles - Fugitive dust emissions from soil storage piles will be controlled by using a temporary cover, water, and/or wind breaks.

Visible Dust Crossing the Property Boundary - Adequate dust mitigation measures will be in place to address the dust at the source of the dust generating activity. If visible dust from demolition-related activities is observed approaching the property boundary, additional dust mitigation measures, including increased wetting, will be implemented. If the additional dust mitigation measures do not prevent dust from approaching the property boundary, demolition activities in that area will stop until additional dust mitigation measures are implemented and demonstrated to reduce dust levels.

Windblown Visible Dust During Inactive Periods - The standards in this section apply on weekends and holidays or any other times when no equipment and personnel are performing work activities on site. In the event of observations on windblown visible dust plumes from soils originating on the project site, mitigation measures will be directed within less than 1 hour of making the observation. Mitigation measures will be implemented until the visible dust plumes originating from the project site are minimized or eliminated. Any observations of visible dust originating from the project site during inactive periods will be reported to the on-site Construction Manager.

5.0 Monitoring and Records

Wind and dust monitoring protocols are summarized below. A detailed synopsis of each monitoring protocol and the associated sampling procedures are included in the *Air Monitoring Program* developed by Arcadis and included as Attachment A herein.

- The wind speed shall be monitored continuously using a combination of (1) an on-site wind meter (Red Oaks Model WM-100 WindMate Wind Meter, or approved equal), and (2) the on-line data from the TCEQ Donna Park Air Monitoring Station. Monitoring locations will initially be established based on prevailing winds but will be adjusted if necessary to maintain the upwind and downwind locations. Monitoring will be conducted at the project boundary both up and downwind of the work zone.
- During demolition, asbestos abatement, and hazardous waste removal activities, the Demolition Contractor shall conduct real-time particulate air monitoring on a continuous basis using two on-site Met One Instruments, Inc. E-BAM portable particulate monitors. Monitoring will be conducted at the project boundary both upwind and downwind of the work zone. Real-time particulate air monitoring data will be averaged over 30-minute intervals during each day of asbestos abatement, hazardous waste removal, and building demolition activities. If real-time

particulate concentrations downwind of the demolition area are higher than the Air Monitoring Program action level thresholds, corrective action must be taken as described in the Air Monitoring Program. If real-time particulate concentrations downwind of the demolition area are higher than the Air Monitoring Program stop work level, demolition-related work will stop. During the work stoppage period (minimum 30 minutes), dust suppression adjustments will be made to reduce airborne particulate concentrations below action level concentrations given in the Air Monitoring Program. If the action level concentrations are again exceeded that day, demolition work will stop for the remainder of that work day, and a more effective dust control program will be implemented prior to resuming work the following day.

- Air samples will be collected from the perimeter of the facility for laboratory analysis of metals at least twice weekly during asbestos abatement, hazardous waste removal, and building demolition activities. Air samples will be collected by the Owner’s Representative near the property boundary upwind and downwind of the area undergoing demolition-related activities. The air sample metals analyses will be evaluated at least twice monthly, and utilized to adjust real-time particulate concentration action levels and stop work levels as needed.
- ACM perimeter air samples will be collected each day of asbestos abatement at the south property boundary between Up River Road and the building(s) undergoing asbestos abatement. The perimeter air samples for asbestos analysis will be 8-hour samples collected using a high-volume air sampling pump. The ACM perimeter air sample results will be evaluated at least twice monthly, and compared to action levels and stop work levels given in the Air Monitoring Program. The ACM perimeter air sample results will be utilized to adjust asbestos abatement procedures as needed to maintain airborne asbestos concentrations below action levels, as detailed in the Air Monitoring Program.

Records of monitoring activities and sampling results will be maintained at the on-site project office trailer. The table presented below summarizes information concerning the wind and dust monitoring team at this facility. These team members are responsible for maintenance and revisions of the plan.

Wind Monitoring and Dust Prevention Team

Employee Name	Employee Title	Designated SWP3 Responsibility
Ed Rameriz	Project Operations Manager	Senior management authority; provide corporate support to ensure availability of necessary resources to maintain compliance with the this plan
Craig Illuasky	Project Manager	Qualified Individual; review and modify the plan to keep it current; ensure record keeping.
Brady Armes or designated representative	Project QA/QC Officer	Overall plan implementation on a daily basis; conduct periodic site inspections; collect samples; monitor site conditions; conduct visual examinations of air quality.

Attachment A

Revised Air Monitoring Program

**AIR MONITORING PROGRAM (Revised 4/7/11)
ENCYCLE DEMOLITION PROJECT
5500 UP RIVER ROAD
CORPUS CHRISTI, TEXAS**

ARCADIS U.S., Inc.
711 North Carancahua
Suite 1700
Corpus Christi
Texas 78401
Tel 361 883 1353
Fax 361 883 7565

TO: Mike Boudloche, Trustee

FROM: Kenneth Brandner, P.E., P.G.

DATE: October 18, 2010; Revised 4/7/11

SUBJECT: Air Monitoring Program - Building and Smokestack Demolition at the former Encycle/Texas Inc. facility, 5500 Up River Road, Corpus Christi, Texas.

ENVIRONMENTAL SERVICES
Texas Engineer License #F-533

The October 18, 2011 “*Air Monitoring Program*” during building and smokestack demolition activities at the former Encycle/Texas, Inc. facility at 5500 Up River Road in Corpus Christi, Texas, was approved by the U.S. Bankruptcy Court for the Southern District of Texas (Case No. 05-21304) on November 29, 2010. The Texas Commission on Environmental Quality (TCEQ) subsequently provided comments to the October 18, 2011 “*Air Monitoring Program*” in e-mails to Mike Boudloche, Trustee, on March 22, 2011; April 4, 2011; and April 5, 2011. The October 18, 2011 “*Air Monitoring Program*” is herein revised to incorporate the TCEQ comments.

Date
April 7, 2011

Contact:
Kenneth Brandner

Phone:
361-883-1353

1. REAL-TIME PARTICULATE AIR MONITORING

1.1 General

As detailed in Exhibit A of the Master Services Agreement between the Demolition Contractor and Mike Boudloche, Trustee, the Demolition Contractor shall undertake adequate measures to control dust during demolition activities. These dust control measures shall include water spraying/misting to control dust during demolition activities, and no wrecking balls or explosives shall be permitted to demolish any portion of the buildings, smokestack, or structures to be demolished.

Also, the Demolition Contractor shall install 10-foot-high Tarps Plus Model TP-BMT1030-1 heavy duty black polyethylene mesh tarps, or approved equal, on the southern side of the buildings and smokestack undergoing active asbestos abatement, hazardous waste removal, and building demolition activities. The tarps shall be positioned in an east-west direction, parallel to Up River Road, as

close to the buildings as possible without impeding the safe movement of Contractor's personnel and equipment. The tarps shall extend a minimum of twenty feet beyond the western and eastern ends of the building (i.e., the tarp length shall be at least 40 feet greater than the east-west length of the building). The tarps can be removed by the Demolition Contractor when active asbestos abatement, hazardous waste removal, and demolition activities for that building have ceased.

During demolition, asbestos abatement, and hazardous waste removal activities, the Demolition Contractor shall conduct real-time particulate air monitoring using two on-site Met One Instruments, Inc. E-BAM portable particulate monitors. The E-BAM instruments provide real-time particulate matter (PM) measurements, including particles finer than 10 microns diameter (PM₁₀) and particles finer than 2.5 microns diameter (PM_{2.5}). The E-BAM detection limits meet EPA National Ambient Air Quality Standards (NAAQS), which are several orders of magnitude lower than the Occupational Safety and Health Administration (OSHA) permissible exposure level (PEL) of 10 milligrams per cubic meter of silica/quartz dust as shown on Table 1. Additional data regarding the E-BAM instruments is provided in Attachment 1.

One E-BAM instrument will be positioned along the south property boundary, between Up River Road and the area undergoing active demolition-related activities (including asbestos abatement, waste removal, and/or demolition). The second E-BAM instrument will be positioned at the upwind end of the site. For example, if the wind direction is from the north (i.e., blowing from north to south), the second E-BAM instrument will be positioned at the north property boundary adjacent to the Corpus Christi Ship Channel to obtain background particulate concentration data.

The particulate concentration measurements from the two E-BAM instruments will be monitored on a continuous basis by the Demolition Contractor during each day of demolition, asbestos abatement, and/or hazardous waste removal.

