Coal Power Plant; Process Assessment & Evaluation, Clear Air Force Station, Alaska

8-12 March 2004

Consultative Letter # AFIOH-DO-BR-CL-2004-0011

Prepared by:

Detachment 3, AFIOH/CD
Kadena AB, Okinawa Japan

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DEPARTMENT OF THE AIR FORCE
DETACHMENT 3, AIR FORCE INSTITUTE FOR OPERATIONAL HEALTH
(AFIOH) (AFMC)
APO AP 96368-5213

11 June 2004

MEMORANDUM FOR 354 MDOS/SGOAB
Attention: Maj Mader

FROM: Detachment 3, AFIOH/CD
Unit 5213
APO AP 96368-5213

SUBJECT: Consultative Letter, AFIOH-DO-BR-CL-2004-0011, Coal Power Plant; Process Assessment & Evaluation, Clear Air Force Station, Alaska

1. Scope: At the request of your office, Detachment 3, of the Air Force Institute for Operational Health (Det 3, AFIOH) performed workplace process evaluations for the hazardous tasks at the Clear AFS Coal Power Plant. Air, swipe and bulk samples were collected during a variety of operations and information gathered from this effort was utilized to create process evaluation sheets.

2. Background: The primary mission of Clear AFS is to provide Early Warning of Intercontinental Ballistic Missiles and Sea-Launched Ballistic Missiles to the Missile Warning Center at North American Aerospace Defense Command. The squadron is also responsible for a portion of the Air Force Space Command Space Surveillance Program and assists in tracking more than 9,500 space objects currently in Earth's orbit. Prime power at Clear Air Force Station is obtained from the station's coal-fired power plant, which is capable of producing 22.5 megawatts of power. The power plant operates seven days per week, 24 hours a day with coal supplied by the Usibelli Coal Mine in Healy, Alaska via the Alaska Railroad. Over the years, the Alaska State Occupational Safety and Health Department has routinely inspected coal plants throughout the state. These visits, primarily concentrated on air emissions from the plant stacks and silica exposures from the coal and ash, have resulted in a variety of violations. Over the past five years, the Clear AFS power plant has implemented several corrective measures to minimize the health impacts of the plant. However, a comprehensive survey is necessary to document the results of these improvements.

3. Personnel Contacted:
Maj Michael Mader, Chief, Bioenvironmental Engineering, Eielson AFB
TSgt Christina Donahue, Bioenvironmental Engineering Craftsman, Eielson AFB
Ronald Herren, Clear AFS Power Plant Supervisor
Mark Templeton, Clear AFS Power Plant Maintenance Supervisor

4. Process Description: Three weeks prior to Detachment 3 arrival in Alaska, a summary of previous surveillance at the Clear AFS Power Plant was provided by the Eielson AFB Bioenvironmental Engineering office. From this summary, an initial sampling and analysis plan was developed. Appropriate media was ordered and shipped to the staging area at Eielson AFB. Sampling pumps, calibrators and all related equipment was packed and shipped as well. Additionally, a meeting was scheduled with the power plant management team for the morning of the first day of the survey.

A team of Detachment 3 personnel arrived at Clear AFS on the evening of March 8th. The following morning, the team met with the plant manager, the maintenance supervisor, and a union representative at the plant. Over the next three days, twenty hazardous tasks performed by the maintenance, operations, and coal crews were evaluated. Information was collected using employee interviews, visual evaluations, and occupational air sampling. From this, process assessment sheets were created for all of the hazardous tasks conducted by government employees.

5. Primary Hazard: Although there were several potential hazards evaluated during this survey, the primary concern is the coal dust and ash containing silica. A summary of pertinent health information about this chemical is provided below.

Silica (Coal Dust and Ash):

Regulatory Source: Generally regulated by the Occupational Safety and Health Administration (OSHA) under 29CFR1910.1001 and by Air Force Occupational Safety & Health (AFOSH) Standard 48-8.

Health Effects: In general, short term exposures to high concentrations of silica-containing dust or ash can cause coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure. The early symptoms of silicosis (cough, mucous production and shortness of breath upon exertion) are nonspecific, so the development of silicosis may not be detected until advanced stages of the disease.

The International Agency for Research on Cancer (IARC) has concluded that crystalline silica in the form of quartz should be classified as carcinogenic to humans (Group 1) due to an increased risk of developing lung cancer. Inhalation of quartz has also been associated with a number of other, less well characterized, harmful effects including effects on the kidney, the liver, the spleen and immune system disorders.

In addition to silica, coal contains a variety of other components. There are some additional health effects from coal dust exposure that differ from silica exposure. All are associated with lung damage and they include pneumoconiosis, bronchitis and emphysema. Coal dust with a silica percentage less than 5% is not considered to be a carcinogen.

6. Field Survey:

March 9th: After a morning planning meeting with plant management, the Detachment 3 team toured the entire facility with Mr. Templeton. During the tour, notes were compiled on the nineteen processes conducted by government employees. Based upon information gathered during the tour, air sampling was scheduled in the afternoon during ash hauling activities. While one of the team members oversaw the air sampling process, the other team member accumulated information on all of the coal crew tasks identified for review. These included work in the thaw shed (Process ID# 901C-001), work with the coal tripper (Process ID# 901C-002), locomotive maintenance (Process ID# 901C-003), conveyor line washing (Process ID# 901C-004), ash hauling (Process ID# 901C-005), and rail maintenance. The rail maintenance task was not assigned a process code since it is actually accomplished by contract employees and not by power plant personnel. All of the process sheets are located in attachment 1.

March 10th: Four workers were chosen for air monitoring, encompassing tasks including ash hauling, conveyor line washing, ash system maintenance, thaw shed work, coal tripper work, and vacuuming/clean-up. Samples were collected for the entire work shift, but were segregated by task in order to evaluate specific jobs. In addition to sampling, a variety of interviews were conducted to evaluate tasks performed by the maintenance crew. These included asbestos operations (Process ID# 901B-001), welding (Process ID#901B-002), turbine overhaul (Process ID# 901B-003), stoker overhaul (Process ID# 901B-004), solvent tank operations (Process ID# 901B-005), refractory repairs (Process ID# 901B-006), bag house maintenance (Process ID# 901B-007), cabinet blasting (Process ID# 901B-008), vacuuming/clean-up (Process ID# 901B-009), battery shop work (Process ID# 901B-010), and boiler maintenance (Process ID# 901B-011). All of the process sheets are located in attachment 1.

March 11th: Four more workers were chosen for air monitoring, encompassing tasks including ash hauling, thaw shed work, coal tripper work, general housekeeping, ash raking, and boiler maintenance. Additional information was collected in the form of bulk and swipe samples of the ash and coal. Members of the operations crew were interviewed and three processes were evaluated. These included ash raking (Process ID# 901A-001), laboratory work (Process ID# 901A-002), and water treatment activities (Process ID# 901A-003). All of the process sheets are located in attachment 1.

7. Findings & Observations:

The process sheets developed during field survey operations combined with the sampling results from the three days of monitoring provided valuable insight into potential exposures for workers at the Clear AFS Power Plant. Several tables have been developed to properly analyze and summarize the information gathered during sampling efforts. The first table presents a summary of metals analysis for bulk and swipe samples. These samples were collected on March 11th, 2004 and include a bulk coal sample, a bulk ash sample, a swipe of coal dust taken from the tripper machine; a swipe of coal dust taken from the thaw shed cable control, and a swipe of ash taken from the ash silo control booth. The swipes were taken from areas frequented by employees with the intent being to demonstrate latent exposure from working in the areas versus direct exposure from the process.

Table 1: Metals Analysis (Bulk & Swipe)

Sample #	GM040080	GD040082	WW040076	WW040077	WW040078
Matrix	Coal	Ash	Coal Dust	Coal Dust	Ash
Type	Bulk	Bulk	Swipe - Tripper	Swipe - Thaw Shed	Swipe - Booth
Units	(ppm)	(ppm)	(µg)	(µg)	(µg)
Aluminum	1900	51000	< 250	< 250	2540
Beryllium	< 10	< 10	< 5	< 5	< 5
Cadmium	< 10	< 10	< 5	< 5	< 5
Chromium	< 10	48	< 5	34	< 5
Copper	< 10	97	< 250	< 250	< 250
Iron	5400	46000	359	< 250	< 2500
Lead	< 10	< 10	44	< 5	6.2
Manganese	84	540	< 5	< 5	34.9
Nickel	< 10	51	< 5	< 5	< 5
Silver	< 10	< 10	< 5	< 5	< 5
Strontium	< 200	1600	5.5	< 5	66.5
Zinc	< 10	18	< 250	< 250	< 250

The bulk samples indicate that the coal actually has a relatively low metal content with respect to some of the more hazardous metals including chromium, cadmium, and lead. However, with the burning process, some of these metals are concentrated. For example, chromium is concentrated almost 500% and copper is concentrated almost 1000%. Based upon this, it would seem prudent to sample for metal exposures when workers conduct processes involving ash (901B-007, 901B-009, and 901C-005). It is probably not necessary to sample for metals during coal processes.

The swipe samples for coal dust mirror the bulk coal results closely. The primary exceptions to this are the lead found on the tripper and the chromium in the thaw shed. Rather than the coal being the source, it seems more likely that some paint was captured during the swipes. Lead and chromium are common components of industrial machinery and both areas swiped were painted surfaces. The swipe sample for ash shows elevated levels of lead, manganese, and strontium. This lends itself to the conclusion reached above; samples taken during ash operations should include metals analysis.

The second table provides a summary of mineral content in the coal and ash. For the most part, these samples are used as reference values for the air samples. However, they can provide some information in their own right so they are presented below. These bulk samples were collected on March 11th, 2004.

Table 2: Coal & Ash Mineral Content

Sample Number	Sample Type	Cristobalite Silica Weight %	Quartz Silica Weight %	Tridymite Silica Weight %
GM040079	Bulk Coal	< 2.00	< 1.00	< 1.00
GD040081	Bulk Ash	< 2.00	6	< 1.00

Although most of the results in the chart are below the detection level for the respective analytes, the table does indicate that there is enough quartz silica in the coal to concentrate at a significant

percentage in the ash. The table also indicates that the coal being utilized at the plant has very little, if any, cristobalite or tridymite. Cristobalite and tridymite are common polymorphs of quartz, meaning that they have the same chemical formula but a different structure. Both of these minerals are commonly found in volcanic rock.

The bulk sampling information is important because it provides an indication of the expected air sample results. Based upon the bulk samples, air samples are not expected to indicate exposures to tridymite or cristobalite. Additionally, high exposures to quartz silica are more likely during ash operations versus during coal operations. Both of these suppositions seem to be born out by the raw sampling data as shown in Table 3 below. Since there were no detectable levels of cristobalite or tridymite in the bulk or air samples, further analysis or comparison to exposure standards is unnecessary.

Table 3: Raw Sampling Data -- Coal & Ash Processes[1]

Sample #	Worker	Task	Process ID	RPNOC[2] (μg)	Cristobalite (μg)	Quartz (μg)	Tridymite (μg)
SZ040057	Maddox	Ash Hauling	901C-005	**80**	< 20	< 10	< 10
FZ040058	Graham	Bag House	901B-007	< 50	< 20	< 10	< 10
FZ040059	Graham	Bag House	901B-007	< 50	< 20	< 10	< 10
FZ040060	Geagan	Thaw Shed	901C-001	< 50	< 20	< 10	< 10
FZ040061	Geagan	Ash Hauling	901C-005	**160**	< 20	< 10	< 10
FZ040062	Verwoest	Tripper	901C-002	**170**	< 20	< 10	< 10
FZ040063	Verwoest	Vacuuming	901B-009	**470**	< 20	**48**	< 10
FZ040064	Maddox	Thaw Shed	901C-001	< 50	< 20	< 10	< 10
FZ040065	Maddox	Line Wash	901C-004	**220**	< 20	< 10	< 10
FZ040068	Dickey	Boiler	901B-011	< 50	< 20	< 10	< 10
FZ040069	Dickey	Boiler	901B-011	< 50	< 20	< 10	< 10
FZ040070	Geagan	Thaw Shed	901C-001	< 50	< 20	< 10	< 10
FZ040071	Geagan	Thaw Shed	901C-001	< 50	< 20	< 10	< 10
FZ040072	Verwoest	Thaw Shed	901C-001	**210**	< 20	< 10	< 10
FZ040073	Verwoest	Clean-Up	901B-009	< 50	< 20	< 10	< 10
FZ040074	Acker	Tripper	901C-002	**140**	< 20	< 10	< 10
FZ040075	Acker	Ash Raking	901A-001	< 50	< 20	< 10	< 10

1 All results are for the respirable fraction. Air sample blanks were all below detection levels. Results presented in the table are not blank corrected. A less than sign indicates that the result was below the laboratory detection limit.
2 RPNOC = Respirable Particulates Not Otherwise Classified

The respirable particulates values give an indication of the dustiness of a given process. As far as coal processes, it is clear that tripper operations and conveyor line washing consistently create airborne particulate. Additionally, one of the five samples taken in the thaw shed was above detection limits for airborne particulate. However, none of these samples translated into any appreciable level of mineral dust. For the ash processes, ash hauling and vacuuming showed elevated levels of airborne particulate with the vacuuming process being the only sample positive for mineral content. This is a testament to the control measures instituted in the plant to minimize exposures to hazardous materials.

Although the raw data is important, the measure of compliance is a comparison between time-weighted airborne concentrations and applicable exposure limits. Appropriate application of exposure limits is outlined in AFOSH Standard 48-8, "Controlling Exposures to Hazardous Materials", paragraph 4.2, where it states that Bioenvironmental Engineers will compare time-weighted airborne concentrations to the most stringent exposure limit from the following three references: OSHA Permissive Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), and other AFOSH Standards. Therefore, an examination of the ways that coal dust and ash is regulated by these organizations is in order.

