DRAFT
Sampling Plan
Ohio Power Company's
Mitchell Plant
Moundsville, WV
Sampling Episode 6550

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1.0 INTRODUCTION

The Engineering and Analysis Division (EAD) of the U.S. Environmental Protection Agency (EPA) is currently conducting a site visit and sampling program at steam electric power plants. The sampling program will characterize raw wastewaters generated by coal-fired steam electric power plants, as well as evaluate treatment technologies and best management practices used to reduce pollutant discharges. This sampling plan, developed for the Ohio Power Company's Mitchell Plant (Mitchell), provides plant-specific sampling procedures and methods EPA and its contractors will follow when conducting sampling activities. Sampling will be performed by EPA's technical contractor, Eastern Research Group, Inc. (ERG), under Contract No. 68-C02-095, Work Assignment 5-22. This document, in combination with the *Generic Sampling and Analysis Plan for Coal-Fired Steam Electric Power Plants* [3], is intended to serve as a guide to the ERG field sampling crew, a review mechanism for EPA personnel, and a source of procedural information for plant personnel.

1.1 Background

Section 304(m) of the Clean Water Act (CWA) requires EPA to develop and publish a biennial plan that establishes a schedule for the annual review and revision of national effluent limitations guidelines and standards (ELGs) required by CWA section 304(b). During EPA's 2005/2006 review of ELGs, EPA determined that the steam electric power generating point source category (40 CFR Part 423) is the second-largest discharger of toxic-weighted pollutants. EPA's analyses indicated that the toxic-weighted loadings are predominantly driven by metals present in wastewater discharges, and that the waste streams contributing the majority of the metals are associated with air pollution controls (APCs). Other potential sources of metals include coal pile runoff, metal/chemical cleaning wastes, coal washing, and certain low volume wastes.

In presenting the findings of the 2005/2006 study, EPA noted certain data limitations affect the Agency's estimate of the potential hazard posed by discharges from this category and, therefore, EPA determined that further review of these discharges during the

2007/2008 ELG planning cycle is warranted. Due to the limited resources and time available for conducting this study, EPA is concentrating its efforts for the 2007/2008 study on better characterizing the sources generating the pollutants responsible for the majority of the toxic-weighted pollutant loadings from steam electric plants and available pollution control technologies/practices.

This sampling plan will focus on characterizing wastewaters and treatment system discharges at Mitchell. For a description of the steam electric process and the wastewaters generated during the operation of a coal-fired steam electric power plant, see Section 3.2 of the *Interim Detailed Study Report for the Steam Electric Power Generating Point Source Category* [1].

1.2 Objectives and Scope

EPA is preparing to collect and analyze samples to characterize wastewater streams generated at coal-fired steam electric power plants. In particular, EPA is interested in characterizing waste streams associated with APC devices, evaluating the cross-media air-to-water transfers occurring in these APC devices, identifying sources of metals, and evaluating the capability of various types of treatment systems to remove metals prior to discharge.

Data from the sampling program will be used to support the following objectives:

- Determine pollutants present in waste streams generated by or associated with APCs (e.g., wet scrubber flue gas desulfurization (FGD) units, wet ash handling systems) and how those waste streams are handled;
- Characterize the treatment performance of steam electric wastewater treatment systems;
- Determine which treatment systems are effective in reducing metal loadings;

- Characterize the pollutants ultimately discharged to surface water from steam electric plants; and
- Determine the contribution of the pollutants from APC wastewaters to the overall pollutant load discharged from steam electric plants.

The steam electric sampling and analysis program will consist of one- or two-day sampling at selected plants. The sampling will characterize the wastewaters generated by APC devices and the treatment performance of the systems used to treat the APC wastewaters. EPA will also collect field quality control (QC) samples consisting of bottle blanks, field blanks, equipment blanks, duplicate samples, and laboratory QC samples used for matrix spike/matrix spike duplicate analyses and serial dilutions.

EPA's sampling program will provide data to perform an engineering assessment of the design, operation, and performance of treatment systems at steam electric plants. Specifically, EPA will collect information regarding system design and day-to-day operation. The sampling will focus on in-process streams from steam electric operations, influent to and effluent from wastewater treatment, and may include collection of final effluent discharges and recycle streams.

1.3 Plant Selection

EPA expects to select up to six coal-fired steam electric plants for wastewater sampling. EPA is basing the plant selection on the process configurations and characteristics of the plants, as well as the site visits conducted for the study. The following characteristics are being used to select plants for sampling (not listed in any priority order):

- Coal-fired boilers;
- Wet FGD scrubber system, including:
    - Type of scrubber,
    - Sorbent used,
    - Year operation began,
    - Chemical additives used,
    - Forced oxidation process,
    - Water cycling, and
    - Solids removal process;

- FGD wastewater treatment system;
- Type of coal;
- NO_x controls;
- Ash handling systems;
- Ash treatment system; and
- Mercury air controls.