1.2 Real-Time Particulate Concentration Action Levels

The real-time particulate air monitoring will include measurement of PM_{2.5} and PM₁₀ concentrations. As shown on Table 2, if the 30-minute average PM_{2.5} concentration in the E-BAM instrument positioned between Up River Road and the area undergoing demolition exceeds the background PM_{2.5} concentration by 0.035 mg/m³ or more over the same time period, the Demolition Contractor will immediately implement increased dust suppression activities. Also, if the one hour average PM₁₀ concentration in the E-BAM instrument positioned between Up River Road and the area undergoing demolition exceeds the background PM₁₀ concentration by 0.15 mg/m³ or more over the same time period, the Demolition Contractor will immediately implement increased dust

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suppression activities. These increased dust suppression activities may include, but are not limited to the following:

- Increased wetting/misting of demolition area;
- Adding wind screens/tarps in demolition area;
- Adjusting the rate/speed and/or quantity of demolition equipment in the work area;
- Installation and/or repositioning of suction fans/blowers with particulate filters;
- Covering debris stockpiles with plastic sheeting or tarps.

1.3 Real-Time Particulate Concentration Stop Work Levels

As shown on Table 2, if the one hour (60-minute) average PM_{2.5} concentration in the E-BAM instrument positioned between Up River Road and the area undergoing demolition exceeds the background PM_{2.5} concentration by 0.045 mg/m³ or more over the same time period, the Demolition Contractor will immediately stop all demolition, asbestos abatement, and hazardous waste removal work. During the work stoppage period (minimum 30 minutes), the Demolition Contractor shall make dust suppression adjustments to reduce airborne particulate matter concentrations below Action Level Concentrations shown on Table 2. The dust suppression adjustment activities may include, but are not limited to the following:

- Increased wetting/misting of demolition area;
- Adding wind screens/tarps in demolition area;
- Adjusting the rate/speed and/or quantity of demolition equipment in the work area;
- Installation and/or repositioning of suction fans/blowers with particulate filters;
- Covering debris stockpiles with plastic sheeting or tarps;
- Stopping specific dust-generating activities until wind directions and/or wind speeds are more conducive to reduced dust levels.

After the Demolition Contractor dust suppression adjustments have been implemented (minimum 30 minute period), the Demolition Contractor may resume work, and continuously monitor real-time particulate air monitoring data to ensure the dust suppression adjustments are effective. Following resumption of work, if particulate concentration Stop Work levels are again exceeded that same day, the Demolition Contractor shall immediately stop work for the remainder of that work day and design a more effective dust control program prior to resuming work the following work day.

2. WIND DIRECTION AND WIND SPEED MONITORING

2.1 General

The wind direction and wind speed shall be monitored by the Demolition Contractor prior to start of work, and continuously during the work period each day of active asbestos abatement, hazardous waste removal, and/or demolition activities. The wind direction shall be monitored continuously using a combination of (1) an on-site wind sock (6" x 24" orange airport aviation wind sock), and (2) on-line data from the TCEQ Donna Park Air Monitoring Station located within approximately 100 feet of the site on the south side of Up River Road. The wind speed shall be monitored continuously using a combination of (1) an on-site wind meter (Red Oaks Model WM-100 WindMate Wind Meter, or approved equal), and (2) the on-line data from the TCEQ Donna Park Air Monitoring Station. As shown on Attachment 2, the Donna Park Air Monitoring Station web page provides the most current hourly averaged data, including wind speed and wind direction. The Demolition Contractor will have direct access to the Donna Park Air Monitoring Station data using a computer monitor in their on-site trailer.

2.2 Real-Time Wind Speed and Direction Stop Work Levels

If the wind direction has a northerly component (i.e., if the wind direction is from the Encycle facility toward Up River Road) and if the sustained wind speed (the wind speed obtained by averaging the observed values over a one minute period) exceeds 15 miles per hour, all building and structure demolition work shall cease until the sustained wind speed declines to 15 miles per hour or lower; or the wind direction shifts such that the wind direction does not have a northerly component (i.e., the wind direction is from Up River Road toward the Encycle facility). The demolition contractor can conduct non-dust producing activities (equipment maintenance, etc.) during these periods.

3. PERIMETER AIR SAMPLE COLLECTION FOR LABORATORY ANALYSES

3.1 Metals Analyses

Air samples will be collected from the perimeter of the facility for laboratory analyses of metals (antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc) during building demolition activities. The air samples will be collected by the Trustee's designated representative near the property boundary upwind and downwind of the facility prior to initiation of demolition activities, and at least twice weekly during active demolition, asbestos abatement, and hazardous waste removal periods. The days

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each week (minimum 2 days per week that work is occurring) selected for laboratory analyses of metals will be prioritized based on (1) day(s) the National Weather Service forecasts wind direction from north to south, and (2) day(s) the Demolition Contractor schedules significant building demolition work.

The air samples for metals analyses other than mercury will be 8-hour samples collected using a Gilian Model GilAir5 air sampling pump, or equal. The air samples will be collected by attaching laboratory-provided air sample filter cartridges (0.8-micrometer cellulose ester membrane filter cartridge) to the pump, and setting the air sample filter cartridges approximately five feet above ground level upwind and downwind of active building demolition areas. The air sample pumps for metals analyses other than mercury will be set at a flow rate of approximately 2 to 3 liters per minute for a period of 8 hours, thereby resulting in an air sample volume of approximately 960 to 1,440 liters per air sample.

The air samples for mercury analysis will be 8-hour samples collected using a Gilian Model GilAir3 air sampling pump, or equal. The air samples will be collected by attaching laboratory-provided air sample filter tubes (200-mg hopcalite solid sorbent tube) to the pump, and setting the air sample tube approximately five feet above ground level upwind and downwind of active building demolition areas. The air sample pumps for mercury analysis will be set at a flow rate of approximately 0.20 liters per minute for a period of 8 hours, thereby resulting in an air sample volume of approximately 96 liters per air sample.

Following air sample collection, the air sample cartridges/tubes will be securely capped, labeled, and delivered with chain of custody documentation to an independent analytical laboratory (TestAmerica Laboratories) for metals analyses. Laboratory analyses on an expedited 3-working-day turnaround will be requested.

Metals laboratory test methods and detection limits are shown on Table 1. Metals other than mercury will be analyzed using NIOSH Method 7303, and test method details are provided in Attachment 3. Mercury will be analyzed using NIOSH Method 6009, and test method details are provided in Attachment 4.

3.2 Asbestos Analyses

As detailed in Exhibit A of the Master Services Agreement between the Demolition Contractor and Mike Boudloche, Trustee, the Demolition Contractor work requirements shall involve removal of the asbestos-containing materials (ACM) in the buildings and structures to be demolished by EPA-accredited asbestos abatement workers with a minimum of one on-site EPA-accredited asbestos project manager/supervisor during asbestos abatement activities.

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The ACM shall be removed in accordance with applicable federal, state, and local regulations, including applicable EPA regulations given in the National Emission Standards for Hazardous Air Pollutants (NESHAPS) (40 CFR Part 61); applicable EPA regulations given in the Asbestos Hazard Emergency Response Act (AHERA) (40 CFR Part 763); applicable OSHA Regulations given in 29 CFR Parts 1910 and 1926; and applicable Texas Department of State Health Services (TDSHS) regulations given in the Texas Asbestos Health Protection Rules (TAHPR).

The Demolition Contractor shall be responsible for proper storage, loading, rigging, transportation and disposition of all friable and non-friable asbestos-containing waste generated during implementation of the building, smokestack, and structure demolition project. The ACM shall be transported to landfill(s) authorized to accept asbestos wastes.

The Demolition Contractor shall be responsible for personal air monitoring and post-abatement clearance monitoring as required by applicable Laws and Regulations. In addition, asbestos perimeter air sampling will be conducted each day of asbestos abatement. At a minimum, one perimeter air sample will be collected each day of asbestos abatement at the south property boundary between Up River Road and the building(s) undergoing asbestos abatement. The perimeter air samples for asbestos analysis will be 8-hour samples collected using a high-volume air sampling pump to obtain a detection limit of 0.001 fibers/cubic centimeter as shown on Table 1. The perimeter air samples will be collected by air monitoring technicians that have completed the air training requirements of TDSHS. The perimeter air samples will be analyzed for asbestos on an expedited (1-2 day turnaround) at a TDSHS-licensed asbestos field laboratory using NIOSH Method 7400.

3.3 Metals and Asbestos Concentration Action Levels

Following receipt of the perimeter metals and asbestos analytical laboratory reports, the analytical data will be compared to the Action Levels shown on Table 2. If the concentrations of asbestos or metals in the samples collected on the south property boundary between Up River Road and the area undergoing demolition exceed the Action Levels shown on Table 2 relative to the background sample concentrations over the same time period, the Demolition Contractor will immediately implement increased dust suppression activities. These increased dust suppression activities may include, but are not limited to the following:

- Increased wetting/misting of demolition or asbestos abatement area;
- Adding wind screens/tarps in demolition area, or adding plastic sheeting in the asbestos abatement area;

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- Adjusting the rate/speed and/or quantity of demolition equipment in the work area;
- Installation and/or repositioning of suction fans/blowers with particulate filters (HEPA filters for asbestos abatement areas);
- Covering debris stockpiles with plastic sheeting or tarps.