Up front, it is important to note that coal dust and ash exposures are not specifically regulated in any Air Force standard. They are generally regulated under AFOSH Standard 48-8, but there are no substance-specific requirements for monitoring, exposure, or controls. Therefore, the appropriate exposure limits will be the more stringent between the ACGIH and OSHA.

The ACGIH has a silica standard that applies to both coal dust and coal ash. In addition, it has a separate standard for respirable coal dust that is based upon coal type. To understand coal type, a short discussion of coal formation is appropriate. Coal is a natural solid formed from fossilized plants. It consists of amorphous carbon with various organic and some inorganic compounds. Coal is created in nature where these deposits are impacted by heat and pressure. The initial form of coal is termed lignite and is regarded as "soft" coal. With more heat and pressure, coal hardness increases, moving up the coal spectrum to subituminous, bituminous, and finally to anthracite (hard). In the 2004 ACGIH TLV booklet, exposure limits are provided for two types of coal dust; bituminous (0.9 mg/m^3) and anthracite (0.4 mg/m^3). The coal used at the Clear plant is classified as subituminous, so the bituminous limit will be used. From bulk samples, it is clear that the main silica form found in coal utilized by the Clear plant is quartz. In the 2004 TLV booklet, the quartz silica exposure limit is 0.05 mg/m^3 with a notice of intended change to lower this value to 0.025 mg/m^3.

In contrast to the ACGIH, OSHA regulates coal dust exposure based strictly upon the amount of silica in the coal. This is typically found by dividing the total of the respirable silica samples by the RPNOC sample result and multiplying by one hundred (using values presented in Table 3). Unfortunately, this calculation does not work when the values are below laboratory detection limits. A second method of finding the silica percentage is to use the bulk sample results. In this case, the total silica for coal is a sum of the three silica polymorphs, or <2% + <1% + <1% = <4%. According to OSHA standard 29 CFR 1910.1000 Table Z-3, when the silica percentage is below 5%, the exposure limit for coal dust is 2.4 mg/m^3. The same exposure limit can be applied to quartz silica for the coal samples.

For the ash processes, one of the samples in Table 3 has a detectable result. During the vacuuming process on 10 Mar 04, the quartz silica percentage is calculated as 10.2% {(48/470)*100}. When the silica percentage is greater than 5%, the PEL for silica quartz is calculated using the following formula:

$$\text{Respirable Quartz PEL } (mg/m^3) = \frac{10\ mg/m^3}{\text{Quartz \% + 2}} = 0.82\ mg/m^3$$

The OSHA PEL and the ACGIH TLV are eight hour time-weighted averages. At the power plant, many workers are on ten hour shifts. Currently, OSHA does not require adjustment of the exposure limit for this extended shift period. Instead, compliance officers are to sample the worst eight hour period in the shift and use those results to determine legal standing. The AF addresses extended work shifts in AFOSH STD 48-8, paragraph 2.7, where it states that the Aeromedical Council will decide appropriate adjustment of the time weighted exposure limit based upon the recommendation of the Bioenvironmental Engineer. There are some models that can be used to take into account the effect of extended work hours. One of the most popular is the Brief & Scala model as discussed in the ACGIH 2004 TLV booklet. Using this model, the exposure limit would be reduced by 30%. Table 4 summarizes all of the exposure limit information with the adjusted values utilizing the noted model.

Table 4: Coal & Ash Exposure Limits

Mineral	OSHA PEL (mg/m^3)	Adjusted OSHA PEL (mg/m^3)	ACGIH TLV (mg/m^3)	Adjusted ACGIH TLV (mg/m^3)
Quart Silica (coal & ash)	n/a	n/a	0.05	0.035
Bituminous Coal Dust	n/a	n/a	0.9	0.63
Coal Dust (<5% Silica)	2.4	1.7	n/a	n/a
Quartz Silica (coal) (<5% Silica)	2.4	1.7	n/a	n/a
Quartz Silica (ash) (>5% Silica)	0.82	0.57	n/a	n/a

In order to determine compliance with these values, an eight hour time weighted average was computed for each work shift. The results of these calculations are shown in Table 5.

Table 5: Coal & Ash Exposure Time-Weighted Averages (8-hour)

Date	Worker	Tasks	Exposure	Coal Dust[2] (mg/m^3)	Quartz Silica (mg/m^3)
9 Mar 04	Maddox[1]	Ash Hauling	Ash only	n/a	< 0.01
10 Mar 04	Graham	Maintenance on Ash Exhauster	Ash only	n/a	< 0.02
10 Mar 04	Geagan	Thaw Shed & Ash Hauling	Coal & Ash	< 0.06	< 0.02
10 Mar 04	Verwoest	Tripper & Ash Vacuuming	Coal & Ash	0.21	0.07
10 Mar 04	Maddox	Thaw Shed & Line Wash	Coal Only	0.33	< 0.02
11 Mar 04	Dickey	Boiler Maintenance	Coal Only	< 0.12	< 0.02
11 Mar 04	Geagan	Thaw Shed & Rail Yard Work	Coal Only	< 0.12	< 0.02
11 Mar 04	Verwoest	Thaw Shed & Clean-Up	Coal Only	0.32	< 0.02
11 Mar 04	Acker	Tripper & Ash Raking	Coal & Ash	0.17	< 0.02

1 A sample was only taken in the afternoon on this day. The remainder of the day was assumed at zero exposure, although the worker did work in thaw shed in the morning.
2 The coal dust standard is specific to coal exposures only. Therefore, on days where workers had exposures to both coal and ash, the portion of the day where ash processes were performed is assumed to be zero coal dust exposure.

It is clear from the calculated exposures that coal dust and quartz silica levels in the plant for all coal operations are relatively low. This is especially true when comparing the values against the OSHA exposure limits, even when the limit has been adjusted for a longer work schedule. The

same can be said for all of the ash processes except for the vacuuming operation performed on 10 Mar 04. Although the exposure was still well below the OSHA limit, it is above the ACGIH TLV and for this reason, appropriate controls are necessary during this process.

8. Conclusions:

The information provided herein qualifies as comprehensive assessments of the processes represented. It is hoped that the evaluation procedures outlined provide a roadmap for future efforts to further characterize exposures in the plant. To ensure that workers continue to receive adequate health protection, the following actions are recommended:

- Provide employee notification of all sampling results contained in this report.

- In general, exposures to coal dust, quartz silica in coal, and quartz silica in ash are controlled in the plant through good engineering and diligent management. However, due to high exposures during ash vacuuming, an air purifying respirator with P-100 cartridges should be required during this operation. For all other operations sampled during this evaluation, respirator usage is not warranted.

- Due to the variability of some operations in the plant, some operations could not be air sampled. These include:

    - Media Blasting: two media-blasting processes are accomplished at the plant: enclosed cabinet and full-scale outdoors. In both cases, three types of media (aluminum oxide, steel shot, and glass bead) can be utilized. Many of the materials being blasted contain heavy metals that could become airborne and create an exposure hazard. Therefore, air sampling should include a metal screen analysis by NIOSH 7300. Metals of concern include chromium, cadmium, beryllium, and lead. Blasting inside the cabinet is accomplished every 30-45 days, but the more hazardous outdoor blasting only occurs every two years during turbine overhauls. Sampling in both cases is necessary to verify that current protective equipment is adequate.

    - Bag House Maintenance: occasionally, workers must enter the confined space of the ash silo bag house to perform maintenance or change out bags. Sampling for respirable silica is necessary to verify that current protective equipment is adequate.

- A new system to prepare plant water (Process ID# 901A-003) is necessary. By obtaining reverse osmosis units, the need for sulfuric acid and sodium hydroxide could be eliminated. In fact, all of the chemical tanks, as well as the cation and anion cells, would be removed in order to install the new system. Funding for this project should be pursued at all levels. Elimination of the chemical process will significantly reduce employee health risk, the potential for accidental release, and

environmental discharge of sulfuric acid, sodium hydroxide, and salt (used as a softener).

9. If you have any questions concerning this survey, please contact me at DSN 634-2638 or e-mail me at gregory.frick@kadena.af.mil. I appreciate the opportunity to provide assistance on this project and would like to extend my gratitude to all of the professionals in your shop for their cooperation and support.

GREGORY A. FRICK, Maj, USAF, BSC, CIH
Chief, Occupational Health Division

Cc: 13 SWS/MAU

2 Attachments:
1. Process Sheets
2. Figures

1 Appendix
Sample Request Forms & Laboratory Results

Clear AFS Power Plant -- Operations Crew
PROCESS ID #901A-001
Bottom Ash Raking/Pulling

Process Description: For the most part, operations crew workers have limited exposure to silica from coal dust and ash. They spend the majority of their time inside the plant and away from the primary exposure areas for these compounds. The exception to this is the ash raking operation. Every day, each of the running boilers must be emptied of ash (typically at 0800, 1300, and 1800). To do this, the vacuum system at the bottom of the first boiler is turned on, gauges are checked to ensure the system is working properly, and then the internal ash door at the bottom of the boiler is partially opened to start the flow of ash from the boiler into the vacuum. All of the appropriate gauges are checked again and then the internal ash door is opened completely. To assist this process, operators open two access doors at the bottom of each boiler and use a rake to move the ash into the vacuum. Each operating boiler is emptied in the same manner. Minimal dust is generated during the process since the ash is under vacuum.

METHOD: A vacuum system is used to empty the boilers of ash. Employees assist the ash into the vacuum by raking/pulling it from the back of the boiler into the vacuum chute at the front.

MACHINE/EQUIPMENT: Employees used standard rakes, picks, and shovels to move the ash. During the process, employees wear leather gloves and safety glasses or face shields.

MATERIAL: Ash is generated by boilers burning coal.

Potential Hazards:

PHYSICAL: There is a potential for cuts/abrasions from the use of hand tools. There is a potential for eye contact from the ash flying out of the boiler. Noise from boilers is loud and could exceed exposure limits.

CHEMICAL: Ash contains quartz silica. Personnel can be exposed via inhalation. In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Air sampling of this operation was conducted during a six hour period in February 2002. This sample captured two of the three daily ash raking events and the results were well below applicable exposure limits. Employees wore leather gloves and safety glasses during the

process. A second sampling event was accomplished in March 2004. Over an eight hour period, one worker was evaluated while he performed two out of the three daily ash raking events. The results were again well below OSHA exposure limits and verify that workers do not need respiratory protection during this process. From a noise perspective, the entire plant is a hazardous noise areas, so workers are required to wear hearing protection while inside.

Controls: Exposures are adequately controlled with leather gloves and eye protection. Noise exposures are controlled through the usage of hearing protection (a requirement throughout the plant).

Clear AFS Power Plant -- Operations Crew

PROCESS ID #901A-002

Laboratory Work

Process Description: The laboratory is used by the operations crew to conduct necessary testing on a variety of plant systems to ensure they are running properly. The laboratory on the second floor is the primary testing location, but there is also a hardness testing unit next to the reverse osmosis unit on the first floor and a silica tester next to the water conditioning units on the second floor. Numerous Hach reagent pillows and colorimetric charts are used during the water testing. Required lab tests are outlined on the water treatment log, but for most samples, water is collected from the boilers, the turbines, or the cooling lines and taken to the lab. Reagent pillows are added to the water and a color chart is used to determine the concentration of the analyte of interest. Exposure to personnel is very limited due to the infrequency of the task, small amounts used, and the containment of the chemicals afforded by the pillows.

METHOD: Water samples are collected from different processes around the plant and taken to the laboratory for analysis. Samples are analyzed using Hach reagents and colorimetric charts.

MACHINE/EQUIPMENT: Sample vials are used for water collection. Colorimetric charts are used for sample analysis. Workers wear eye protection and rubber gloves or rubber finger protectors when performing laboratory work.

MATERIAL: Water from a variety of plant sources and small quantities of a large number of reagent grade chemicals.

Potential Hazards:

PHYSICAL: None.

CHEMICAL: A large variety of reagent grade chemicals are used to perform the necessary laboratory tests. All of the chemicals are in very limited quantities, typically < 100g, and are present in powder form. They are significantly diluted when mixed with the plant water being analyzed. For this reason, inhalation exposure is expected to be minimal. However, there is a potential for splashing of chemicals out of the vials during laboratory work. Some of the chemicals can cause eye and skin irritation.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Laboratory tests typically take around twenty minutes. Workers wear eye and hand protection to prevent splash and spill of chemicals onto skin. Due to method utilized, inhalation exposures are not expected.

Controls: Rubber gloves or finger protectors and safety glasses.

Clear AFS Power Plant -- Operations Crew
PROCESS ID #901A-003
Water Treatment Activities

Process Description: Operators regulate and add a variety of chemicals into the plant water. Some chemicals are added directly to the water as a form of treatment whereas other chemicals are utilized to prepare the water prior to use. The following table summarizes the different types of treatment chemicals and where they are used:

Chemical	Usage
Molybdate	Located between boiler 1 & 2; used for treatment of the bearing cooling water, keeps the pipes clean and inhibits corrosion.
Amekor	Located on the first floor by the caustic soda and sulfuric acid tanks; added to the deaerator tanks as an oxygen inhibitor.
Mekor	Located on the first floor by the caustic soda and sulfuric acid tanks; added to the boilers to complex and remove copper. Started in 2001 due to elevated levels of copper in the boilers, probably due to slow leaching/breakdown of copper pipes. Most of the copper has now been removed, so the plant is planning on using up the mekor until it is gone and then not ordering any more.
Drewphos	Located on the first floor by the caustic soda and sulfuric acid tanks; added to the boiler water as a polymer to control phosphate in the boilers.
Monosodium Phosphate	Along with disodium phosphate and trisodium phosphate added to boilers to control pH. They are only used rarely since the small reverse osmosis unit is being used as pretreatment for the plant water and that helps to control pH.
Sodium Chloride	Added twice a day for water softening. Between 50-400 pounds is used each time, completely dependent on the hardness readings of the water.