Mitchell was selected by EPA for sampling based on the following site characteristics:

- The plant is a coal-fired power plant that burns Eastern Bituminous coal in each of its two generating units;
- The plant operates limestone forced oxidation wet FGD systems on both units;
- The plant operates a segregated FGD wastewater treatment system, which includes the following steps:
  - Desaturation (lime addition);
  - Clarification;
  - Equalization;
  - Ferric chloride addition;
  - Polymer addition; and
  - Clarification.
- The plant operates an SCR on both units (SCRs will not be in service during the sampling episode); and
- The plant produces a commercial-grade gypsum byproduct.

2.0 FACILITY OVERVIEW

Mitchell operates two steam electric units and each has a coal-fired boiler. Mitchell burns approximately XX million tons of Eastern Bituminous coal per year. Units 1 and 2, which both came on line in 1971, each have a capacity of 800 megawatts (MW) and have been burning low-sulfur coal. The plant recently installed FGD scrubbers on both units and is in the process of transitioning to a higher sulfur coal. At the time the sampling occurs, the plant will not have reached the design coal for the FGD scrubbers; however, the plant will have been burning the same coal for an extended period of time. The Mitchell plant is located on approximately XX acres in Moundsville, WV, along the Ohio River. [QUESTION FOR

MITCHELL: How much coal does the plant burn during the year? How many acres of land does the plant own? What percent sulfur coal will be burned during the sampling episode (or as of mid September)?]

Mitchell recently retrofitted both units with a wet FGD scrubber system to control the sulfur dioxide (SO_2) releases from the plant. The Unit 2 FGD system was installed in January 2007, and the Unit 1 FGD system was installed in April 2007. The wet FGD scrubbers are designed to achieve a 98 percent removal of SO_2. Mitchell representatives estimate the average SO_2 removal from the scrubbers is slightly lower than 98 percent due to the lower efficiency during startup and shutdown of the scrubbers. With the recent addition of the FGD scrubber systems, Mitchell also installed an FGD wastewater treatment system to control the discharges of the wastewater generated during the operation of the FGD scrubbers. The FGD system is discussed further in Section 2.1 and the FGD wastewater treatment system is discussed further in Section 2.2.

In XXXX, Mitchell retrofitted both Units 1 and 2 with selective catalytic reduction (SCR) systems to control nitrogen oxide (NO_x) releases from the plant. In addition, the plant installed low NO_x burners in the boilers to further reduce the NO_x emissions from the plant. At this time, Mitchell is only operating the SCRs seasonally, from May 1 through September 30; therefore, the SCRs will not be operating during the sampling episode. However, in the future, Mitchell will begin operating the SCR systems year-round. [QUESTION FOR MITCHELL: When were the SCR units installed for Units 1 and 2? When were the low NO_x burners installed?]

As the flue gas passes over the catalyst in the SCR process, some of the sulfur dioxide is oxidized to sulfur trioxide. Emissions of this sulfur trioxide contribute to the formation of acid rain in the environment, as well as a blue plume. To control the formation of sulfur trioxide, Mitchell injects trona, a sodium-based carbonate (i.e., sodium carbonate and/or sodium bicarbonate) into the flue gas to remove the sulfur trioxide. Mitchell blows the trona into the flue gas as a dry powder downstream of the air preheater, but upstream of the electrostatic precipitators (ESPs). [QUESTION FOR MITCHELL: When the SCR is not operating, does the flue gas bypass the SCR? Does the plant still operate the trona injection process?]

The ESPs at Mitchell are particulate control devices that remove the fly ash and other particulates from the flue gas. Mitchell utilizes ESPs to remove the fly ash from both units. The ESPs are designed to remove 99.7 percent of the fly ash from the flue gas. The fly ash and other particulates are collected in hoppers and sluiced to the fly ash pond. The ESPs and ash sluicing are described in more detail in Section 2.3 and the fly ash pond system is described in more detail in Section 2.4.

Units 1 and 2 have the following configuration:

- Boiler;
- SCR system;
- Air preheater;
- Trona injection;
- Electrostatic precipitator (ESP); and
- FGD scrubber system.