3.4 Metals and Asbestos Concentration Stop Work Levels

If the concentrations of asbestos or metals in the samples collected on the south property boundary between Up River Road and the area undergoing demolition exceed the Stop Work Levels shown on Table 2 relative to the background sample concentrations over the same time period, the Demolition Contractor will immediately stop all demolition, asbestos abatement, and hazardous waste removal work. During the work stoppage period (minimum 30 minutes), the Demolition Contractor shall make dust suppression adjustments to reduce airborne particulate matter concentrations below Action Level Concentrations shown on Table 2. The dust suppression adjustment activities may include, but are not limited to the following:

- Increased wetting/misting of demolition or asbestos abatement area;
- Adding wind screens/tarps in demolition area, or adding plastic sheeting in the asbestos abatement area;
- Adjusting the rate/speed and/or quantity of demolition equipment in the work area;
- Installation and/or repositioning of suction fans/blowers with particulate filters (HEPA filters for asbestos abatement areas);
- Covering debris stockpiles with plastic sheeting or tarps;
- Stopping specific dust-generating and/or asbestos abatement activities until wind directions and/or wind speeds are more conducive to reduced dust levels.

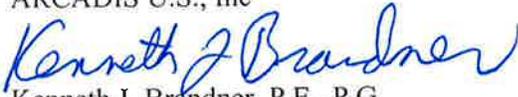
After the Demolition Contractor dust suppression adjustments have been implemented (minimum 30 minute period), the Demolition Contractor may resume work, and collect additional perimeter air samples. Following receipt of the analytical laboratory results for samples collected following resumption of work, if metals or asbestos concentration Stop Work levels are again exceeded, the Demolition Contractor shall immediately stop work for the remainder of that work day and design a more effective dust control program prior to resuming work the following work day.

4. DEMOLITION CONTRACTOR POINTS OF CONTACT

The on-site Demolition Contractor points of contact are provided in Attachment 5, including the Demolition Contractor company name, company representative, and cell phone numbers. These Demolition Contractor points of contact have the authority to implement additional dust control provisions and stop work provisions based on the air monitoring program described herein, and air monitoring data obtained by the TCEQ. The TCEQ will be contacted if changes to the points of contact in Attachment 5 are made.

Sincerely,

ARCADIS U.S., Inc



Kenneth J. Brandner, P.E., P.G.
Geological Engineer

Table 1. Air Monitoring Parameters (Updated 4/6/11), Encycle Demolition Project, 5500 Up River Road, Corpus Christi, Texas

Parameter	OSHA PEL (8 hour TWA)	NAAQS	Test Method	Method	
				Detection Limit ^g	Sample Collection Frequency
Asbestos ^a	0.1 f/cc		PCM NIOSH 7400	0.001 f/cc	During asbestos abatement activities, including daily at south property boundary and each day of building interior clearance air monitoring.
Dust/Particulates ^b (silica/quartz dust)	10 mg/m ³	0.15 mg/m ³ (PM ₁₀)	Field Measurement (E-BAM, or equal)	0.15 mg/m ³ (PM ₁₀)	Continuous real-time measurements during demolition at south property boundary and at upwind end of Encycle site.
Antimony ^b	0.5 mg/m ³	0.035 mg/m ³ (PM _{2.5})	NIOSH 7303	0.00833	At least twice weekly upwind and downwind during demolition.
Arsenic ^c	0.01 mg/m ³		NIOSH 7303	0.00833	At least twice weekly upwind and downwind during demolition.
Barium ^b	0.5 mg/m ³		NIOSH 7303	0.00167	At least twice weekly upwind and downwind during demolition.
Cadmium ^d	0.005 mg/m ³		NIOSH 7303	0.0000833	At least twice weekly upwind and downwind during demolition.
Chromium ^b	0.5 mg/m ³		NIOSH 7303	0.00833	At least twice weekly upwind and downwind during demolition.
Copper ^b	1 mg/m ³		NIOSH 7303	0.00167	At least twice weekly upwind and downwind during demolition.
Lead ^e	0.05 mg/m ³	0.00015 mg/m ³ (f)	NIOSH 7303	0.00015	At least twice weekly upwind and downwind during demolition.
Mercury	0.05 mg/m ³		NIOSH 6009	0.000868	At least twice weekly upwind and downwind during demolition.
Nickel ^b	1 mg/m ³		NIOSH 7303	0.00167	At least twice weekly upwind and downwind during demolition.
Selenium ^b	0.2 mg/m ³		NIOSH 7303	0.00833	At least twice weekly upwind and downwind during demolition.
Silver ^b	0.01 mg/m ³		NIOSH 7303	0.000833	At least twice weekly upwind and downwind during demolition.
Zinc ^b	15 mg/m ³		NIOSH 7303	0.00833	At least twice weekly upwind and downwind during demolition.

f/cc Fibers per cubic centimeter

mg/m³ Milligrams per cubic meter

PEL Permissible exposure limit

TWA Time-weighted average

NAAQS National Ambient Air Quality Standards

PM_{2.5} and PM₁₀ NAAQS particulate matter (in micrometers diameter) 24-hour average standard. Annual standard (arithmetic mean) for PM_{2.5} is 0.015 mg/m³.

a 29 CFR 1910.1001 (c)

b 29 CFR 1910.1000

c 29 CFR 1910.1018

d 29 CFR 1910.1027

e 29 CFR 1910.1025

f NAAQS Rolling 3-Month Average; Quarterly Average is 0.0015 mg/m³.

g Method detection limit varies with air sample volume. Limits shown are generally maximum values.

Table 2. Air Monitoring Action Levels and Stop Work Levels during Encycle Demolition Project, 5500 Up River Road, Corpus Christi, Texas

Parameter	OSHA PEL (8 hour TWA)	NAAQS	South Property		Sample Collection Frequency
			Boundary Action Level Relative to Background to Increase	South Property Boundary Stop Work Level Relative to Background ^{b/c}	
Asbestos	0.1 f/cc	0.01 f/cc	0.1 f/cc	0.1 f/cc	Daily during asbestos abatement activities.
Dust/Particulates (silica/quartz dust)	10 mg/m ³	0.15 mg/m ³ (PM ₁₀) ^d 0.035 mg/m ³ (PM _{2.5}) ^e	0.15 mg/m ³ (PM ₁₀) ^d 0.035 mg/m ³ (PM _{2.5}) ^e	0.045 mg/m ³ (PM _{2.5}) ^f	Continuous real-time measurements during demolition, asbestos abatement, and hazardous waste removal.
Antimony	0.5 mg/m ³	0.05 mg/m ³	0.05 mg/m ³	0.5 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Arsenic	0.01 mg/m ³	0.001 mg/m ³	0.001 mg/m ³	0.01 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Barium	0.5 mg/m ³	0.05 mg/m ³	0.05 mg/m ³	0.5 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Cadmium	0.005 mg/m ³	0.0005 mg/m ³	0.0005 mg/m ³	0.005 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Chromium	0.5 mg/m ³	0.05 mg/m ³	0.05 mg/m ³	0.5 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Copper	1 mg/m ³	0.1 mg/m ³	0.1 mg/m ³	1 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Lead	0.05 mg/m ³	0.00015 mg/m ³ (f)	0.00015 mg/m ³	0.05 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Mercury	0.05 mg/m ³	0.005 mg/m ³	0.005 mg/m ³	0.05 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Nickel	1 mg/m ³	0.1 mg/m ³	0.1 mg/m ³	1 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Selenium	0.2 mg/m ³	0.02 mg/m ³	0.02 mg/m ³	0.2 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Silver	0.01 mg/m ³	0.001 mg/m ³	0.001 mg/m ³	0.01 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
Zinc	15 mg/m ³	1.5 mg/m ³	1.5 mg/m ³	15 mg/m ³	At least twice weekly during demolition, asbestos abatement, and hazardous waste removal.
f/cc	Fibers per cubic centimeter				
mg/m ³	Milligrams per cubic meter				
PEL	Permissible exposure limit				
TWA	Time-weighted average				
NAAQS	National Ambient Air Quality Standards				
PM _{2.5} and PM ₁₀	NAAQS particulate matter (in micrometers diameter) 24-hour average standard. Annual standard (arithmetic mean) for PM _{2.5} is 0.015 mg/m ³ .				
a	South property boundary along Up River Road. If action level is exceeded, increased dust suppression/emissions controls will be conducted.				
b	South property boundary along Up River Road. If stop work level is exceeded, demolition, hazardous waste removal, and asbestos abatement work will be stopped; and additional dust suppression/emission controls will be implemented. Work may resume after 30 minutes to allow for additional dust suppression/emissions control resources to be positioned in the immediate work area(s).				
c	Stop Work Level for north property boundary is OSHA PELs.				
d	Average over one hour period.				
e	Average over 30 minute period. 0.015 mg/m ³ annual average shall not be exceeded.				