Contact with treatment chemicals is very rare since most of the process is enclosed. However, when chemicals need to be added to the feed hoppers, personnel can potentially come into contact with the liquid forms of these materials or can inhale the dusts from the dry forms.

The two primary water preparation chemicals are sulfuric acid and sodium hydroxide. These chemicals are used in a deionization cell process to deionize the plant water. The deionization process is located on the first and second floors of the main building, with the chemical tanks and chemical storage on the lower floor and the anion/cation cells on the upper floor. There are two main anion cells, but in most cases only one is operating at a time. Sodium hydroxide is used to charge these cells. This chemical comes in pellet form to limit dust and is added to a feed tank on the first floor about once every month. There are two cation cells as well, but both of these cells are always on. Sulfuric acid is used to recharge these cells. The acid comes in 55 gallon drums of liquid and is pumped into a feed tank on the first floor once every 6-8 weeks. Plant Standard Operating Procedure (SOP) 91-47 governs both of these chemical processes. Protective equipment required when adding these chemicals includes face shields, nitrile gloves, chemical suits (bibs & coat), and rubber boots. Respirator usage is not required during sulfuric

acid filling, but a half-face respirator with acid gas cartridges and P-100 pre-filters is required for sodium hydroxide filling. Some workers also wear a respirator during sulfuric acid work.

METHOD: A variety of treatment and water preparation chemicals are added to feed tanks by hand. Chemicals are either poured directly from buckets or bags, or pumped from drums.

MACHINE/EQUIPMENT: Electric pumps and tubing are used to transfer chemicals from drums into the tanks. Drums and bags of chemicals are moved around the plant utilizing forklifts. Face shields, nitrile gloves, chemical suits, rubber boots and respirators are used as PPE.

MATERIAL: Treatment chemicals.

Potential Hazards:

PHYSICAL: Improper lifting of the chemical containers can cause back injury. Hazardous noise is present throughout the plant and exposures could be above AF exposure limits.

CHEMICAL: Sodium hydroxide can cause severe burns to the eyes, skin, and mucous membranes. Eye contact can result in permanent damage. Inhalation of dust, mist, or spray can cause severe lung damage. Additionally, it can react violently with water. Sulfuric acid is a strong mineral acid, an oxidizing agent and a dehydrating agent that is rapidly damaging to all human tissue on contact. Ingestion may cause severe injury or death. Eye contact produces severe or permanent injury. Inhalation of mists can damage both upper respiratory tract and lungs. The other treatment chemicals are mild irritants with limited inhalation effects.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: A variety of refilling operations were evaluated and the following observations were noted:

- The use of sodium hydroxide pellets has significantly reduced the potential exposures associated with this operation. Inhalation of sodium hydroxide dust is further minimized by the use of respirators.
- The sulfuric acid process is mostly enclosed, so the potential for exposure is minimal. Respirator usage is not necessary based upon this process.
- The plant is in the process of trying to fund a new system for deionization that would completely replace the sulfuric acid and sodium hydroxide process. All of the chemical tanks would be removed for this system. This is the best solution for potential exposures in this area.

Controls: Chemical exposures are controlled with respirators, protective clothing, gloves, and face shields. Administrative controls include the training provided to workers in this area as well as SOP 91-47 on filling of sulfuric acid and sodium hydroxide storage tanks.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-001
Asbestos Operations

Process Description: All in-house asbestos work is performed by the welder and/or the boilermaker. The plant policy is not to accomplish any asbestos work unless absolutely required. Large projects are contracted out, but repair operations and Class III asbestos removals using glove bags are accomplished, normally by one worker with the other worker standing by as an attendant.

- Removals are infrequent (usually no more than one a month), but can vary based upon maintenance requirements and contract work (if a contractor is coming to the plant to accomplish some work, asbestos may need to be removed so they can access their work areas). Materials removed are limited to thermal system insulation and gaskets. Standard glove bag procedures are used per EPA training.
- Repairs occur on an average of once every three weeks, but this is completely driven by circumstances that create damage. An example was given of an earthquake that damaged several asbestos areas and the workers performed multiple repair operations over a period of a couple of weeks. If the tear is small, it is normally locked down with Fiberset PM or pasted over with lagging adhesive. For larger tears, they occasionally use cheesecloth or canvas tarp to wrap the area prior to applying the adhesive.

METHOD: Glove bag for removal operations and lockdown/lagging for repairs.

MACHINE/EQUIPMENT: NILFISK HEPA vacuum, airless manual-pump aerosol sprayer, carpet knife, pliers, 3M pads, saw, duct tape, staple gun, cheesecloth, canvas tarp, coveralls, ½ face respirators w/ HEPA cartridges.

MATERIAL: Asbestos, amended water, Fiberset PM, lagging adhesive, fiberglass, and cal-temp.

Potential Hazards:

PHYSICAL: Workers can potentially be burned when working around hot water and steam lines. In most cases, all machinery in the area of asbestos work is shut down prior to initiation of activities. However, in some instances this is not possible and asbestos work must be accomplished around pipes and fittings that hot water/steam is flowing through. Due to the use of knives and saws, there is a potential for cutting injuries.

CHEMICAL: Asbestos is a recognized lung hazard and exposures by inhalation should be kept to a minimum. To be a significant health concern, asbestos fibers must be inhaled at high concentrations over an extended period of time. Asbestos fibers then accumulate in the lungs. As exposure increases, the risk of disease also increases. As asbestos fibers accumulate in the lungs, several types of diseases may occur. **Asbestosis** is a scarring of the lung tissue. It is a slowly progressive disease with a latency period of 15 to 30 years. The next type of disease attributed to asbestos exposure is **Mesothelioma**. It is a cancer of the pleural lining. Similar to other asbestos

related diseases, mesothelioma has a longer latency period of 30 to 40 years. **Lung Cancer** is a malignant tumor of the bronchi covering. The time between exposure to asbestos and the occurrence of lung cancer is 20 to 30 years. It should be noted that there is a synergistic effect between smoking and asbestos exposure, which creates an extreme susceptibility to lung cancer.

Other chemicals used during asbestos work are of low hazard.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Of the two tasks, glove bag operations are considered to produce the greatest potential exposures. However, by enclosing the operation in a bag and utilizing amended water to minimize dust generation, exposures are controlled. Air sampling on glove bag operations throughout the AF has been well below asbestos exposure limits. For these reasons, the control measures in place are considered adequate.

Controls: Both employees have attended the forty hour asbestos training course and receive 8-hour annual refresher courses. The rest of the plant workers get two hour awareness training since there is a large amount of equipment in the plant still covered with asbestos insulation. There is an accumulation point inside the old paint booth on site for asbestos -- all asbestos materials are double-bagged and then labeled for shipping. Workers wear coveralls and ½ face respirators w/ HEPA filters to prevent exposure.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-002
Welding

Process Description: Maintenance personnel perform stick, tungsten inert gas (TIG), and metal inert gas (MIG) arc-welding. Personnel use the following welding rods during stick-arc welding operations: Jupiter, Electra, Brutus, Tartan, Polaris, McKay and Shield Bright. Personnel use a hammer to chip and remove slag from the weld site after welding. Workers use 1100 Aluminum and Stainless Steel electrode welding rods during TIG arc-welding. Welders use Dual Shield, Blue Max, Wire Alloys AWS, and Corex Supdat welding wire during MIG arc-welding operations. Argon and argon/carbon dioxide (75/25) shield gases are also used during TIG and MIG arc-welding operations. Stick arc-welding and MIG arc-welding operations are performed inside the plant a couple of times per week, lasting 2-6 hours. Stick arc-welding is more commonly performed throughout the plant at job sites, but MIG and TIG welding are typically accomplished in the machine shop area. TIG welding is very infrequent -- 2-3 times per year. Non-reflective, noncombustible welding screens with attached warning signs are used at the worker's discretion when welding in the shop or throughout the plant. A fume eliminator portable ventilation system is available to provide ventilation during operations in the machine shop.

METHOD: TIG, MIG, and stick arc-welding.

MACHINE/EQUIPMENT: Welding machines, welding rods, welding screens, welding helmets, fire-resistant welding leathers, and welder's leather glove

MATERIAL: Welding rods contain iron, aluminum, manganese, zinc. Argon gas.

Potential Hazards:

PHYSICAL: Occasionally, workers must enter confined spaces during welding operations. Confined areas present many hazards, including the potential for slips, trips, and falls. In addition, welding in these areas can contribute to oxygen deficiency.

CHEMICAL: A large variety of metal fumes with the most common including iron, aluminum, manganese, and zinc. An inert carrier gas is also used – typically argon.

BIOLOGICAL: None

RADIOLOGICAL: Workers are potentially exposed to UV/IR radiation from the flash and heat generated during the welding process.

Evaluation: Air sampling of similar operations has shown exposures below current regulatory limits. However, additional sampling is necessary to more thoroughly document welding exposures. The welding helmets and screens help to prevent UV/IR exposures.

Controls: Welding helmet, welding leathers, leather gloves, welding screens, and fume eliminator portable ventilation system.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-003
Turbine Overhaul

Process Description: The turbine overhaul process involves complete teardown and refurbishment of one of the plant's turbines. Each turbine is worked on in this manner once every two years. In order to perform the refurbishment, the turbine must be completely disassembled and all of the blades must be inspected. Additionally, the main drive is removed and sandblasted. Although the disassembly and reassembly process is quite involved and some greases and lubricants are utilized, the primary hazard from this operation is during the sandblasting. In order to sandblast the drive gear, it must be suspended from the ceiling of the first floor of the ash silo. The ash silo is utilized since it has two large bay doors that can be opened at either end. This creates a large amount of natural dilution ventilation. Then, a worker suited in full body protection with a supplied air hood sandblasts the drive. Due to the large number of blades that must be blasted, this process can take two workers (trading off) 5-7 days. The media used can be either sand or glass.

METHOD: Open sandblasting of turbine drive.

MACHINE/EQUIPMENT: Air-powered blasting equipment, tyvek suit, and 3M supplied air blasting hood.

MATERIAL: Silica from the sandblasting media and heavy metals (lead, cadmium, chromium) from the turbine drive.

Potential Hazards:

PHYSICAL: Heat stress is a concern due to the long time periods inside protective equipment necessary to perform this operation. Sandblasting is a dangerous task that has several safety concerns including the potential for falls, cuts, and bruising.

CHEMICAL: In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

Inhalation of heavy metal dust created during the blasting of metal parts can cause a variety of health effects. Long-term exposure to cadmium in air leads to a buildup of cadmium in the kidneys and possible kidney disease. Other long-term effects include lung damage and bone fragility. Breathing high levels of chromium (VI) can cause severe irritation of the nose, resulting in ulcers and holes in the nasal septum. Lead can affect almost every organ and system in the body. The most sensitive is the central nervous system, although it also damages kidneys and the reproductive system.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Due to the infrequency of the operation, air sampling has never been accomplished to determine if current protective measures are adequate. Air sampling should be accomplished both for silica and a suite of heavy metals to ensure that PPE is protecting workers. During the air sampling event, waste collection and disposal should be addressed as well. This is a concern from both an environmental and a continued exposure standpoint. If large amounts of silica and heavy metals are left behind after the blasting process, workers in the ash silo may continue to be exposed for several more weeks.

Controls: Natural ventilation, tyvek suits, supplied air blasting hoods, and worker rotation.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-004
Stoker Overhaul

Process Description: Stokers are removed for maintenance about once per year. To allow plant operations to continue as normal, a previously overhauled stoker is rotated in as a replacement. The stoker that has been rotated out is disassembled and some of the parts are cleaned using the solvent tank (see Process #901B-005). Other parts are blasted in the enclosed cabinet (see Process #901B-008). Besides these two hazard sources, the stokers are covered in grease impregnated with coal dust. When working with the stokers, personnel come into contact with this grease.

METHOD: Overhaul stokers using solvents, cabinet blasting, and lubricants.

MACHINE/EQUIPMENT: Blasting cabinet, solvent tank, hand tools, and nitrile gloves.

MATERIAL: The blasting cabinet uses glass or steel media. The solvent tank uses FB45 Breakthrough. Greases include SRI Grease, Dielectric compound, GE greases, and Marfax multi-purpose grease. Lubricants include Aerokril, penetrating fluid, super lube, dry film lubricant, and WD-40. Oils include instrument oil, marvel mystery oil, cutting fluid, rapid tap, hydraulic fluid, machine oil, and gear oil. Coal dust is present in the grease as a result of normal operations.

Potential Hazards:

PHYSICAL: Some of the stoker parts can be very heavy. Improper lifting can lead to muscle strains and serious back injuries.

CHEMICAL: Blasting and solvent usage are addressed in other process sheets. Greases, lubricants, and oils contain petroleum hydrocarbons and these can be skin defatting agents. Repeated exposure can lead to dry, cracked skin, eventually resulting in dermatitis. The coal dust contains silica. Skin contact with silica has not been linked with adverse health outcomes. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. Silicosis usually develops gradually over 20 years or more of exposure.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: All plant workers have completed training on proper lifting and a variety of lifting aids are available to prevent muscular strain. Workers have adequate protective equipment to prevent excessive exposure to oils, greases, and lubricants. The concern with coal dust is unfounded since there are no operations conducted during the stoker overhaul that could result in coal dust being released from the grease matrix.

Controls: Nitrile gloves during work with oils, greases, and lubricants.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-005
Solvent Tank Operations

Process Description: There are two solvent tanks located on the first floor of the main plant. Both tanks contain FB45 Breakthrough manufactured by Inland Technology. The solvent tank is used to clean a multitude of mechanical parts being repaired or refurbished by the maintenance crew. The parts cleaners are stationary devices with a large reservoir opening and a cleaning spray brush. Parts are placed into the reservoir where they can be washed by hand, set to soak, or sprayed with a stream of cleaner while brushing. Maintenance personnel use the parts washers 3-5 days per week, usually 10-30 minutes each time. The used solvent is changed out of the tank every 3-6 months, depending on amount of usage.

METHOD: Parts washing tank with spray brush is used to clean a variety of maintenance parts.

MACHINE/EQUIPMENT: Parts washing tank, faceshields, goggles, aprons, and gloves.

MATERIAL: FB45 Breakthrough.

Potential Hazards:

PHYSICAL: None.

CHEMICAL: According to the Material Safety Data Sheet, the primary component of the solvent is paraffinic hydrocarbons. It also states that there are no regulated chemicals in the product and that no exposure limits apply. As with all hydrocarbon based products, however, there is a concern with skin defatting and the potential development of dermatitis. Also, due to the nature of the operation, it would be simple for solvent to splash out and get in the eyes. As a minimum, the product is an eye irritant.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation conducted in March 2004. Due to the low hazard potential associated with this chemical, there is no inhalation hazard. The PPE currently in use is adequate to protect against skin and eye contact.

Controls: Face shields, goggles, aprons, and nitrile gloves.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-006
Refractory Repairs

Process Description: Maintenance personnel use Sairset, High Temp Refractory, adhesives, and other powdered insulating materials to make refractory repairs inside of the boilers. This type of work is a non-routine task that is only accomplished when there is damage to the fire bricks inside of the boilers. Typically, when the boilers are taken off line each year, there is minimal damage to the bricks through normal wear and tear. Small amounts of damage are filled in with powdered insulation mixed with water and then the area is covered with Sairset bonding mortar (acts like a glazing when the boiler is fired up). When there is significant damage to the bricks and they have to be replaced, full size bricks are purchased and cut to size using a wet cutter. All of these products are typically applied with a hand trowel.

METHOD: Hand trowel application of refractory repair compounds inside boilers.

MACHINE/EQUIPMENT: Hand trowel, safety glasses, confined space monitor and hearing protection.

MATERIAL: Powdered insulating materials, adhesives, bonding mortar, and water.

Potential Hazards:

PHYSICAL: Noise from boilers is loud and could exceed exposure limits. The inside of the boilers is considered a confined space. Confined areas present many hazards, including the potential for safety concerns and the possibility of an oxygen deficient atmosphere.

CHEMICAL: The refractory materials contain silica. In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation conducted in March 2004. Due to the high level of plant noise, hearing protection must be worn during all work inside the plant. Based upon the use of wet methods and manual application techniques while repairing refractory materials, exposures to silica will be well below regulatory limits. Eye protection should be worn as a general practice.

Controls: Hearing protection and safety glasses.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-007
Bag House Maintenance

Process Description: Maintenance personnel change the bags in the ash house silo when they get holes in them. On average, this occurs about once every three years. To accomplish the task, workers enter the confined space of the bag house, remove the damaged bags, and replace them with new ones. Standard confined space entry procedures are utilized during this task, including an exhaust fan, a confined space monitor, and an attendant. Protective equipment includes a ½ face respirator with P-100 cartridges, tyvek disposable coveralls, and leather gloves.

METHOD: Manual change-out of ash silo bags.

MACHINE/EQUIPMENT: Leather gloves, tyvek suits, and ½ face respirators w/ P-100 filters.

MATERIAL: No chemicals are used during the process, but personnel can be exposed to the fly ash (containing silica) while working in the bag house.

Potential Hazards:

PHYSICAL: The ash silo is a confined space that is awkward to navigate and can present several safety hazards.

CHEMICAL: The ash contains silica. In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation of this task was accomplished in March 2004. Due to the infrequency of the task, air sampling has not been accomplished during an operation. Current controls seem adequate based upon similar exposures in other parts of the plant.

Controls: Confined Space entry procedures. Leather gloves, tyvek suits, and ½ face respirators w/ P-100 filters.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-008
Cabinet Blasting

Process Description: An enclosed cabinet blasting system is used to remove rust and scaling from metallic parts. Items are loaded into the blasting cabinet via a side door and then sealed inside. The operator then places their hands in the gloves in the front of the cabinet and utilizes an 85 psi blasting gun to clean the parts. A variety of media can be used depending on the items being cleaned. The most commonly used types include sand, glass, and stainless steel. No protective equipment is necessary during the process since it is entirely contained in the cabinet.

METHOD: Cabinet blasting of metal parts.

MACHINE/EQUIPMENT: Blasting cabinet.

MATERIAL: Blasting media includes sand, glass, and stainless steel. When the parts are being blasted, a variety of heavy metals (cadmium, lead, chromium) can be removed both from the paint covering the item and from the structural material of the item itself.

Potential Hazards:

PHYSICAL: Occasionally, the gloves in the cabinet can get holes in them and this can lead to skin abrasions if they are not promptly repaired. Based upon the physical makeup of the operator, the position assumed during blasting can contribute to low back pain and general muscle fatigue. The system can not be easily adjusted for tall individuals and this can result in awkward positions for extended periods of time during usage.

CHEMICAL: As mentioned above, a variety of chemicals are involved in the blasting process including heavy metals and silica. In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

Inhalation of heavy metal dust created during the blasting of metal parts can cause a variety of health effects. Long-term exposure to cadmium in air leads to a buildup of cadmium in the kidneys and possible kidney disease. Other long-term effects include lung damage and bone fragility. Breathing high levels of chromium (VI) can cause severe irritation of the nose, resulting in ulcers and holes in the nasal septum. Lead can affect almost every organ and system in the body. The most sensitive is the central nervous system, although it also damages kidneys and the reproductive system.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation was conducted in February 2002. Air sampling was performed during a two hour blasting operation involving several metallic parts. One half of the items were loaded into the cabinet and then individually blasted with the gun. Some of these parts were coated with suspect lead-based paint. About half way through the process, the first set of parts was removed from the machine and a second set was loaded. Again, each part was individually blasted. During the entire process, there was no observable dust outside of the machine. The worker took frequent breaks to minimize problems with muscle strain from standing in one position for extended periods of time. Samples were analyzed for heavy metals and silica. All samples were below detection limits for these chemicals. This is consistent with observations during the process and indicates that the enclosed cabinet is functioning properly.

Controls: The enclosed cabinet adequately protects workers during this process.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-009
Vacuuming/Clean-Up

Process Description: As ash is transferred from the boilers to the ash house silo to the ash hauling trucks, small ash particles are released into the air and settle throughout the ash silo building and accompanying overpass. Maintenance workers vacuum these areas using a house vacuum system to prevent build up of ash in these areas. Typically, vacuuming starts on the fifth floor of the ash silo building and proceeds into the overpass tunnel and down through the rest of the floors in the silo building. The house vacuum system consists of a series of wall mounted fixtures that a wire wound hose and metal wand is attached to. Surfaces vacuumed include the silos, the silo support beams, the ash transfer piping, the water lines, the steam lines, the floors, and all other structural surfaces. The house vacuum system is set up to transfer all vacuumed items into the ash silo. Workers wear leather gloves when vacuuming as a general safety measure. Hearing protection is worn due to the general noise of the plant.

METHOD: House vacuum system is used to clean up ash and other debris throughout the plant.

MACHINE/EQUIPMENT: Wire wound hose and metal wand are attached to vacuum outlets located throughout the plant. Workers wear leather gloves and hearing protection.

MATERIAL: Ash dust contains silica.

Potential Hazards:

PHYSICAL: Vacuuming in some areas requires a degree of dexterity due to the large amount of equipment located throughout the plant. This can cause workers to be in awkward, and sometimes precarious, positions in order to reach some dirty areas. Noise levels in the plant are above acceptable levels, so any vacuuming done in the plant requires the use of hearing protection. The vacuum system does not contribute appreciably to the noise level.

CHEMICAL: The ash contains silica. In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation was conducted in March 2004. One worker was sampled during a four hour vacuuming operation. During this time, he vacuumed the fifth floor of the ash silo and the accompanying overpass. Sample results from this operation were below the OSHA

Occupational Exposure Limit, but were above the ACGIH TLV. This is most likely due to the high concentration of ash in this area coupled with the agitation provided by vacuuming. Workers performing this operation should wear a respirator.

Controls: Leather gloves as a general safety precaution and hearing protection due to the high levels of plant noise. Workers should be required to wear a air purifying respirator with P-100 cartridges.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-010
Battery Shop Work

Process Description: The plant has a battery room containing sixty wet cell lead-acid batteries (Hoppecke 6 GroE 150) used for back-up DC power in case of plant shutdown. These batteries can power the alarm system and some of the vital controls that will enable the plant to recover from a DC power loss. The cells are relatively maintenance free, but once a week one of the maintenance workers goes through the room and checks the cell temperatures, voltages, specific gravities, and fluid levels. There is no exposure during this process. Occasionally, water needs to be added to cells with a low fluid level. Since the cells have liquid sulfuric acid in them, adding water presents a potential exposure. Water is added by hand using a small funnel. Workers wear an apron, face shield, and neoprene gloves when adding water. There is an emergency eyewash in the room in case of exposure and baking soda is available to neutralize any spills. A vent system is also present to limit acid gas build up during charging.

METHOD: Visual checking of wet cell batteries and occasional water addition.

MACHINE/EQUIPMENT: Wet cell batteries, ventilation system, aprons, face shields, and neoprene gloves.

MATERIAL: The wet cell batteries have sulfuric acid inside of them.

Potential Hazards:

PHYSICAL: The battery system can produce a dangerous voltage level, so electric shock is a concern when working around or with the batteries. The batteries are also quite heavy, so proper lifting procedures must be followed when moving them.

CHEMICAL: Sulfuric acid is a strong mineral acid, an oxidizing agent and a dehydrating agent that is rapidly damaging to all human tissue on contact. Ingestion may cause severe injury or death. Eye contact produces severe or permanent injury. Inhalation of mists can damage both upper respiratory tract and lungs. The other treatment chemicals are mild irritants with limited inhalation effects.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: This process was initially evaluated in March 2004. The battery shop worker was observed during normal weekly check activities. All administrative procedures were correctly followed. Worker exposures and safety issues are minimal when proper procedures are observed. The vent system was not operating properly and needs to be evaluated.

Controls: Workers should wear aprons, face shields, and neoprene gloves when adding water to the cells. An emergency eyewash and sodium hydroxide are available in case of accident.

Clear AFS Power Plant -- Maintenance Crew
PROCESS ID #901B-011
Boiler Maintenance

Process Description: Maintenance workers enter the boilers to perform a variety of operations (refractory work, grinding, welding, torch-cutting, mechanical repairs, breaking up clinkers, etc.). These operations can be performed up to 2-3 times per month. The primary hazards of these tasks are identified under their specific process identification codes, but an additional hazard is added since the boilers are a confined space. In most cases, these areas are permit-required based upon the impact the different tasks have on the atmosphere. The shop uses a Master Entry Permit to handle all of these confined space entries. As part of that permit, they utilize an atmosphere monitoring device to evaluate oxygen, carbon dioxide, and carbon monoxide levels in the space. Additionally, an attendant is always present to watch the operations being accomplished.

METHOD: Large variety of maintenance tasks performed inside confined space of boiler.

MACHINE/EQUIPMENT: Welding equipment, torch equipment, jackhammer, confined space monitor, and associated protective equipment for the tasks.

MATERIAL: Welding fumes, oxygen deficiency, silicates in refractory materials, greases, oils, cleaners, and adhesives.

Potential Hazards:

PHYSICAL: The primary physical hazards inside the boiler involve the cramped area that workers must operate in and the potential for fire/burns during torch and welding operations. Due to the awkward positions that workers must utilize in order to maintain/repair the inside of the boiler, the potential for physical harm is greater. Noise inside the boilers is muffled compared to the rest of the plant, but hearing protection is still worn.

CHEMICAL: Although work inside the boilers does not expose workers to different chemicals than those already mentioned, the concentrations can be greater due to the confined area of the work.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation was conducted in March 2004. Workers entered the boiler to remove clinkers. These are coal ash conglomerates that must be broken so they can be removed through the ash doors. Workers can use sledgehammers and jack hammers to break up the clinkers. The process is performed 2-3 times per year and can last 3-6 hours. Sample results during the operation were below all detection levels and well below the OSHA exposure limit. Personnel wear leather gloves, tyvek coveralls, and ½ face respirators with P-100 cartridges when performing this task. Based upon the infrequency of the operation and the protective

equipment being used, personnel are adequately protected during this process. Additional tasks inside the boilers should be evaluated as they come up. It is expected that welding and torch-cutting exposures may be significant and air sampling is necessary.

Controls: Clinkers; leather gloves, tyvek coveralls, and ½ face respirators w/ P-100 cartridges. Welding; leather gloves, leather smock, welding screens, and welding helmets.