ATTACHMENT 1

E-BAM PORTABLE PARTICULATE MONITOR DETAILS

E-BAM

E-BAM is a complete measurement system it comes with the following standard components:

- 6 Channel Datalogger
- Internal DC Vacuum Pump
- Real-Time Concentration
- PM10 Dichot Head
- Aluminum Tripod
- Ambient Temperature Sensor
- Volumetric Flow Control
- Weatherproof Enclosure
- Filter Temperature
- Filter RH
- Filter Pressure
- Calibration Membranes

Options and Accessories

- Flow Calibrator
- WINS Impactor
- PM2.5 Sharp-Cut Cyclone
- TSP Inlet, External AC Vacuum Pump
- Power Solar Panel Array, AC Power Supply
- Sensor inputs Wind Speed Sensor,
- Wind Direction Sensor, Ambient RH,
- Ambient Pressure
- Communications Transfer Module, Modem,
- Radio Modem
- Calibration, Zero Calibration Kit, Flow Calibration Kit

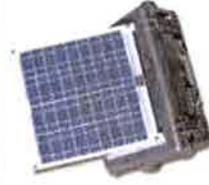
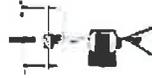
Specifications

Range	0 - 100 mg per cubic meter
Accuracy	2.5 ug in 24 hour period
Measurement Cycle	Standard @ 60 Minutes, actual sampling time 59 Minutes
Beta Source	C14, less than 75 microcurie, Half life of 5730 years
Detector:	Scintillation probe
Analog Output	0-1V, 0-5V, 0-10V selectable, 12 bit accuracy
Filter Tape	Continuous glass fiber filter
Inlet	PM10 impactor type
Flow Rate:	16.7 liters per minute, adjustable
Flow accuracy	+/- 3% of reading, volumetric flow controlled
Sample Pump	Dual diaphragm type, internally mounted
Alarm Signals	Filter, flow, power and operation failure
Input Power	12 Volts DC @ 36 Watts, 25°C
Alarm Contact Closure	2 Amp @ 240 VAC
Operating Temperature	-30 Deg C to 40 Deg C
Enclosure	

BX-807	PM 2.5 Sharp Cut Cyclone
390062	Battery, 12VDC 100AHR,
390052	Battery Charger, 12 VDC @ 4 A / .3A hold AC adaptor, 100-240 VAC in, 12VDC @ 6A,
591	Wind speed sensor
590	Wind direction sensor
592	Temperature sensor
593	Humidity sensor
	MicroMet Plus Software

Consumables Part Number

Filter tape, roll 460130



Sensor inputs (photo of sensor array), Wind Speed Sensor.

Met One Instruments, Inc.

Corporate Sales & Service: 1800 Washington Blvd., Grants Pass, Oregon 97526 • Tel: (541) 471-7111 • Fax: (541) 471-7116
Regional Sales & Service: 3206 Main Street, Suite 106, Rowlett, Texas 75088 • Tel: (972) 412-4147 • Fax: (972) 412-4716

<http://www.metone.com> • metone@metone.com



The Met One E-BAM is a portable real-time beta gauge traceable to US-EPA requirements for automated PM 2.5 and PM 10 measurement.

The Met One E-BAM has been built to satisfy users, regulators and those from the health community by providing truly accurate, precise, real time measurement of fine particulate matter automatically. In addition, it is rugged, portable battery operated, deployable in 15 minutes.

The E-BAM offers the following advanced features:

1. Accuracy and precision consistent with US-EPA requirements for Class III designation for PM 2.5.
2. Real-time, accurate results regardless of season or geographic location without correction factors.
3. True ambient sampling provides accurate measurement of semi-volatile nitrates and organic compounds.
4. Lightweight, ruggedized construction may be easily mounted on a tripod in minutes.
5. Rugged all-weather construction allows for true ambient sampling.
6. Will operation for either AC or DC power. Battery and solar operation available.



Met One Instruments, Inc.



Continuous Monitoring

E-BAM automates particulate measurement by continuously sampling and reporting particulate concentration, data is updated every second, and data records updated every minute. E-BAM eliminates the old process of filter collection and manual filler weighing, and eliminates the need for more expensive, high maintenance instruments. Today, with the adaptation of Beta Attenuation to ambient monitoring this process became simple streamlined and inexpensive.

About Accuracy

Real-time accurate, reliable, and repeatable measurement of ambient fine particulate matter has been the elusive goal of environmental regulators and health professionals for many years. Met One Instruments has developed advanced particulate monitoring instrumentation which will meet or exceed all US-EPA requirements for Class-III PM_{2.5} designation, is reliable, and is easy to operate. It will also report results in real time and is automatic thereby eliminating the need for high levels of human intervention.

Because sampling occurs under true ambient conditions semi-volatile organic compounds and nitrates are easily detected thereby avoiding under measurement.

Continuous Sampling

Mobility

E-BAM is a lightweight portable instrument that operates directly in hostile environments without exterior enclosure. E-BAM is a very robust portable sampler system that is easily installed in less than 15 minutes. No other sampler matches the portability and flexibility of the E-BAM.

Set up

Quick setup of the E-BAM is assured with a series of prompts instructing the installer on the sequence to follow. Then the E-BAM performs a series of self test diagnostics and alerts the installer of any corrective action, upon completion the E-BAM automatically places itself in normal operate mode.

Particulate size selection

Size selective concentration measurements are made using a variety of sampling inlets, the E-BAM may be supplied with TSP (Total Suspended Particulate), PM₁₀, PM_{2.5} or PM₁ inlets. Flow dependent cut points in the size selective inlets are maintained using integral flow meter, pressure sensor and ambient temperature sensor.

The PM₁₀ inlet removes particles larger than 10 microns, the inlet is not affected by wind speed and wind direction. For PM_{2.5} or PM₁ secondary size selection is made using a second downstream inlet.

Construction etc.

Digital, Analog and Alarm Outputs

The E-BAM provides both continuous digital and analog outputs, alarm output may be set for any concentration level. Analog output is selectable to either voltage or current, digital output is supplied as RS-232 or USB.

Reporting modes

The internal data logger can store up over 200 days of concentration data at one hour sample times, and collect data from six other measurements at the same time! Both digital and analog outputs are included to enable users to connect to other data recording systems and to network with other monitors.

Easy to Operate

E-BAM has been programmed to operate, at all times, except during calibration verification. Current data, historical data, and status information are available at all times without interrupting normal E-BAM operation.

Data Validation

The operator may select various criteria for data validation, including deviation from rolling average, high value excursions, power failure and others. If an error occurs it is entered into the error log with date, time and type of error.

The standard configuration of the E-BAM is a self-contained environmentally sealed aluminum enclosure placed on a rugged tripod. This system can be permanently placed on rooftops, near roads, at industrial sites or rapidly deployed to monitor emergency situations.

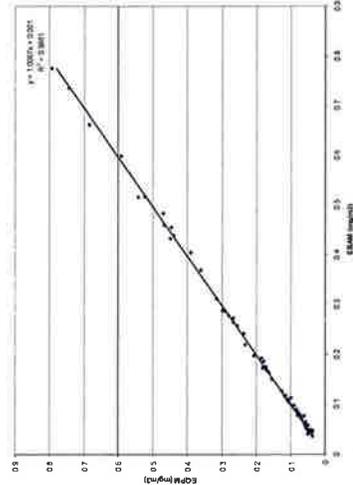
E- represents Environment Proof instrument, E-BAM has been specifically designed to work in hostile environments without additional protection.

Direct Field Reporting

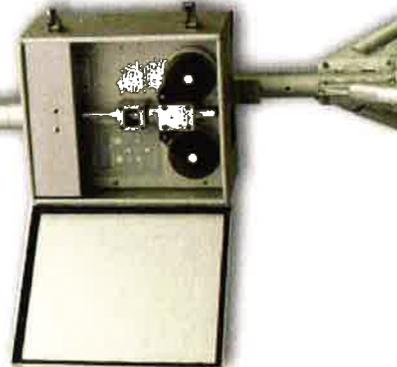
Collecting real time or historical particulate data from a field site has never been easier. Advanced communication options include cellular phone, Line of Sight Radio, and for very remote sites satellite communications are now available. E-BAM also supports the full line of standard MET ONE options, such as data transfer module, phone modem, and direct communications to a portable computer.

E-BAM data is recorded internally and may be retrieved using one of the communication options or data may be forwarded to third party data acquisition system.

MicroMet Plus Software supports the E-BAM and provides a complete communication, data base and reporting modules with charting.



EPA Designated Method EQPM-4798-122 VS EBAM



ATTACHMENT 2

DONA PARK AIR MONITORING STATION DATA

Brandner, Ken

From: Omar Valdez [Omar.Valdez@tceq.texas.gov]
Sent: Friday, February 11, 2011 12:06 PM
To: Backens, Charmaine; Brandner, Ken; mboudloche@ch13boudloche.com; Rodriguez, Jacquelyn; Shafford, Bill
Subject: Dona Park Air Monitoring Station
Attachments: Omar Valdez.vcf

Good afternoon,

Per our discussion yesterday, below is the link to the Dona Park air monitoring station that displays the meteorological data.