Clear AFS Power Plant -- Coal Crew
PROCESS ID #901C-001
Thaw Shed -- Coal Unloading

Process Description: Coal is delivered to the plant via the railroad utilizing standard coal cars. The cars are moved around the plant yard using a small locomotive and a series of pulleys. Prior to unloading the cars, they are moved into the thaw shed. This helps the frozen coal to warm up, making it easier to unload. Typically, two workers are involved in the coal unloading process. Depending on plant requirements (heavily dependent on temperature), 2-3 coal cars are unloaded every day. The front half of the rail car is positioned over the grizzly using cables and pulleys. A pick is used to open the doors in the bottom of the car and the coal is gravity fed through the floor into the waiting grizzly below. Occasionally, workers must use shovels, brooms, and picks to break up frozen blocks of coal. In most cases, workers leave the dumping area and wait in an adjacent office area while the coal is flowing. After most of the coal has emptied, workers return to the main shed area and lower a shaker over the top of the coal car. The shaker is activated for 30-40 seconds, during which time the remaining coal in the car is emptied into the grizzly. The car doors are then closed and the car is moved forward so that the back half of the car is positioned over the grizzly. The above process is repeated for this part of the car. After the car is completely empty, it is moved out of the area and another car is positioned over the grizzly.

METHOD: Manual unloading of coal cars into the power plant conveyor system.

MACHINE/EQUIPMENT: Coal cars, shaker, grizzly, brooms, picks, shovels, leather gloves, and hearing protection.

MATERIAL: Quartz silica from coal and coal dust.

Potential Hazards:

PHYSICAL: The thaw shed is not normally a hazardous noise area. However, during coal car unloading and especially during operation of the shaker, the noise level in the shed is very high and hearing protection is necessary. Moving the coal cars around the yard requires workers to be outside. This can expose them to extremely cold temperatures, resulting in significant cold stress. The thaw shed can also be a dangerous place to work from a safety standpoint. The cables running along the floor coupled with the floor grates present significant trip and fall hazards.

CHEMICAL: In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation was conducted in March 2000. Air sampling at the time was determined to be indecisive. No further samples of the process were accomplished until March 2004. At that time, four different workers were sampled over two days during the coal unloading process. The results decisively demonstrated that workers are not being exposed to hazardous levels of respirable silica in coal dust. All samples were below laboratory detection limits and well below OSHA exposure limits. In fact, four of the five samples were practically free of all types of respirable dust.

Controls: Workers wear leather gloves and hearing protection. There is a ventilation system positioned next to the cars as they sit on the grizzly grates.

Clear AFS Power Plant – Coal Crew
PROCESS ID #901C-002
Coal Tripper

Process Description: Coal crew personnel haul coal to the thaw shed via railcars. From there coal is emptied into the grizzlies. From the grizzlies, coal is transported via 3 belt lines to the tripper room where coal empties into one of three bunkers via a tripper. One person is assigned tripper duties and is responsible for moving the tripper from bunker to bunker as they fill. This person is responsible for visually checking the capacity of the bunker and moving the tripper. The tripper is moved back and forth along the rails from one bunker to another by pulling a lever located on the side of the tripper. In between moving the tripper and waiting for the bunker to fill, the worker stands to the side and visually checks bunker fill level every 10 to 15 minutes.

METHOD: Coal is moved from the thaw shed to the bunkers via belt lines and a tripper.

MACHINE/EQUIPMENT: Belt lines, tripper, leather gloves, and hearing protection.

MATERIAL: Quartz silica in coal dust generated from coal hauling.

Potential Hazards:

PHYSICAL: Noise levels in the plant are high and some workers must spend the entire day in the area. Long term exposure to high levels of noise can cause irreversible hearing loss.

CHEMICAL: In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation of this operations occurred in March 2004. Air sampling was accomplished on two different workers over two days. The results decisively demonstrated that workers are not being exposed to hazardous levels of respirable silica in coal dust. All samples were below laboratory detection limits and well below OSHA exposure limits.

Controls: A “mister” is used to wet coal prior to entering the tripper room. This system help reduce the amount of coal dust generated from coal hauling. Misters are also located on the ceiling of the tripper room to help reduce coal dust. There is a ventilation system in the bunkers to help reduce coal dust.

Clear AFS Power Plant -- Coal Crew
PROCESS ID #901C-003
Locomotive Maintenance

Process Description: The rail yard controlled by the coal plant is managed using two locomotives. In order to keep the locomotives running, one of the workers spends part of his time as a mechanic. In some instances, he is assisted by other members of the coal and maintenance crews. The work he performs is typically considered minor maintenance; major items are handled by a specialized Army unit located in Salt Lake City, Utah. Maintenance tasks include changing fan belts, changing air valves, changing oil, changing filters (coolant, fuel, oil, etc.), lubricating and greasing the chassis, cleaning the brushes, and changing the batteries. Chemicals utilized include oil, grease, spray paint, silicone, simple green solvent, general purpose cleaner and starting fluid. Chemicals are used in very small amounts and the only PPE normally worn is protective eyewear. Occasionally, the mechanic must start the engine up during maintenance and this creates diesel exhaust. However, the doors of the maintenance shed are always open when this occurs and there are exhaust vents in the ceiling that help remove the diesel from the building.

METHOD: General maintenance of locomotive engines.

MACHINE/EQUIPMENT: Hand tools, electric drill, protective eyewear.

MATERIAL: Oil, grease, spray paint, silicone, solvent, general purpose cleaner, and starting fluid.

Potential Hazards:

PHYSICAL: None.

CHEMICAL: The chemicals used during maintenance activities are minor skin irritants and defatting agents. The primary route of exposure is through contact.

BIOLOGICAL: None.

RADIOLOGICAL: None.

Evaluation: Initial evaluation was conducted in March 2004. Maintenance tasks are minor in nature, occupy minimal amounts of time, and present a very low hazard potential.

Controls: Protective eyewear.

Clear AFS Power Plant -- Coal Crew
PROCESS ID #901C-004
Conveyor Line Washing

Process Description: There are 3 beltlines at the Clear AFS Power Plant and each is washed on a monthly basis. Washing duties are rotated among Coal Crew members. Beltline washing begins at the top of the beltline. The walls, ceiling, floor, and beltline system are hosed down using pre-installed water hoses along the length of the line. The process is accomplished with the belt shutdown to minimize dust. Beltline washing typically lasts 1 to 2 hours depending on the amount of coal dust that has accumulated inside the beltline. Personnel assigned for this duty wear full-face air purifying respirators and coveralls during the entire process.

METHOD: Water hoses are used to wash the beltlines from top to bottom.

MACHINE/EQUIPMENT: Water hose, full face respirator, coveralls.

MATERIAL: Settled coal dust generated from coal hauling.

Potential Hazards:

PHYSICAL: None

CHEMICAL: Silica from coal dust. In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation was accomplished in March 2004. Washing of the longest beltline was sampled from start to finish, with the process lasting fifty minutes. The results decisively demonstrated that workers are not being exposed to hazardous levels of respirable silica in coal dust. The sample was below laboratory detection limits and well below OSHA exposure limits, although there was an appreciable level of respirable dust in the air. The low results can most likely be explained by the relatively low amount of silica in the coal as compared to the ash and the presence of large amounts of water.

Controls: Exposure during this process is adequately controlled with the use of water. A full-face air purifying respirator may be used to minimize dust inhalation since a paper mask would be destroyed by the large amount of water. Personnel shower immediately after completion of beltline washing.

Clear AFS Power Plant -- Coal Crew
PROCESS ID #901C-005
Ash Hauling

Process Description: Ash from the power plant is transported into the ash shed via a vacuum system. Ash is stored into 2 silos located at the top of the ash shed until they are emptied for disposal. The silos are emptied and mechanically loaded using an "ash unloader" into a dump truck. This process is accomplished 3 times per week using one of two "ash unloaders". The ash is then hauled to the ash dump where it is disposed of. This process involves one worker who activates the "ash unloader" located on the unloader floor. The worker then proceeds to the ground floor and monitors ash unloading from an enclosed booth. Depending on the amount of ash stored in the silo, it maybe necessary for the worker to stop the ash unloading and re-position the dump truck to avoid overloading. Once the silos are empty, the worker proceeds to the unloader floor to pressure wash the internal components of the "ash unloader". The mixture of ash and water resulting from pressure washing falls directly onto the dump truck. After washing the "ash unloaders", the dump truck is driven to a designated dump site where the ash is disposed off. Since the silos are allowed to completely be emptied, a clouding effect in the unloader floor and the ground floor occurs that is referred to as "ash fly". This material easily aerosolizes and does not mix well with water, resulting in the material settling all over the ash shed.

METHOD: Ash unloaders are used to empty the silos and a dump truck is used to haul the ash to the dump site.

MACHINE/EQUIPMENT: Ash unloader and dump truck.

MATERIAL: Ash generated from boilers burning coal.

Potential Hazards:

PHYSICAL: There is a potential for eye contact from the ash flying from the ash unloaders and from the ash fly.

CHEMICAL: There is a potential inhalation hazard from quartz silica contained in the ash. In general, short term exposures to high concentrations of silica-containing dust causes coughing and mild, temporary irritation. Although this can be uncomfortable, acute exposures are not the primary problem with silica. Prolonged or repeated exposure to fine airborne crystalline silica dust may cause severe scarring of the lungs, a disease called silicosis. The risk of developing and the severity of silicosis depends on the airborne concentration of respirable-size silica dust to which an employee is exposed and duration of exposure. Silicosis usually develops gradually over 20 years or more of exposure.

BIOLOGICAL: None

RADIOLOGICAL: None

Evaluation: Initial evaluation was completed in March 2004. Two workers were monitored on two separate days to determine potential exposures to respirable silica. The results decisively demonstrated that workers are not being exposed to hazardous levels of respirable silica in ash during the ash hauling task. Both samples were below laboratory detection limits and well below OSHA exposure limits, although there was some respirable dust in the air. Exposures are likely low due to employees spending most of their time in an enclosed booth during the loading of the dump truck. This is the portion of the task that generates the most dust.

Controls: Exposures are controlled by using an enclosed booth to monitor ash loading.

Figure 1: Laboratory Work -- Lab (901A-002)

Figure 2: Laboratory Work -- Plant (901A-002)

Figure 3: Water Treatment -- Feeder Tanks (901A-003)

Figure 4: Water Treatment -- Anion & Cation Tanks (901A-003)

Figure 5: Turbine Overhaul (901B-003)

Figure 6: Stoker Overhaul (901B-004)

Figure 7: Bag House Maintenance (901B-007)

Figure 8: Vacuuming (901B-009)

Figure 9: Battery Shop (901B-010)

Figure 10: Thaw Shed (901C-001)

Figure 11: Thaw Shed -- Vent (901C-001)

Figure 12: Thaw Shed -- Unloading (901C-001)

Figure 13: Tripper (901C-002)

Figure 14: Tripper -- Line Mister (901C-002)

Figure 15: Tripper -- Conveyor Mister (901C-002)

Figure 16: Conveyor Line Washing (901C-004)

Figure 17: Conveyor Line Washing (901C-004)

Figure 18: Ash Hauling -- Loading (901C-005)

Figure 19: Ash Hauling -- Washing (901C-005)

Figure 20: Ash Hauling -- Dumping (901C-005)

APPENDIX

SAMPLE PAPERWORK

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E R H 9 0 1 C

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant*

DATE COLLECTED *(YYMMDD)*: *040311*

BLDG NO / LOCATION: *111*

ROOM / AREA:

MAIL REPORTS TO (CIRCLE IF CHANGED)		
	ORIGINAL	*Gregory Frick, Det 3/AFIOH*
	COPY 1	
	COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*: *Florendo, E-5, 4B071*

SIGNATURE: *F. M. F*

AUTOVON: *634-2634*

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID:

SOURCE BEING SAMPLED: *Bulk Samples*

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*:

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		*Bulk Ash*	*Bulk Coal*	
OEHL SAMPLE NO.				
BASE SAMPLE NO.		*GD040081*	*GM040079*	
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	*Cristobalite*	*Cristobalite*	
	A CAS NO.			
	B NAME	*Quartz*	*Quartz*	
	B CAS NO.			
	C NAME	*Tridymite*	*Tridymite*	
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.				
COLLECTION TIME: OFF/ON				
TOTAL COLLECTION TIME				
FLOW RATE: OFF/ON				
VOLUME SAMPLED				
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.			
	NOMENCLATURE			

COMMENTS

Samples taken to support silica air samples at Clear Air Station Power Plant.