Let me know of any questions or if you are unable to open the link.

http://www.tceq.state.tx.us/cgi-bin/compliance/monops/daily_summary.pl?cams=0199

Thanks!

Omar Valdez
Project Manager
Superfund/SSDAP Section
Remediation Division
Texas Commission on Environmental Quality
512-239-6858





SITE SEARCH:
 please enter search phrase

SUBJECT INDEX
 > Air > Water > Waste
 > Search TCEQ Data
 > Agency Organization Map

[Air Quality Maps](#) [Data Reports](#) [AutoGC](#) [Water Data](#) [Site Info](#)

Dona Park C635/AF199/F299 Data by Site by Date (all parameters)

Use this form to retrieve hourly data collected at Dona Park C635/AF199/F299. Although this is the most current data, it is not considered official until it has been certified by the technical staff. This information is updated hourly.

This web page provides the most current hourly averaged data available. Our convention for time-tagging data is the beginning of each hour. For example, values shown for the noon hour are based on measurements taken from noon to 1:00 p.m. The noon average will not be calculated until after 1:00 p.m. The noon average will then be available on our external server from 1:15 p.m. to 1:30 p.m. This results in an apparent one-hour time lag in the data. We also present our data in Local Standard Time for each measuring site. During Daylight Savings, this introduces another apparent one-hour time lag in the data.

Use the controls below to select a different date or time format. Click on the Generate Report button once you have made your selections. Click on the Plot Data button once the tabular report has been generated to open a separate window containing data plots.

CAMS 199 Dona Park C635/AF199/F299 [Select a different site](#)

Month: Day: Year: Time Format:

April 6 2011 12 Hour (AM/PM)

Highlight validated data

The table below contains hourly averages for all the pollutants and meteorological conditions measured at Dona Park C635/AF199/F299 for Wednesday, April 6, 2011. All times shown are in CST.

Parameter Measured	Morning										Parameter Measured	POC
	Mid	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00		
Sulfur Dioxide	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	NA	NA	Sulfur Dioxide	1 R
Hydrogen Sulfide	0.09	0.14	0.12	0.17	0.14	0.18	SPN	SPN	NA	NA	Hydrogen Sulfide	1 R
Total Non-Methane Organic Compounds	1.45	1.03	1.08	1.16	2.07	2.11	18.37	147.95	NA	NA	Total Non-Methane Organic Compounds	1
Methane	1874.07	1874.49	1879.06	1874.07	1884.06	1931.07	1935.23	2033.85	NA	NA	Methane	1
Wind Speed	4.7	4.7	5.1	4.5	3.9	3.5	2.9	3.1	NA	NA	Wind Speed	1
	5.3	5.0	5.4	5.0	4.0	3.8	2.9	2.9	NA	NA		2
Resultant Wind Speed	4.4	4.5	4.8	4.2	3.6	3.3	2.5	2.6	NA	NA	Resultant Wind Speed	1
	5.0	4.7	5.2	4.6	3.7	3.6	2.6	2.3	NA	NA		2
Resultant Wind Direction	153	144	143	157	159	152	164	188	NA	NA	Resultant Wind Direction	1
	151	147	144	155	157	151	164	192	NA	NA		2
Maximum Wind Gust	11.0	9.5	10.2	9.8	8.2	7.4	6.9	8.9	NA	NA	Maximum Wind Gust	1
	10.7	9.8	10.1	11.5	7.9	7.3	6.0	6.1	NA	NA		2
Std. Dev. Wind Direction	22	17	18	23	21	19	27	32	NA	NA	Std. Dev. Wind Direction	1
	20	19	18	22	22	20	28	38	NA	NA		2
Outdoor Temperature	61.7	61.2	61.2	61.3	61.0	61.0	61.5	63.7	NA	NA	Outdoor Temperature	1
	61.7	61.1	61.1	61.3	60.8	60.5	59.9	63.1	NA	NA		2
Relative Humidity	71.1	73.9	75.5	76.9	79.1	81.3	83.4	81.2	NA	NA	Relative Humidity	1
Parameter Measured	Mid	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	Parameter Measured	POC
Maximum values for each parameter are bold within the table. Minimum values are bold italic . R - Data from this instrument meets EPA quality assurance criteria for regulatory purposes.												

PLEASE NOTE: This data has not been verified by the TCEQ and may change. This is the most current data, but it is not official until it has been certified by our technical staff. Data is collected from TCEQ ambient monitoring sites and may include data collected by other outside agencies. This data is updated hourly. All times shown are in Local Standard Time.

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ATTACHMENT 3

METALS ANALYSES DETAILS – NIOSH METHOD 7303

ELEMENTS by ICP (Hot Block/HCl/HNO₃ Digestion)

7303

MW: Table 1

CAS: Table 2

RTECS: Table 2

METHOD: 7303, Issue 1

EVALUATION: PARTIAL

Issue 1: 15 March 2003

OSHA: Table 2
NIOSH: Table 2
ACGIH: Table 2

PROPERTIES: Table 1

ELEMENTS: aluminum antimony* arsenic barium beryllium bismuth* boron	cadmium calcium chromium cobalt copper gallium gold	indium iron lead* magnesium manganese molybdenum neodymium	nickel palladium phosphorus platinum potassium selenium sodium	strontium tellurium thallium tin* titanium vanadium yttrium	zinc
---	---	--	--	---	------

* With certain restrictions (see Table 3)

SAMPLING	MEASUREMENT
<p>SAMPLER: FILTER (0.8-μm, cellulose ester membrane)</p> <p>FLOW RATE: 1 to 4 L/min</p> <p>VOL-MIN: Table 1 -MAX: Table 1</p> <p>SHIPMENT: Routine</p> <p>SAMPLE STABILITY: Stable</p> <p>BLANKS: 2 to 10 field blanks per set</p>	<p>TECHNIQUE: INDUCTIVELY COUPLED ARGON PLASMA, ATOMIC EMISSION SPECTROSCOPY</p> <p>ANALYTE: See element list above</p> <p>REAGENTS: Conc. HCl, 1.25 mL; and conc. HNO₃, 1.25 mL</p> <p>FINAL SOLUTION: 5% HCl and 5% HNO₃, 25 mL</p> <p>WAVELENGTH: Element and instrument specific</p> <p>BACKGROUND CORRECTION: Spectral wavelength shift</p> <p>CALIBRATION: Elements in 5% HCl, 5% HNO₃</p> <p>RANGE: LOQ to 50,000 μg/sample [1]</p> <p>ESTIMATED LOD: Varies with element; Table 1</p> <p>PRECISION (\bar{s}): Not evaluated</p>
ACCURACY	
<p>RANGE STUDIED: 5,000 to 50,000 μg/sample</p> <p>BIAS: Not determined</p> <p>OVERALL PRECISION: Not determined</p> <p>ACCURACY: Not determined</p>	

APPLICABILITY: The working range of this method is up to 100 mg/m³ for each element in a 500-L sample (the minimum range depends on the LOD for each sample; see Table 1). The analysis is not compound specific. Certain elemental compounds are known to be acceptable or unacceptable by this method (see Table 3). For unverified compounds, a test run should be conducted using a known amount of the compound in question to determine acceptability.

INTERFERENCES: Interferences are spectral in nature and are accounted for by choosing appropriate wavelengths, applying interelement correction factors, and background correction.

OTHER METHODS: Alternative, more sensitive methods exist for some elements by graphite furnace atomic absorption spectroscopy. This method is similar to NIOSH Method 7301, differing only in the use of the hot block for digestion of the sampler.

REAGENTS:

1. Hydrochloric acid,* conc., ultra pure.
2. Nitric acid,* conc., ultra pure.
3. Calibration stock solutions, 50-1000 µg/mL. Commercially available single element solutions or multielement solutions prepared as instructed by the instrument manufacturer.
4. Argon, prepurified.
5. Distilled, deionized, Type II water.
6. Diluting solution: 5% HCl : 5% HNO₃. To about 600 mL of deionized water in a 1-L volumetric flask, slowly add 50 mL conc. HCl and 50 mL conc. HNO₃. Dilute to the mark with deionized water.

* See SPECIAL PRECAUTIONS

EQUIPMENT:

1. Sampler: cellulose ester membrane filter, 0.8-µm pore size, 37-mm diameter; in cassette filter holder.
2. Personal sampling pump, 1 to 4 L/min, with flexible connecting tubing.
3. Inductively coupled argon plasma atomic emission spectrometer, equipped as specified by the manufacturer for analysis of elements of interest.
4. Hot block apparatus at 95 °C.
5. Digestion vessels and caps, 50-mL.
6. Watchglasses.
7. Pipettes, electronic and mechanical.
8. Regulator, two-stage, for argon.
9. Forceps.