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E R H 9 0 1 C

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant*

DATE COLLECTED *(YYMMDD)*: *040311*

BLDG NO / LOCATION: *111*

ROOM / AREA:

MAIL REPORTS TO (CIRCLE IF CHANGED)		
	ORIGINAL	*Gregory Frick, Det 3/AFIOH*
	COPY 1	
	COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*: *Florendo, E-5, 4B071*

SIGNATURE: *F. M. F*

AUTOVON: *634-2634*

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED: *Bulk Samples*

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		*Bulk Ash*	*Bulk Coal*
OEHL SAMPLE NO.			
BASE SAMPLE NO.		*GD040082*	*GM040080*
COLLECTION MEDIA			
ANALYSES REQUESTED	A NAME	*Aluminium*	*Aluminium*
	A CAS NO.		
	B NAME	*Beryllium*	*Beryllium*
	B CAS NO.		
	C NAME	*Cadmium*	*Cadmium*
	C CAS NO.		
	D NAME	*Chromium*	*Chromium*
	D CAS NO.		
PUMP OR MONITOR NO.			
COLLECTION TIME: OFF/ON			
TOTAL COLLECTION TIME			
FLOW RATE: OFF/ON			
VOLUME SAMPLED			
TEMPERATURE/BAROMETER			
RELATIVE HUMIDITY/WIND			
SUPPORTING SAMPLES	OEHL SAMPLE NO.		
	BASE SAMPLE NO.		
	NOMENCLATURE		

COMMENTS

Also analyze for Copper, Iron, Lead, Nickel, Silver, Strontium, Zinc, and Manganese

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E R H 9 0 1 C

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant*

DATE COLLECTED *(YYMMDD)*: *040311*

BLDG NO / LOCATION: *111*

ROOM / AREA:

MAIL REPORTS TO (CIRCLE IF CHANGED)		
	ORIGINAL	*Gregory Frick, Det 3/AFIOH*
	COPY 1	
	COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*: *Florendo, E-5, 4B071*

SIGNATURE

AUTOVON: *634-2634*

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED: *Swipe Samples*

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		*Swipe Tripper Handle*	*Swipe, Thaw Shed Elec Control Panel*	*Swipe Ash Booth*
OEHL SAMPLE NO.				
BASE SAMPLE NO.		*WW040076*	*WW040077*	*WW040078*
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	*Aluminium*	*Aluminium*	*Aluminium*
	A CAS NO.			
	B NAME	*Beryllium*	*Beryllium*	*Beryllium*
	B CAS NO.			
	C NAME	*Cadmium*	*Cadmium*	*Cadmium*
	C CAS NO.			
	D NAME	*Chromium*	*Chromium*	*Chromium*
	D CAS NO.			
PUMP OR MONITOR NO.				
COLLECTION TIME: OFF/ON				
TOTAL COLLECTION TIME				
FLOW RATE: OFF/ON				
VOLUME SAMPLED				
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.			
	NOMENCLATURE			

COMMENTS

Also analyze for Copper, Iron, Lead, Nickel, Silver, Strontium, Zinc, and Manganese

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E R H 9 0 1 C

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant (Coal Crew)*

DATE COLLECTED *(YYMMDD)*	BLDG NO / LOCATION	ROOM / AREA
040309	111	

MAIL REPORTS TO (CIRCLE IF CHANGED)	
ORIGINAL	Gregory Frick, Det 3/AFIOH
COPY 1	
COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*	SIGNATURE	AUTOVON
Florendo, E-5, 4B071		634-2634

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED: Air Samples During Ash Hauling

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		Blank	Maddox, Albert 6244	
OEHL SAMPLE NO.				
BASE SAMPLE NO.		BK040056	SZ040057	
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	PNOR (NIOSH 600)	PNOR (NIOSH 600)	
	A CAS NO.			
	B NAME	Silica (NIOSH 7500)	Silica (NIOSH 7500)	
	B CAS NO.	14808-60-7	14808-60-7	
	C NAME			
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.			671220	
COLLECTION TIME: OFF/ON			1635/1303	
TOTAL COLLECTION TIME			212 minutes	
FLOW RATE: OFF/ON			1.7 lpm 1.7 lpm	
VOLUME SAMPLED			360 liters	
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.		GD040081	
	NOMENCLATURE		Bulk Ash	

COMMENTS

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

CALIBRATION RECORDS

PUMP	MANUFACTURER	SERIAL NUMBER
A	***SKC Airchek Sampler Model 224-PCXR8***	***671220***
B		
C		

		PRESURVEY	POSTSURVEY
DATE AND TIME		Y Y M M D D Hours ***040309 1250***	Y Y M M D D Hours ***040309 1644***
LOCATION/ TEMP & ALT		***At Power Plant***	***At Power Plant***
VOLTAGE CHECKED		***Ok***	***Ok***
CALIBRATION METHOD		***Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)***	***Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)***
FLOW RATE	PUMP A	***1.7 lpm***	***1.7 lpm***
	PUMP B		
	PUMP C		
CALIBRATOR'S NAME		***SSgt Florendo***	***SSgt Florendo***
CALIBRATOR'S AFSC		***4B071***	***4B071***

LOCAL GRAVIMETRIC DETERMINATIONS

BASE SAMPLE NO.					
FINAL WEIGHT					
INITIAL WEIGHT					
NET WEIGHT					

PERSONAL EXPOSURE DATA

CONTAMINANT	HOURS PER DAY	DAYS PER WEEK
A		
B		
C		
D		
E NONE		

CALCULATIONS ***(8 hr TWA, STEL, etc.)***

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E H R 9 0 1 B

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant (Maintenance)*

DATE COLLECTED *(YYMMDD)*	BLDG NO / LOCATION	ROOM / AREA
040310	111	

MAIL REPORTS TO (CIRCLE IF CHANGED)	
ORIGINAL	Gregory Frick, Det 3/AFIOH
COPY 1	
COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*	SIGNATURE	AUTOVON
Florendo, E-5, 4B071		634-2634

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED
Air Samples During Number 2 Ash Exhauster Maintenance (Oil Change)

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		Blank	Graham, Billy 1843	Graham, Billy 1843
OEHL SAMPLE NO.				
BASE SAMPLE NO.		BK040066	FZ040058	FZ040059
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	PNOR (NIOSH 600)	PNOR (NIOSH 600)	PNOR (NIOSH 600)
	A CAS NO.			
	B NAME	Silica (NIOSH 7500)	Silica (NIOSH 7500)	Silica (NIOSH 7500)
	B CAS NO.	14808-60-7	14808-60-7	14808-60-7
	C NAME			
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.			671211	671211
COLLECTION TIME: OFF/ON			1057 / 0726	1539 / 1136
TOTAL COLLECTION TIME			211 minutes	243 minutes
FLOW RATE: OFF/ON			1.7 / 1.7 lpm	1.7 / 1.7 lpm
VOLUME SAMPLED			359 liters	413 liters
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.		GD040081	GM040079
	NOMENCLATURE		Bulk Ash	Bulk Coal

COMMENTS

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

CALIBRATION RECORDS

PUMP	MANUFACTURER	SERIAL NUMBER
A	*SKC Airchek Sampler Model 224-PCXR8*	*671211*
B		
C		

		PRESURVEY	POSTSURVEY
DATE AND TIME		Y Y M M D D Hours *040310 0700*	Y Y M M D D Hours *040310 1647*
LOCATION/ TEMP & ALT		*At Power Plant*	*At Power Plant*
VOLTAGE CHECKED		*Ok*	*Ok*
CALIBRATION METHOD		*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*	*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*
FLOW RATE	PUMP A	*1.7 lpm*	*1.7 lpm*
	PUMP B		
	PUMP C		
CALIBRATOR'S NAME		*SSgt Florendo*	*SSgt Florendo*
CALIBRATOR'S AFSC		*4B071*	*4B071*

LOCAL GRAVIMETRIC DETERMINATIONS

BASE SAMPLE NO.					
FINAL WEIGHT					
INITIAL WEIGHT					
NET WEIGHT					

PERSONAL EXPOSURE DATA

CONTAMINANT	HOURS PER DAY	DAYS PER WEEK
A		
B		
C		
D		
E NONE		

CALCULATIONS ***(8 hr TWA, STEL, etc.)***

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E R H 9 0 1 C

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant (Coal Crew)*

DATE COLLECTED *(YYMMDD)*	BLDG NO / LOCATION	ROOM / AREA
040310	111	

MAIL REPORTS TO (CIRCLE IF CHANGED)	
ORIGINAL	Gregory Frick, Det 3/AFIOH
COPY 1	
COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*	SIGNATURE	AUTOVON
Florendo, E-5, 4B071		634-2634

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED
Air Samples During Coal Car Unloading In Thaw Shed And Ash Hauling (Afternoon)

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		Geagan, Pat 5000	Geagan, Pat 5000	
OEHL SAMPLE NO.				
BASE SAMPLE NO.		FZ040060	FZ040061	
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	PNOR (NIOSH 600)	PNOR (NIOSH 600)	
	A CAS NO.			
	B NAME	Silica (NIOSH 7500)	Silica (NIOSH 7500)	
	B CAS NO.	14808-60-7	14808-60-7	
	C NAME			
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.		671286	671286	
COLLECTION TIME: OFF/ON		1051 / 0730	1633 / 1131	
TOTAL COLLECTION TIME		201 minutes	302 minutes	
FLOW RATE: OFF/ON		1.7 / 1.7 lpm	1.7 / 1.7 lpm	
VOLUME SAMPLED		342 liters	513 liters	
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.	GM040079	GD040081	
	NOMENCLATURE	Bulk Coal	Bulk Ash	

COMMENTS

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

CALIBRATION RECORDS

PUMP	MANUFACTURER	SERIAL NUMBER
A	*SKC Airchek Sampler Model 224-PCXR8*	*671286*
B		
C		

		PRESURVEY	POSTSURVEY
DATE AND TIME		Y Y M M D D Hours *040310 0700*	Y Y M M D D Hours *040310 1644*
LOCATION/ TEMP & ALT		*At Power Plant*	*At Power Plant*
VOLTAGE CHECKED		*Ok*	*Ok*
CALIBRATION METHOD		*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*	*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*
FLOW RATE	PUMP A	*1.7 lpm*	*1.7 lpm*
	PUMP B		
	PUMP C		
CALIBRATOR'S NAME		*SSgt Florendo*	*SSgt Florendo*
CALIBRATOR'S AFSC		*4B071*	*4B071*

LOCAL GRAVIMETRIC DETERMINATIONS

BASE SAMPLE NO.					
FINAL WEIGHT					
INITIAL WEIGHT					
NET WEIGHT					

PERSONAL EXPOSURE DATA

CONTAMINANT	HOURS PER DAY	DAYS PER WEEK
A		
B		
C		
D		
E NONE		

CALCULATIONS ***(8 hr TWA, STEL, etc.)***

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E H R 9 0 1 B

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant (Maintenance)*

DATE COLLECTED *(YYMMDD)*	BLDG NO / LOCATION	ROOM / AREA
040310	111	

MAIL REPORTS TO (CIRCLE IF CHANGED)	
ORIGINAL	Gregory Frick, Det 3/AFIOH
COPY 1	
COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*	SIGNATURE	AUTOVON
Florendo, E-5, 4B071		634-2634

REASON FOR SUBMISSION: H R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED
Air Samples During Coal Loading In Bunkers Via Tripper And Ash Vacuuming (Afternoon)

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		Verwoest, Mark 7343	Verwoest, Mark 7343	
OEHL SAMPLE NO.				
BASE SAMPLE NO.		FZ040062	FZ040063	
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	PNOR (NIOSH 600)	PNOR (NIOSH 600)	
	A CAS NO.			
	B NAME	Silica (NIOSH 7500)	Silica (NIOSH 7500)	
	B CAS NO.	14808-60-7	14808-60-7	
	C NAME			
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.		671303	671303	
COLLECTION TIME: OFF/ON		1051 / 0734	1635 / 1134	
TOTAL COLLECTION TIME		197 minutes	301 minutes	
FLOW RATE: OFF/ON		1.7 / 1.7 lpm	1.7 / 1.7 lpm	
VOLUME SAMPLED		335 liters	512 liters	
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.	G M 0 4 0 0 7 9	G D 0 4 0 0 8 1	
	NOMENCLATURE	Bulk Coal	Bulk Ash	

COMMENTS

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

CALIBRATION RECORDS

PUMP	MANUFACTURER	SERIAL NUMBER
A	***SKC Airchek Sampler Model 224-PCXR8***	***671303***
B		
C		

		PRESURVEY	POSTSURVEY
DATE AND TIME		Y Y M M D D Hours ***040310 0700***	Y Y M M D D Hours ***040310 1642***
LOCATION/ TEMP & ALT		***At Power Plant***	***At Power Plant***
VOLTAGE CHECKED		***Ok***	***Ok***
CALIBRATION METHOD		***Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)***	***Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)***
FLOW RATE	PUMP A	***1.7 lpm***	***1.7 lpm***
	PUMP B		
	PUMP C		
CALIBRATOR'S NAME		***SSgt Florendo***	***SSgt Florendo***
CALIBRATOR'S AFSC		***4B071***	***4B071***

LOCAL GRAVIMETRIC DETERMINATIONS

BASE SAMPLE NO.					
FINAL WEIGHT					
INITIAL WEIGHT					
NET WEIGHT					

PERSONAL EXPOSURE DATA

CONTAMINANT	HOURS PER DAY	DAYS PER WEEK
A		
B		
C		
D		
E NONE		

CALCULATIONS ***(8 hr TWA, STEL, etc.)***

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E R H 9 0 1 C

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant (Coal Crew))*

DATE COLLECTED *(YYMMDD)*	BLDG NO / LOCATION	ROOM / AREA
040310	111	

MAIL REPORTS TO (CIRCLE IF CHANGED)	
ORIGINAL	Gregory Frick, Det 3/AFIOH
COPY 1	
COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*	SIGNATURE	AUTOVON
Florendo, E-5, 4B071		634-2634

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED
Air Samples During Coal Car Unloading In Thaw Shed And Wash Conveyor Line

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		Maddox, Albert 6244	Maddox, Albert 6244	
OEHL SAMPLE NO.				
BASE SAMPLE NO.		FZ040064	FZ040065	
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	PNOR (NIOSH 600)	PNOR (NIOSH 600)	
	A CAS NO.			
	B NAME	Silica (NIOSH 7500)	Silica (NIOSH 7500)	
	B CAS NO.	14808-60-7	14808-60-7	
	C NAME			
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.		671146	671146	
COLLECTION TIME: OFF/ON		1053 / 0737	1633 / 1133	
TOTAL COLLECTION TIME		196 minutes	300 minutes	
FLOW RATE: OFF/ON		1.7 / 1.7 lpm	1.7 / 1.7 lpm	
VOLUME SAMPLED		333 liters	510 liters	
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.	GM0400799	GM0400799	
	NOMENCLATURE	Bulk Coal	Bulk Coal	