SPECIAL PRECAUTIONS: Concentrated acids are powerful oxidizers, toxic, and corrosive liquids. Wear protective clothing and work in a fume hood.

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line.
2. Sample at an accurately known flow rate between 1 and 4 L/min for a total sample size of 200 to 2000 L for TWA measurements. Do not exceed a filter loading of approximately 2 mg total dust.

SAMPLE PREPARATION:

3. Open the cassette filter holder and with forceps remove the sample filter. Fold the filter into quarters taking care not to lose any sample, and transfer to a clean, 50-mL hot block digestion tube.
4. Add 1.25 mL HCl. Cover with a plastic watchglass. Place in the hot block and heat at an internal temperature of 95 °C for 15 minutes.
NOTE: The internal temperature may vary from the digital readout. Calibrate the hot block prior to digestion.
5. Remove the sample from the hot block and cool for 5 minutes. Remove watchglass and add 1.25 mL HNO₃. Replace watchglass and return to hot block at 95 °C for 15 minutes.
6. Remove the sample from the hot block and cool for at least 5 minutes. Rinse watchglass into the sample container and discard watchglass.
7. Dilute to 25-mL final volume with distilled, deionized Type II water.

CALIBRATION AND QUALITY CONTROL:

8. Calibrate the spectrometer according to the manufacturer's recommendations. Use standards consisting of the same 5% HCl : 5% HNO₃ matrix as the samples.
9. Analyze a standard every 10 samples.
10. Analyze a media blank every 20 samples, and a reagent blank every 10 samples.
11. Analyze a set of two laboratory control samples every 40 samples of a given matrix for a given analyte.
12. Check recoveries with at least two spiked media blanks per ten samples.
NOTE: In the determination of lead, there may be a measurement interference (for example, samples with high aluminum levels). More recent instruments have a correction for this.

MEASUREMENT:

13. Set spectrometer to conditions specified by manufacturer.
14. Analyze standards, samples and quality control checks.

NOTE: If the elemental value for a sample is above the linear range of the element(s) in question, dilute the sample solution with 5% HCl : 5% HNO₃ diluting solution, reanalyze and apply the appropriate dilution factor in the calculations.

CALCULATIONS:

15. Obtain the solution concentrations for the sample, C_s (µg/mL), and the average media blank, C_b (µg/mL), from the instrument.
16. Using the solution volumes of sample, V_s (mL), and media blank, V_b (mL), calculate the concentration, C (mg/m³), of each element in the air volume sampled, V (L):

$$C = \frac{C_s V_s - C_b V_b}{V}, \text{mg} / \text{m}^3$$

NOTE: µg/L = mg/m³

EVALUATION OF METHOD:

The method was evaluated for all elements and compounds listed in Table 1 and Table 2 between 1999 and 2001 using known amounts of bulk material [4]. Evaluation is ongoing for additional elements and compounds. The limits of detection and quantitation were also determined for each element. Two ICP instruments were used in the evaluation, a Thermal Jarrell Ash Model 61E [5] and a TJA IRIS [6], operated according to the manufacturer's instructions.

REFERENCES:

- [1] WOHL [2001]. Metals validation using hot block digestion, Unpublished data. Wisconsin Occupational Health Laboratory, Madison, WI.
- [2] NIOSH [1994]. Method 7300: Elements by ICP, NIOSH Manual of Analytical Methods, Fourth Edition, Issue 2, Aug. 15, 1994.
- [3] WOHL [2001]. Metals Manual 2001, WOHL Internal Document, Updated Apr. 1, 2001. Wisconsin Occupational Health Laboratory, Madison, WI.
- [4] WOHL [2001]. WOHL General Operations Procedures Manual, WOHL Internal Document, Updated 2001. Wisconsin Occupational Health Laboratory, Madison, WI.
- [5] Thermal Jarrell Ash [1991]. ICAP 61E Plasma Spectrometer Operator's Manual, Thermal Jarrell Ash Corp., Part No. 128832-01, Feb., 1991.
- [6] Thermal Jarrell Ash [1997]. IRIS Plasma Spectrometer User's Guide, Thermal Jarrell Ash Corp., Part No. 135811-0, Feb. 4, 1997.

METHOD WRITTEN BY:

Jason Loughrin, Lyle Reichmann, Doug Smieja, Shakker Amer, Curtis Hedman
Wisconsin Occupational Health Laboratory (WOHL).

TABLE 1: ANALYTE INFORMATION FOR VALID ELEMENTS AND COMPOUNDS

Analyte	Properties		LOD ($\mu\text{g/mL}$)	LOQ ($\mu\text{g/mL}$)	Estimated LOQ ($\mu\text{g/sample}$)*	Minimum** air vol. (L)	Maximum*** air vol. (L)
	MW	MP ($^{\circ}\text{C}$)					
Al	26.98	660	0.111	0.37	9.25	2	10,000
As	74.92	817	0.009	0.03	0.075	8	5,000,000
Au	196.97	10.63	0.015	0.05	1.25	1	3,300
B	10.81	2177	0.0094	0.0283	0.71	1	3,300
Ba	137.34	3.51	0.0018	0.006	0.15	1	100,000
Be	9.01	2178	0.00075	0.0025	0.062	35	25,000,00
Bi	208.98	271	0.025	0.085	2.12	1	10,000
Ca	40.08	842	0.099	0.33	8.25	2	10,000
CaO	56.08	2927	0.139	0.462	11.6	3	10,000
Cd	112.4	321	0.0037	0.012	0.30	3	500,000
Co	58.93	1495	0.003	0.011	0.27	3	500,000
Cr	52.00	1890	0.009	0.03	0.75	8	500,000
Cu	63.54	1083	0.020	0.060	1.50	15	500,000
Fe	55.85	1535	0.070	0.20	5.00	1	5,000
Fe ₂ O ₃ (as Fe)	159.69	1462	0.070	0.20	5.00	1	5,000
Ga	69.72	29.75	0.03	0.09	2.25	1	3,300
In	114.82	156.3	0.015	0.05	1.25	15	500,000
Mg	24.31	651	0.047	0.14	3.50	1	10,000
MgO	40.32	2825	0.078	0.23	5.75	5	33,000
Mn	54.94	1244	0.0012	0.004	0.10	0.05	10,000
Mo	95.94	651	0.0072	0.024	0.60	0.5	10,000
Nd	92.906	2477	0.01	0.03	0.75	0.1	3,300
Ni	58.71	1453	0.012	0.039	0.98	1	50,000
P	30.97	44	0.3	1.0	25	250	500,000
Pb	207.19	328	0.023	0.07	1.75	35	100,000
Pd	106.4	1550	0.009	0.03	0.75	0.1	3,300
Pt	195.09	1769	0.0045	0.015	0.38	200	25,000,000
Sb	121.75	630.5	0.018	0.06	1.50	3	100,000
Se	78.96	217	0.021	0.064	1.60	8	250,000
Sn	118.69	232	0.015	0.05	1.25	1	25,000
Sr	87.62	769	0.002	0.006	0.15	300	100,000,000
Te	127.60	450	0.15	0.5	12.5	125	500,000
Ti	47.90	1675	0.005	0.016	0.40	0.1	10,000
Tl	204.37	304	0.044	0.133	3.32	35	500,000
V	50.94	1890	0.003	0.01	0.25	2.5	500,000
Y	88.91	1495	0.001	0.003	0.075	0.1	50,000
Zn	65.37	419	0.022	0.066	1.65	0.5	10,000
ZnO	81.37	1970	0.027	0.082	2.05	0.5	10,000

* Value based on a 25-mL sample volume.

** The minimum sampling volume needed to obtain the OSHA PEL at the LOQ for the element/compound at a sample digestion volume of 25 mL.

*** The maximum sampling volume for a given sample, calculated by taking 50,000 μg as the limit for the element/compound per sample.

NOTE: The LOD and LOQ values are dependent on the particular analytical instrument used. Also, LOD and LOQ values may vary for a particular element due to certain interelement interferences.

TABLE 2. EXPOSURE LIMITS, CAS #, RTECS

Element (Symbol)	CAS #	RTECS	Exposure Limits, mg/m ³ (Ca = carcinogen)		
			OSHA	NIOSH	ACGIH
Silver (Ag)	7440-22-4	VW3500000	0.01 (dust, fume, metal)	0.01 (metal, soluble)	0.1 (metal) 0.01 (soluble)
Aluminum (Al)	7429-90-5	BD0330000	15 (total dust) 5 (respirable)	10 (total dust) 5 (respirable fume) 2 (salts, alkyls)	10 (dust) 5 (powders, fume) 2 (salts, alkyls)
Arsenic (As)	7440-38-2	CG0525000	varies	C 0.002, Ca	0.01, Ca
Barium (Ba)	7440-39-3	CQ8370000	0.5	0.5	0.5
Beryllium (Be)	7440-41-7	DS1750000	0.002, C 0.005	0.0005, Ca	0.002, Ca
Calcium (Ca)	7440-70-2	--	varies	varies	varies
Cadmium (Cd)	7440-43-9	EU9800000	0.005	lowest feasible, Ca	0.01 (total), Ca 0.002 (respir.), Ca
Cobalt (Co)	7440-48-4	GF8750000	0.1	0.05 (dust, fume)	0.02 (dust, fume)
Chromium (Cr)	7440-47-3	GB4200000	0.5	0.5	0.5
Copper (Cu)	7440-50-8	GL5325000	1 (dust, mists) 0.1 (fume)	1 (dust) 0.1 (fume)	1 (dust, mists) 0.2 (fume)
Iron (Fe)	7439-89-6	NO4565500	10 (dust, fume)	5 (dust, fume)	5 (fume)
Potassium (K)	7440-09-7	TS6460000	--	--	--
Lanthanum	7439-91-0	--	--	--	--
Lithium (Li)	7439-93-2	--	--	--	--
Magnesium (Mg)	7439-95-4	OM2100000	15 (dust) as oxide 5 (respirable)	10 (fume) as oxide	10 (fume) as oxide
Manganese (Mn)	7439-96-5	OO9275000	C 5	1; STEL 3	5 (dust) 1; STEL 3 (fume)
Molybdenum (Mo)	7439-98-7	QA4680000	5 (soluble) 15 (total insoluble)	5 (soluble) 10 (insoluble)	5 (soluble) 10 (insoluble)
Nickel (Ni)	7440-02-0	QR5950000	1	0.015, Ca	0.1 (soluble) 1 (insoluble, metal)
Phosphorus (P)	7723-14-0	TH3500000	0.1	0.1	0.1
Lead (Pb)	7439-92-1	OF7525000	0.05	0.05	0.05
Antimony (Sb)	7440-36-0	CC4025000	0.5	0.5	0.5
Selenium (Se)	7782-49-2	VS7700000	0.2	0.2	0.2
Tin (Sn)	7440-31-5	XP7320000	2	2	2
Strontium (Sr)	7440-24-6	--	--	--	--
Tellurium (Te)	13494-80-9	WY2625000	0.1	0.1	0.1
Titanium (Ti)	7440-32-6	XR1700000	--	--	--
Thallium (Tl)	7440-28-0	XG3425000	0.1 (skin) (soluble)	0.1 (skin) (soluble)	0.1 (skin)
Vanadium (V)	7440-62-2	YW2400000	--	C 0.05	--
Tungsten	7440-33-7	--	5	5 10 (STEL)	5 10 (STEL)
Yttrium (Y)	7440-65-5	ZG2980000	1	N/A	1
Zinc (Zn)	7440-66-6	ZG8600000	--	--	--
Zirconium (Zr)	7440-67-7	ZH7070000	5	5, STEL 10	5, STEL 10

TABLE 3: VALIDATION SUMMARY

Analyte	Status ¹	Analyte	Status	Analyte	Status
Ag	Not Valid	CuO	Valid	S	Not Valid
Al	Valid	Fe	Valid	Sb	Partially Valid ⁴
Al ₂ O ₃	Not Valid	Fe ₂ O ₃	Valid	Sb ₂ O ₃	Partially Valid ⁵
As	Valid	Ga	Valid	Se	Valid
Au	Valid	In	Valid	Si	Not Valid
B	Valid	KCl	Pending	Sn	Partially Valid ⁶
Ba	Pending	Mg	Valid	SnO	Pending
BaO	Pending	MgO	Valid	SnO ₂	Pending
BaO ₂	Pending	Mn	Valid	Sr	Valid
BaCl ₂	Valid	MnO	Valid	SrCrO ₄	Valid (by Cr)
BaSO ₄	Pending	Mo	Valid	Te	Valid
Be	Valid	NaCl	Pending	Ti	Valid
Bi	Partially Valid ²	Nd	Valid	Tl	Valid
Ca	Valid	Ni	Valid	V	Valid
CaCO ₃	Valid	P	Valid	V ₂ O ₅	Valid
CaO	Valid	Pb	Partially Valid ³	Y	Valid
Cd	Valid	PbCrO ₄	Valid (by Cr)	Zn	Valid
Co	Valid	PbO	Valid	ZnO	Valid
Cr	Valid	Pd	Valid	Zr	Not Valid
Cu	Valid	Pt	Valid	ZrO	Not Valid

¹ Status definitions

Valid: The method is suitable for samples up to at least 0.0500 g bulk material with recoveries of between 90 and 110 percent. This weight exceeds most expected levels encountered in work environments.

Partially Valid: The method is suitable with bulk-material recoveries of between 90 and 110 percent under certain conditions (as footnoted above).

Not Valid: The method procedure is not suitable for samples at any weight with recoveries of between 90 and 110 percent. An alternative method should be used.

² Valid up to 10,000 µg/sample and within 7 days of sample digestion.

³ Valid up to 50,000 µg/sample and at least 24 hours after sample digestion; Valid up to 15,000 µg/sample within 24 hours of sample digestion.

⁴ Valid up to 25,000 µg/sample and within 7 days of sample digestion.

⁵ Valid up to 25,000 µg/sample and within 7 days of sample digestion.

⁶ Valid up to 30,000 µg/sample and within 7 days of sample digestion.

NOTE: The upper limits of the method can be extended by serial dilution of the samples at the time of analyses.

ATTACHMENT 4

MERCURY ANALYSIS DETAILS – NIOSH METHOD 6009

MERCURY

6009

Hg

MW: 200.59

CAS: 7439-97-6

RTECS: OV4550000

METHOD: 6009, Issue 2

EVALUATION: PARTIAL

Issue 1: 15 May 1989
Issue 2: 15 August 1994

OSHA : C 0.1 mg/m³ (skin)
NIOSH: 0.05 mg/m³ (skin)
ACGIH: 0.025 mg/m³ (skin)

PROPERTIES: liquid; d 13.55 g/mL @ 20 °C; BP 356 °C;
HP -39 °C; VP 0.16 Pa (0.0012 mm Hg);
13.2 mg/m³ @ 20 °C; Vapor Density
(air=1) 7.0

SYNONYMS: quicksilver

SAMPLING		MEASUREMENT	
SAMPLER:	SOLID SORBENT TUBE (Hopcalite in single section, 200 mg)	TECHNIQUE:	ATOMIC ABSORPTION, COLD VAPOR
FLOW RATE:	0.15 to 0.25 L/min	ANALYTE:	elemental mercury
VOL-MIN:	2 L @ 0.5 mg/m ³	DESORPTION:	conc. HNO ₃ /HCl @ 25 °C, dilute to 50 mL
-MAX:	100 L	WAVELENGTH:	253.7 nm
SHIPMENT:	routine	CALIBRATION:	standard solutions of Hg ²⁺ in 1% HNO ₃
SAMPLE STABILITY:	30 days @ 25 °C [1]	RANGE:	0.1 to 1.2 µg per sample
FIELD BLANKS:	2 to 10 field blanks per set	ESTIMATED LOD:	0.03 µg per sample
MEDIA BLANKS:	at least 3 per set	PRECISION (S_r):	0.042 @ 0.9 to 3 µg per sample [4]
ACCURACY			
RANGE STUDIED:	0.002 to 0.8 mg/m ³ [2] (10-L samples)		
BIAS:	not significant		
OVERALL PRECISION (S_{r,r}):	not determined		
ACCURACY:	not determined		

APPLICABILITY: The working range us 0.01 to 0.5 mg/m³ for a 10-L air sample. The sorbent material irreversibly collects elemental mercury. A prefilter can be used to exclude particulate mercury species from the sample. The prefilter can be analyzed by similar methodology. The method has been used in numerous field surveys [3].

INTERFERENCES: Inorganic and organic mercury compounds may cause a positive interference. Oxidizing gases, including chlorine, do not interfere.

OTHER METHODS: This replaces method 6000 and its predecessors, which required a specialized desorption apparatus [4,5,6]. This method is based on the method of Rathje and Marcero [7] and is similar to the OSHA method ID 145H [2].

REAGENTS:

1. Water, organics-free, deionized.
2. Hydrochloric acid (HCl), conc.
3. Nitric acid (HNO₃), conc.
4. Mercuric oxide, reagent grade, dry.
5. Calibration stock solution, Hg²⁺, 1000 µg/mL. Commercially available or dissolve 1.0798 g of dry mercuric oxide (HgO) in 50 mL of 1:1 hydrochloric acid, then dilute to 1 L with deionized water.
6. Intermediate mercury standard, 1 µg/mL. Place 0.1 mL 1000 µg/mL stock into a 100 mL volumetric containing 10 mL deionized water and 1 mL hydrochloric acid. Dilute to volume with deionized water. Prepare fresh daily.
7. Stannous chloride, reagent grade, 10% in 1:1 HCl. Dissolve 20 g stannous chloride in 100 mL conc. HCl. Slowly add this solution to 100 mL deionized water and mix well. Prepare fresh daily.
8. Nitric acid, 1% (w/v). Dilute 14 mL conc. HNO₃ to 1 L with deionized water.