COMMENTS

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

CALIBRATION RECORDS

PUMP	MANUFACTURER	SERIAL NUMBER
A	*SKC Airchek Sampler Model 224-PCXR8*	*671146*
B		
C		

		PRESURVEY	POSTSURVEY
DATE AND TIME		Y Y M M D D Hours *040310 0700*	Y Y M M D D Hours *040310 1645*
LOCATION/ TEMP & ALT		*At Power Plant*	*At Power Plant*
VOLTAGE CHECKED		*Ok*	*Ok*
CALIBRATION METHOD		*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*	*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*
FLOW RATE	PUMP A	*1.7 lpm*	*1.7 lpm*
	PUMP B		
	PUMP C		
CALIBRATOR'S NAME		*SSgt Florendo*	*SSgt Florendo*
CALIBRATOR'S AFSC		*4B071*	*4B071*

LOCAL GRAVIMETRIC DETERMINATIONS

BASE SAMPLE NO.					
FINAL WEIGHT					
INITIAL WEIGHT					
NET WEIGHT					

PERSONAL EXPOSURE DATA

CONTAMINANT	HOURS PER DAY	DAYS PER WEEK
A		
B		
C		
D		
E NONE		

CALCULATIONS ***(8 hr TWA, STEL, etc.)***

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E H R 9 0 1 B

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant (Maintenance)*

DATE COLLECTED *(YYMMDD)*	BLDG NO / LOCATION	ROOM / AREA
040311	111	

MAIL REPORTS TO (CIRCLE IF CHANGED)	
ORIGINAL	Gregory Frick, Det 3/AFIOH
COPY 1	
COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*	SIGNATURE	AUTOVON
Florendo, E-5, 4B071		634-2634

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED
Air Samples During General Maintenance Work

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		Blank	Dickey, David 7966	Dickey, David 7966
OEHL SAMPLE NO.				
BASE SAMPLE NO.		BK040067	FZ040068	FZ040069
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	PNOR (NIOSH 600)	PNOR (NIOSH 600)	PNOR (NIOSH 600)
	A CAS NO.			
	B NAME	Silica (NIOSH 7500)	Silica (NIOSH 7500)	Silica (NIOSH 7500)
	B CAS NO.	14808-60-7	14808-60-7	14808-60-7
	C NAME			
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.			671220	671220
COLLECTION TIME: OFF/ON			1107 / 0751	1636 / 1137
TOTAL COLLECTION TIME			196 minutes	299 minutes
FLOW RATE: OFF/ON			1.7 / 1.7 lpm	1.7 / 1.7 lpm
VOLUME SAMPLED			333 liters	508 liters
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.		GM040079	GM040079
	NOMENCLATURE		Bulk Coal	Bulk Coal

COMMENTS

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

CALIBRATION RECORDS

PUMP	MANUFACTURER	SERIAL NUMBER
A	***SKC Airchek Sampler Model 224-PCXR8***	***671220***
B		
C		

		PRESURVEY	POSTSURVEY
DATE AND TIME		Y Y M M D D Hours ***040311 0710***	Y Y M M D D Hours ***040311 1638***
LOCATION/ TEMP & ALT		***At Power Plant***	***At Power Plant***
VOLTAGE CHECKED		***Ok***	***Ok***
CALIBRATION METHOD		***Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)***	***Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)***
FLOW RATE	PUMP A	***1.7 lpm***	***1.7 lpm***
	PUMP B		
	PUMP C		
CALIBRATOR'S NAME		***SSgt Florendo***	***SSgt Florendo***
CALIBRATOR'S AFSC		***4B071***	***4B071***

LOCAL GRAVIMETRIC DETERMINATIONS

BASE SAMPLE NO.					
FINAL WEIGHT					
INITIAL WEIGHT					
NET WEIGHT					

PERSONAL EXPOSURE DATA

CONTAMINANT	HOURS PER DAY	DAYS PER WEEK
A		
B		
C		
D		
E NONE		

CALCULATIONS ***(8 hr TWA, STEL, etc.)***

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E R H 9 0 1 C

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant (Coal Crew)*

DATE COLLECTED *(YYMMDD)*	BLDG NO / LOCATION	ROOM / AREA
040311	111	

MAIL REPORTS TO (CIRCLE IF CHANGED)	
ORIGINAL	Gregory Frick, Det 3/AFIOH
COPY 1	
COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*	SIGNATURE	AUTOVON
Florendo, E-5, 4B071		634-2634

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED
Air Samples During Coal Car Unloading In Thaw Shed

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		Geagan, Pat 5000	Geagan, Pat 5000	
OEHL SAMPLE NO.				
BASE SAMPLE NO.		FZ040070	FZ040071	
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	PNOR (NIOSH 600)	PNOR (NIOSH 600)	
	A CAS NO.			
	B NAME	Silica (NIOSH 7500)	Silica (NIOSH 7500)	
	B CAS NO.	14808-60-7	14808-60-7	
	C NAME			
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.		671286	671286	
COLLECTION TIME: OFF/ON		1106 / 0754	1631 / 1138	
TOTAL COLLECTION TIME		192 minutes	293 minutes	
FLOW RATE: OFF/ON		1.7 / 1.7 lpm	1.7 / 1.7 lpm	
VOLUME SAMPLED		326 liters	498 liters	
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.	GM0400799	GM0400799	
	NOMENCLATURE	Bulk Coal	Bulk Coal	

COMMENTS

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

CALIBRATION RECORDS

PUMP	MANUFACTURER	SERIAL NUMBER
A	*SKC Airchek Sampler Model 224-PCXR8*	*671286*
B		
C		

		PRESURVEY	POSTSURVEY
DATE AND TIME		Y Y M M D D Hours *040311 0710*	Y Y M M D D Hours *040311 1634*
LOCATION/ TEMP & ALT		*At Power Plant*	*At Power Plant*
VOLTAGE CHECKED		*Ok*	*Ok*
CALIBRATION METHOD		*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*	*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*
FLOW RATE	PUMP A	*1.7 lpm*	*1.7 lpm*
	PUMP B		
	PUMP C		
CALIBRATOR'S NAME		*SSgt Florendo*	*SSgt Florendo*
CALIBRATOR'S AFSC		*4B071*	*4B071*

LOCAL GRAVIMETRIC DETERMINATIONS

BASE SAMPLE NO.					
FINAL WEIGHT					
INITIAL WEIGHT					
NET WEIGHT					

PERSONAL EXPOSURE DATA

CONTAMINANT	HOURS PER DAY	DAYS PER WEEK
A		
B		
C		
D		
E NONE		

CALCULATIONS ***(8 hr TWA, STEL, etc.)***

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E H R 9 0 1 B

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant (Maintenance)*

DATE COLLECTED *(YYMMDD)*	BLDG NO / LOCATION	ROOM / AREA
040311	111	

MAIL REPORTS TO (CIRCLE IF CHANGED)	
ORIGINAL	Gregory Frick, Det 3/AFIOH
COPY 1	
COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*	SIGNATURE	AUTOVON
Florendo, E-5, 4B071		634-2634

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID

SOURCE BEING SAMPLED
Air Samples During Coal Car Unloading & General Maintenance Duties (Mostly Housekeeping)

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		Verwoest, Mark 7343	Verwoest, Mark 7343	
OEHL SAMPLE NO.				
BASE SAMPLE NO.		FZ040072	FZ040073	
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	PNOR (NIOSH 600)	PNOR (NIOSH 600)	
	A CAS NO.			
	B NAME	Silica (NIOSH 7500)	Silica (NIOSH 7500)	
	B CAS NO.	14808-60-7	14808-60-7	
	C NAME			
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.		671303	671303	
COLLECTION TIME: OFF/ON		1108 / 0728	1624 / 1134	
TOTAL COLLECTION TIME		220 minutes	290 minutes	
FLOW RATE: OFF/ON		1.7 / 1.7 lpm	1.7 / 1.7 lpm	
VOLUME SAMPLED		374 liters	493 liters	
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.	GM0400799	GM0400799	
	NOMENCLATURE	Bulk Coal	Bulk Coal	

COMMENTS

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

CALIBRATION RECORDS

PUMP	MANUFACTURER	SERIAL NUMBER
A	*SKC Airchek Sampler Model 224-PCXR8*	*671303*
B		
C		

		PRESURVEY	POSTSURVEY
DATE AND TIME		Y Y M M D D Hours *040311 0710*	Y Y M M D D Hours *040311 1627*
LOCATION/ TEMP & ALT		*At Power Plant*	*At Power Plant*
VOLTAGE CHECKED		*Ok*	*Ok*
CALIBRATION METHOD		*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*	*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*
FLOW RATE	PUMP A	*1.7 lpm*	*1.7 lpm*
	PUMP B		
	PUMP C		
CALIBRATOR'S NAME		*SSgt Florendo*	*SSgt Florendo*
CALIBRATOR'S AFSC		*4B071*	*4B071*

LOCAL GRAVIMETRIC DETERMINATIONS

BASE SAMPLE NO.					
FINAL WEIGHT					
INITIAL WEIGHT					
NET WEIGHT					

PERSONAL EXPOSURE DATA

CONTAMINANT	HOURS PER DAY	DAYS PER WEEK
A		
B		
C		
D		
E NONE		

CALCULATIONS ***(8 hr TWA, STEL, etc.)***

INDUSTRIAL HYGIENE SAMPLING DATA

(Use this space for mechanical imprint)

OEHL USE ONLY
2750.DOC

WORKPLACE IDENTIFIER: 0 9 9 8 C E R H 9 0 1 A

BASE: *Clear Air Station*

ORGANIZATION: *13 SWS*

WORKPLACE: *Power Plant (Operations)*

DATE COLLECTED *(YYMMDD)*: *040311*

BLDG NO / LOCATION: *111*

ROOM / AREA:

MAIL REPORTS TO (CIRCLE IF CHANGED)		
	ORIGINAL	*Gregory Frick, Det 3/AFIOH*
	COPY 1	
	COPY 2	

SAMPLE COLLECTED BY *(Name, Grade, AFSC)*: *Florendo, E-5, 4B071*

SIGNATURE: *F. M. F*

AUTOVON: *634-2634*

REASON FOR SUBMISSION: H / R

A- ACCIDENT/INCIDENT C- COMPLAINT F- FOLLOWUP/CLEANUP
R- ROUTINE/PERIODIC SURVEY O- OTHER *(Specify)*

OEHL PID:

SOURCE BEING SAMPLED: *Air Samples During Tripper Duties, Ash Raking, And Gauge Checks*

EXISTING CONTROLS *(Personnel Protective Equipment, Engineering, Administrative)*:

SAMPLE COLLECTION DATA

EMPLOYEE NAME & SSAN OR SAMPLE LOCATION		*Acker, Gabe 2304*	*Acker, Gabe 2304*	
OEHL SAMPLE NO.				
BASE SAMPLE NO.		*FZ040074*	*FZ040075*	
COLLECTION MEDIA				
ANALYSES REQUESTED	A NAME	*PNOR (NIOSH 600)*	*PNOR (NIOSH 600)*	
	A CAS NO.			
	B NAME	*Silica (NIOSH 7500)*	*Silica (NIOSH 7500)*	
	B CAS NO.	*14808-60-7*	*14808-60-7*	
	C NAME			
	C CAS NO.			
	D NAME			
	D CAS NO.			
PUMP OR MONITOR NO.		*671146*	*671146*	
COLLECTION TIME: OFF/ON		*1107 / 0758*	*1612 / 1135*	
TOTAL COLLECTION TIME		*189 minutes*	*277 minutes*	
FLOW RATE: OFF/ON		*1.7 / 1.7 lpm*	*1.7 / 1.7 lpm*	
VOLUME SAMPLED		*321 liters*	*471 liters*	
TEMPERATURE/BAROMETER				
RELATIVE HUMIDITY/WIND				
SUPPORTING SAMPLES	OEHL SAMPLE NO.			
	BASE SAMPLE NO.	*G M 0 4 0 0 7 9*	*G D 0 4 0 0 8 1*	
	NOMENCLATURE	*Bulk Coal*	*Bulk Ash*	

COMMENTS

SUMMARY OF SURVEY RESULTS *(See reverse for calculations)*

CALCULATED EXPOSURE CONCENTRATIONS	STANDARDS

CALIBRATION RECORDS

PUMP	MANUFACTURER	SERIAL NUMBER
A	*SKC Airchek Sampler Model 224-PCXR8*	*671146*
B		
C		

		PRESURVEY	POSTSURVEY
DATE AND TIME		Y Y M M D D Hours *040311 0710*	Y Y M M D D Hours *040311 1620*
LOCATION/ TEMP & ALT		*At Power Plant*	*At Power Plant*
VOLTAGE CHECKED		*Ok*	*Ok*
CALIBRATION METHOD		*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*	*Bios DryCal DC-Lite, Model DCL-M # 101167 (Primary Standard)*
FLOW RATE	PUMP A	*1.7 lpm*	*1.7 lpm*
	PUMP B		
	PUMP C		
CALIBRATOR'S NAME		*SSgt Florendo*	*SSgt Florendo*
CALIBRATOR'S AFSC		*4B071*	*4B071*

LOCAL GRAVIMETRIC DETERMINATIONS

BASE SAMPLE NO.					
FINAL WEIGHT					
INITIAL WEIGHT					
NET WEIGHT					

PERSONAL EXPOSURE DATA

CONTAMINANT	HOURS PER DAY	DAYS PER WEEK
A		
B		
C		
D		
E NONE		

CALCULATIONS ***(8 hr TWA, STEL, etc.)***

Detachment 3, AFIOH (AFMC)
Analytical Division
Unit 5213
APO AP 96368-5213
DSN: 634-2265 FAX: 634-3016

Friday, April 30, 2004

Maj Gregory Frick
Det 3, AFIERA
Unit 5213
APO, AP 963685213

TEL: ( ) 634-2648
FAX ( ) 634-2611

RE: 00-Det 3-01

Order No.: 0403044

Dear Maj Gregory Frick:

Det 3, AFIOH received 3 sample(s) on 3/26/2004 for the analyses presented in the following report.