EQUIPMENT:

1. Sampler: glass tube, 7 cm long, 6-mm OD, 4-mm ID, flame sealed ends with plastic caps, containing one section of 200 mg Hopcalite held in place by glass wool plugs (SKC, Inc., Cat. #226-17-1A, or equivalent).
NOTE: A 37-mm, cellulose ester membrane filter in a cassette preceding the sorbent may be used if particulate mercury is to be determined separately.
2. Personal sampling pump, 0.15 to 0.25 L/min, with flexible connecting tubing.
3. Atomic absorption spectrophotometer with cold vapor generation system (see Appendix) or cold vapor mercury analysis system.*
4. Strip chart recorder, or integrator.
5. Flasks, volumetric, 50-mL, and 100-mL.
6. Pipet, 5-mL, 20-mL, others as needed.
7. Micropipet, 10- to 1000-µL.
8. Bottles, biological oxygen demand (BOD), 300-mL.

* See SPECIAL PRECAUTIONS

SPECIAL PRECAUTIONS: Mercury is readily absorbed by inhalation and contact with the skin. Operate the mercury system in a hood, or bubble vented mercury through a mercury scrubber.

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line.
2. Break ends of sampler immediately prior to sampling. Attach sampler to pump with flexible tubing.
3. Sample at an accurately known rate of 0.15 to 0.25 L/min for a total sample size between 2 and 100 L.
NOTE: Include a minimum of three unopened sampling tubes from the same lot as the samples for use as media blanks.
4. Cap sampler and pack securely for shipment.

SAMPLE PREPARATION:

5. Place the Hopcalite sorbent and the front glass wool plug from each sampler in separate 50-mL volumetric flasks.
6. Add 2.5 mL conc. HNO₃ followed by 2.5 mL conc. HCl.
NOTE: The mercury must be in the oxidized state to avoid loss. For this reason, the nitric acid must be added first.
7. Allow the sample to stand for 1 h or until the black Hopcalite sorbent is dissolved. The solution will turn dark brown and may contain undissolved material.
8. Carefully dilute to 50 mL with deionized water. (Final solution is blue to blue-green).
9. Using a volumetric pipet, transfer 20 mL of the sample to a BOD bottle containing 80 mL of deionized water. If the amount of mercury in the sample is expected to exceed the standards, a smaller aliquot may be taken, and the volume of acid adjusted accordingly. The final volume in

the BOD bottle must be 100 mL. To prevent possible loss of mercury during transfer, place the pipet tip below the surface of the liquid in the BOD bottle.

CALIBRATION AND QUALITY CONTROL:

10. Prepare a minimum of two series (six levels each) of working standards covering the range 0.01 to 0.5 µg Hg per aliquot by adding known amounts of the intermediate standard to BOD bottles containing enough 1% nitric acid to bring the final volume to 100 mL.
11. Analyze the working standards together with the samples and blanks (steps 13 through 16). Analyze full set of standards at the beginning of the run, and a second set at the end of the run. Additional standards may be run intermediately during the analysis to confirm instrument response.
12. Prepare calibration graph (peak height vs. solution concentration, µg/sample).

MEASUREMENT:

13. Zero the spectrophotometer by removing the bubbler from the BOD bottle, allowing the baseline on the recorder to stabilize.
14. Place the bubbler in a BOD bottle containing 0.5 µg mercury in 100 mL 1% nitric acid. Adjust the spectrophotometer so that it will give a 75% to full-scale deflection of the recorder.
15. Vent the mercury vapor from the system.
16. Analyze standards, samples and blanks (including media blanks).
 - a. Remove the bubbler from the BOD bottle.
 - b. Rinse the bubbler with deionized water.
 - c. Allow the recorder tracing to establish a stable baseline.
 - d. Remove the stopper from the BOD bottle containing the next sample to be analyzed. Gently swirl the BOD bottle.
 - e. Quickly add 5 mL 10% stannous chloride solution.
 - f. Quickly place the bubbler into the BOD bottle.
 - g. Allow the spectrophotometer to attain maximum absorbance.
 - h. Vent the mercury vapor from the system.
 - i. Place the bubbler into an empty BOD bottle. Continue venting the mercury until a stable baseline is obtained.
 - j. Close the mercury vent.

CALCULATIONS:

17. Calculate the amount of mercury in the sample aliquot (W, µg) from the calibration graph.
18. Calculate the concentration C (mg/m³), of mercury in the air volume sampled, V (L):

$$C = \frac{W \cdot \frac{V_s}{V_a} - B}{V}$$

Where: V_s = original sample volume (step 8; normally 50 mL)

V_a = aliquot volume (step 9; normally 20 mL)

B = average amount of mercury present in the media blanks

EVALUATION OF METHOD:

Rathje and Marcero originally used Hopcalite (MSA, Inc.) as the sorbent material [7]. Later, Hopcalite was shown superior to other methods for the determination of mercury vapor [8]. Atmospheres of mercury vapor for the study were dynamically generated in the range 0.05 to 0.2 mg/m³ and an adsorbent tube loading of 1 to 7 µg was used. The Hydrar material sometimes used is similar to Hopcalite. No significant difference in the laboratory analysis of mercury collected on the two sorbent materials was observed [9]. OSHA also validated a method for mercury using Hydrar [2]. An average 99% recovery, with $\bar{S}_r = 0.042$, was seen for 18 samples with known amounts (0.9 to 3 µg) of mercury added (as Hg(NO₃)₂) [10]. No change in recovery was seen for samples stored up to 3 weeks at room temperature or up to 3 months at -15 °C; longer storage times were not investigated [10].

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- [4] NIOSH Manual of Analytical Methods, 3rd. ed., Method 6000. (1984).
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- [9] Internal Methods Development Research, DataChem Laboratories, Inc., Salt Lake City, UT (1982).
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METHOD WRITTEN BY:

Keith R. Nicholson and Michael R. Steele, DataChem Laboratories, Inc., Salt Lake City, Utah, under NIOSH contract No. 200-87-2533.

APPENDIX: COLD VAPOR MERCURY ANALYSIS SYSTEM

1. The valve should direct the vented vapors to a hood or to a mercury scrubber system.
2. When the valve is opened to "Vent" the peristaltic pump should draw room air. Place a Hopcalite tube in the air intake to eliminate any mercury that may be present.
3. Adjust the peristaltic pump to a flow that will create a steady stream of bubbles in the BOD bottle, but not so great that solution droplets enter the tubing to the quartz cell.
4. If water vapor condenses in the quartz cell, heat the cell slightly above room temperature by wrapping it with a heating coil and attaching a variable transformer.
5. The bubbler consists of a glass tube with a bulb at the bottom, slightly above the bottom of the BOD bottle. The bulb contains several perforations to allow air to escape into the solution (in a stream of small bubbles). A second tube is provided to allow the exit of the vapor. The open end of the second tube is well above the surface of the liquid in the bottle. The two tubes are fixed into a stoppering device (preferably ground glass) which fits into the top of the bottle. A coarse glass frit can be used in place of the bulb on the first tube. However, it is more difficult to prevent contamination when a frit is used.
6. Replace the flexible tubing (Tygon or equivalent) used to connect the bubbler, cell, and pump periodically to prevent contamination from adsorbed mercury.

ATTACHMENT 5

DEMOLITION CONTRACTOR POINTS OF CONTACT

Air Monitoring Program - Encycle Project Contacts

Company	Contact	Title	Phone	Mobile	Fax	Email	Address	Service
SIS	Ed Ramirez	Operations Mgr	562-921-9974	562-254-0647	562-381-913	Ed@ecologysis.com	Specializes Industrial Services LLC 14150 Vine Place Cerritos Ca 90703	
SIS	Craig Illausky	Project Mgr	562-921-9974	562-244-4785	562-381-913	Craig@ecologysis.com	Specializes Industrial Services LLC 14150 Vine Place Cerritos Ca 90703	
ERP	Robert Resuriz	Project Manager		713-562-6912	512-314-8699	rresuriz@aol.com or rresuriz@energyrenewalpartners.com	Energy Renewal Partners, LLC 2705 Bee Caves Road, Ste 340., Austin, TX 78746	
ERP	Mike Lindstrom	Regulatory/Waste Manager		512-633-6143	512-314-8699	mlindstrom@energyrenewalpartners.com	Energy Renewal Partners, LLC 2705 Bee Caves Road, Ste 340., Austin, TX 78746	
ERP	Brady Armes	QA/QC Officer		512-913-8524	512-314-8699	barnes@energyrenewalpartners.com	Energy Renewal Partners, LLC 2705 Bee Caves Road, Ste 340., Austin, TX 78746	
ERP	Carl Jones	Project Technician		361-813-7472			Energy Renewal Partners, LLC 2705 Bee Caves Road, Ste 340., Austin, TX 78746	