The information contained in this report relate only to the items submitted for analysis. Samples received in acceptable condition to perform requested testing unless otherwise noted in the Case Narrative. There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative. If you have any questions regarding these test results, please feel free to call or email at Det3.AFIOH@kadena.af .mil or DSN 634-1347.

Robert McLaughlin, Capt, USAF
Chief, Analytical Division

ATTENTION
The information contained in this report is solely intended for the recipient. If you have received this report in error, please contact Detachment 3 AFIOH at DSN 634-1347.

Det 3, AFIOH **Date:** *08-Jun-04*

CLIENT: Det 3, AFIERA
Project: 00-Det 3-01
Lab Order: 0403044

CASE NARRATIVE

Corrected Report: First report displayed duplicate analytes whose values were incorrect.

Detachment 3, AFIOH (AFMC)
Analytical Division
Unit 5213
APO AP 96368-5213
DSN: 634-2265 FAX: 634-3016

Det 3, AFIOH

Date: *08-Jun-04*

CLIENT:	Det 3, AFIERA	**Client Sample ID:**	WW040076
Lab Order:	0403044	**Tag Number:**	
Project:	00-Det 3-01	**Collection Date:**	3/11/2004
Lab ID:	0403044-001A	**Matrix:**	SWIPE

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SWIPE METALS			Analyst:			**Kikunaga**
Aluminum	< 250	250		µg, Total	1	4/19/2004
Beryllium	< 5.00	5.00		µg, Total	1	4/19/2004
Cadmium	< 5.00	5.00		µg, Total	1	4/19/2004
Chromium	< 5.00	5.00		µg, Total	1	4/19/2004
Copper	< 250	250		µg, Total	1	4/19/2004
Iron	359	250		µg, Total	1	4/19/2004
Lead	44.0	5.00		µg, Total	1	4/19/2004
Manganese	< 5.00	5.00		µg, Total	1	4/19/2004
Nickel	< 5.00	5.00		µg, Total	1	4/19/2004
Silver	< 5.00	5.00		µg, Total	1	4/19/2004
Strontium	5.48	5.00		µg, Total	1	4/19/2004
Zinc	< 250	250		µg, Total	1	4/19/2004

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Detachment 3, AFIOH (AFMC)
Analytical Division
Unit 5213
APO AP 96368-5213
DSN: 634-2265 FAX: 634-3016

Det 3, AFIOH

Date: *08-Jun-04*

CLIENT:	Det 3, AFIERA	**Client Sample ID:**	WW040077
Lab Order:	0403044	**Tag Number:**	
Project:	00-Det 3-01	**Collection Date:**	3/11/2004
Lab ID:	0403044-002A	**Matrix:**	SWIPE

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SWIPE METALS			Analyst:			**Kikunaga**
Aluminum	< 250	250		µg, Total	1	4/19/2004
Beryllium	< 5.00	5.00		µg, Total	1	4/19/2004
Cadmium	< 5.00	5.00		µg, Total	1	4/19/2004
Chromium	34.3	5.00		µg, Total	1	4/19/2004
Copper	< 250	250		µg, Total	1	4/19/2004
Iron	< 250	250		µg, Total	1	4/19/2004
Lead	< 5.00	5.00		µg, Total	1	4/19/2004
Manganese	< 5.00	5.00		µg, Total	1	4/19/2004
Nickel	< 5.00	5.00		µg, Total	1	4/19/2004
Silver	< 5.00	5.00		µg, Total	1	4/19/2004
Strontium	< 5.00	5.00		µg, Total	1	4/19/2004
Zinc	< 250	250		µg, Total	1	4/19/2004

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

Detachment 3, AFIOH (AFMC)
Analytical Division
Unit 5213
APO AP 96368-5213
DSN: 634-2265 FAX: 634-3016

Det 3, AFIOH

Date: *08-Jun-04*

CLIENT:	Det 3, AFIERA	**Client Sample ID:**	WW040078
Lab Order:	0403044	**Tag Number:**	
Project:	00-Det 3-01	**Collection Date:**	3/11/2004
Lab ID:	0403044-003A	**Matrix:**	SWIPE

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SWIPE METALS			Analyst:		**Kikunaga**	
Aluminum	2540	2500		µg, Total	10	4/19/2004
Beryllium	< 5.00	5.00		µg, Total	1	4/19/2004
Cadmium	< 5.00	5.00		µg, Total	1	4/19/2004
Chromium	< 5.00	5.00		µg, Total	1	4/19/2004
Copper	< 250	250		µg, Total	1	4/19/2004
Iron	< 2500	2500		µg, Total	10	4/19/2004
Lead	6.19	5.00		µg, Total	1	4/19/2004
Manganese	34.9	5.00		µg, Total	1	4/19/2004
Nickel	< 5.00	5.00		µg, Total	1	4/19/2004
Silver	< 5.00	5.00		µg, Total	1	4/19/2004
Strontium	66.5	50.0		µg, Total	10	4/19/2004
Zinc	< 250	250		µg, Total	1	4/19/2004

Qualifiers:

*	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside accepted recovery limits		

MEMORANDUM FOR: 27 May 2004

18 AMDS/SGPB
18 AMDS/SGPB
UNIT 5267
APO AP
KADENA AB, JPN 96368-5267

FROM: AFIOH/SDC
2350 Gillingham Drive
Brooks City-Base, TX 78235-5103

REF: Order No.: S0403300

Enclosed are the sample reports from 22 samples received on 3/30/2004.

Samples, not consumed in analysis, will be held according to the appropriate regulatory authority unless you specifically request otherwise. Should you choose to reproduce this report, we recommend you do so in its entirety so that the integrity of the data package is kept intact.

If you have questions, or if we may be of further assistance to you, please do not hesitate to contact us.

Sincerely,

LOURDES GALARZA
Chief, Program Management
Tel: (210) 536-6177 (DSN Prefix: 240)
Fax: (210) 536-4578 (DSN Prefix: 240)

Note: Sample analysis performed by: Clayton Environmental (MI)

AFIOH/SDC

CLIENT: 18 AMDS/SGPB
Project:
Lab Work Order: S0403300

CASE NARRATIVE

There were no problems associated with the samples or analysis except where noted below.

Sample Analytical Comments:

SampID	*TestCode*	*SampType*	*Comments*
S0403300-01A	N0600_AC	SAMP	Actual value of the particulate blank was - 20 ug. Results have not been blank corrected.
S0403300-03A	N0600_AC	SAMP	Actual value of the particulate blank was - 50 ug. Results have not been blank corrected.
S0403300-12A	N0600_AC	SAMP	Actual value of the particulate blank was 0 ug. Results have not been blank corrected.

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: BK040056 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-01A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): NA | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	--	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	--	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	--	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	--	--	10		NIOSH 7500	4/1/2004

Client Sample ID: SZ040057 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-02A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 360 | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	80.0	0.222	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0556	0	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0278	0	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0278	0	10		NIOSH 7500	4/1/2004

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: BK040066 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-03A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): NA | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	--	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	--	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	--	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	--	--	10		NIOSH 7500	4/1/2004

Client Sample ID: FZ040058 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-04A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 359 | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.139	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0557	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0279	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0279	--	10		NIOSH 7500	4/1/2004

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: FZ040059 — **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-05A — **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 413 — **Analyst:** DCD
Site Identifier: 0998CERH901C — **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.121	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0484	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0242	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0242	--	10		NIOSH 7500	4/1/2004

Client Sample ID: FZ040060 — **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-06A — **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 342 — **Analyst:** DCD
Site Identifier: 0998CERH901C — **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.146	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0585	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0292	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0292	--	10		NIOSH 7500	4/1/2004

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: FZ040061 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-07A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 513 | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	160	0.312	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0390	0	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0195	0	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0195	0	10		NIOSH 7500	4/1/2004

Client Sample ID: FZ040062 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-08A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 335 | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	170	0.507	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0597	0	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0299	0	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0299	0	10		NIOSH 7500	4/1/2004

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: FZ040063 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-09A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 512 | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	470	0.918	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0391	0	20		NIOSH 7500	4/1/2004
Silica, Quartz	48.0	0.0938	10.2	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0195	0	10		NIOSH 7500	4/1/2004

Client Sample ID: FZ040064 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-10A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 333 | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.150	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0601	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0300	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0300	--	10		NIOSH 7500	4/1/2004

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: FZ040065 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-11A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 510 | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	220	0.431	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0392	0	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0196	0	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0196	0	10		NIOSH 7500	4/1/2004

Client Sample ID: BK040067 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-12A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): NA | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	--	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	--	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	--	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	--	--	10		NIOSH 7500	4/1/2004

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: FZ040068 — **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-13A — **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 333 — **Analyst:** DCD
Site Identifier: 0998CERH901C — **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.150	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0601	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0300	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0300	--	10		NIOSH 7500	4/1/2004

Client Sample ID: FZ040069 — **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-14A — **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 508 — **Analyst:** DCD
Site Identifier: 0998CERH901C — **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.0984	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0394	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0197	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0197	--	10		NIOSH 7500	4/1/2004

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: FZ040070 — **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-15A — **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 326 — **Analyst:** DCD
Site Identifier: 0998CERH901C — **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.153	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0613	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0307	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0307	--	10		NIOSH 7500	4/1/2004

Client Sample ID: FZ040071 — **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-16A — **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 498 — **Analyst:** DCD
Site Identifier: 0998CERH901C — **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.100	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0402	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0201	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0201	--	10		NIOSH 7500	4/1/2004

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: FZ040072 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-17A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 374 | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	210	0.561	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0535	0	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0267	0	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0267	0	10		NIOSH 7500	4/1/2004

Client Sample ID: FZ040073 | **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-18A | **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 493 | **Analyst:** DCD
Site Identifier: 0998CERH901C | **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.101	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0406	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0203	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0203	--	10		NIOSH 7500	4/1/2004

Particulate Analysis Results
for
18 AMDS/SGPB

WorkOrder: S0403300
Project:
Date Reported: 05/21/2004

Client Sample ID: FZ040074 — **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-19A — **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 321 — **Analyst:** DCD
Site Identifier: 0998CERH901C — **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	140	0.436	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0623	0	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0312	0	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0312	0	10		NIOSH 7500	4/1/2004

Client Sample ID: FZ040075 — **Date Sampled:** 3/9/2004
Lab Sample ID: S0403300-20A — **Date Received:** 3/30/2004
Sample Type:
Air Vol.(L): 471 — **Analyst:** DCD
Site Identifier: 0998CERH901C — **Approver:** Clayton MI
Sample Location: BLDG 111

Analyte	Concentration (µg)	Concentration (mg/m³)	Concentration %	Limit of Detection (µg)	Qual	Method Reference	Analysis Date
Particulates, Respirable	<50.0	<0.106	--	50		NIOSH 600	3/31/2004
Cristobalite	<20.0	<0.0425	--	20		NIOSH 7500	4/1/2004
Silica, Quartz	<10.0	<0.0212	--	10		NIOSH 7500	4/1/2004
Tridymite	<10.0	<0.0212	--	10		NIOSH 7500	4/1/2004

General Notes:
<: Less than the indicated limit of detection (LOD).
--: Information not available or not applicable.
The calculated concentration (mg/m³) was obtained using the collection volume provided on the analysis request form.

Report of Analysis
for
18 AMDS/SGPB

Lab Order:	S0403300	**Collection Date:**	3/9/2004
Project:		**Date Reported:**	05/21/2004
Lab Sample ID:	S0403300-21A	**Matrix:**	BULK SOLID
Client Sample ID:	GD040081		
Site Identifier:	0998CERH901C	**Sample Location:**	BLDG 111

Analyses	Result	Detection Limit	Qual	Units	DF	Date Analyzed
NIOSH 7500			**Approver:** Clayton MI			**Analyst:** DCD
Cristobalite	< 2.00	2.00		wt%	1	04/05/2004 0:00
Silica, Quartz	6.00	1.00		wt%	1	04/05/2004 0:00
Tridymite	< 1.00	1.00		wt%	1	04/05/2004 0:00

Qualifiers

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
H - Exceeds holding time

Report of Analysis
for
18 AMDS/SGPB

Lab Order:	S0403300	**Collection Date:**	3/9/2004
Project:		**Date Reported:**	05/21/2004
Lab Sample ID:	S0403300-22A	**Matrix:**	BULK SOLID
Client Sample ID:	GM040079		
Site Identifier:	0998CERH901C	**Sample Location:**	BLDG 111

Analyses	Result	Detection Limit	Qual	Units	DF	Date Analyzed
NIOSH 7500			**Approver:** Clayton MI			**Analyst:** DCD
Cristobalite	< 2.00	2.00		wt%	1	04/05/2004 0:00
Silica, Quartz	< 1.00	1.00		wt%	1	04/05/2004 0:00
Tridymite	< 1.00	1.00		wt%	1	04/05/2004 0:00

Qualifiers

ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
B - Analyte detected in the associated Method Blank
* - Value exceeds Maximum Contaminant Level
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
E - Value above quantitation range
H - Exceeds holding time