2.1 FGD Scrubber System

Mitchell operates a wet FGD scrubber system on both Units 1 and 2, downstream of the ESP, to control the emission of sulfur dioxide from the unit. The plant uses a limestone slurry as the sorbent for sulfur dioxide absorption. Mitchell receives the limestone via barge and has onsite ball mills to pulverize the limestone. After the limestone is pulverized, Mitchell dilutes it with water to approximately 25 to 30 percent solids (by weight) and holds it in the reagent slurry storage tank until it is pumped to the scrubbers.

The fresh limestone slurry is fed to the bottom of the scrubbers in the reaction tank. Mitchell pulls a mixture of the fresh slurry and some of the reacted product from the reaction tank and pumps it up to the various spray levels in the scrubber. This slurry is pressurized and sprayed downward into the scrubber vessel through spray nozzles. As the slurry falls downward and the flue gas flows counter-current to the slurry, the sulfur dioxide contacts and reacts with the limestone particles and produces calcium sulfite, which continues to flow downward in the scrubber until it reaches the reaction tank. Mitchell bubbles air through the reaction tank to oxidize the calcium sulfite to calcium sulfate (i.e., gypsum).

Mitchell intermittently blows down the gypsum slurry from the reaction tank to control the solids concentration in the scrubber between 18 and 22 percent solids. Mitchell pumps the blow down from the scrubber to the hydroclone feed tanks. Mitchell stores the gypsum slurry in the two hydroclone feed tanks, each with a capacity of 0.75 million gallons, for a short period of time during the blowdown of the scrubber to allow for a continuous feed to the hydroclones, which improves their performance. Once there is enough volume in the hydroclone feed tanks, Mitchell begins dewatering the gypsum slurry. Mitchell typically dewaters gypsum slurry for approximately 10 to 12 hours per day. [Question for Mitchell: How long is the gypsum slurry held in the hydroclone feed tanks? What is the blowdown rate from the absorber to the hydroclones?]

The gypsum slurry is pumped to the dewatering hydroclones where the solid gypsum is separated from the water by centrifugal force. The solid gypsum is forced outward to the walls of the hydroclones and falls downward, while the water exits the top of the hydroclones. The gypsum from the dewatering hydroclones is transferred to the vacuum filter belts. The supernatant water from the dewatering hydroclone is transferred to the dewatering hydroclone overflow head tank, and is expected to contain approximately 5.7 percent solids.

Mitchell rinses the gypsum sent to the vacuum filter belts with river water, as it is poured onto the belts. The vacuum filter belts dry the gypsum to a 96 to 97 percent solids product. Mitchell temporarily stores the gypsum on site and it is then hauled to a nearby wallboard manufacturer for beneficial reuse. Mitchell has two hydroclones and two vacuum filter belts. The hydroclones and vacuum filter belts are both operated in parallel and each unit has a designated hydroclone and filter belt. Each of the vacuum filter belts is capable of producing 50 tons of gypsum per hour when the dewatering process is operating.

Mitchell analyzes the chlorides in the wastewater that is sent to the dewatering hydroclone overflow head tank to determine whether the water should be directed to the reclaim tanks and recycled back to the reaction tank in the scrubbers or transferred to the FGD wastewater treatment system. If the chlorides are less than 8,000 ppm, then the water is directed back to the scrubbers; however, if the chlorides are greater than 8,000 ppm, then a portion of the water is sent to the first stage of the FGD wastewater treatment system. The chlorides concentration in the scrubber typically ranges from 5,500 to 8,500 ppm, with a maximum allowable concentration of 12,000 ppm. According to plant representatives, the wastewater is usually sent to the reclaim tank and recycled back to the scrubbers. However, over the course of a day, the plant does typically purge hydroclone overflow to the FGD wastewater treatment system for approximately six to eight hours during the day shift at a rate of 550 gpm. Mitchell also has the capability of transferring water from the reclaim tanks to the FGD wastewater treatment system, if needed. [QUESTION FOR MITCHELL: Is the chloride purge (CPS) to treatment continuous over the six to eight hours of typical purging during the day? Is the plant still purging to the FGD WWT approximately six to eight hours per day at a rate of 550 gpm? If not, please provide a new estimate.]

2.2 FGD Wastewater Treatment System

The FGD wastewater treatment system is designed to receive intermittent transfers of FGD wastewater from the dewatering hydroclone overflow head tank at a flow rate of approximately 550 gpm. The intermittent transfers typically occur for six to eight hours over the course of a day. The plant operates the FGD wastewater treatment system 24 hours per day. The wastewater treatment system was installed to treat the wastewater discharge that is necessary to control the concentration of chlorides in the scrubber system. The Mitchell FGD wastewater treatment system contains the following treatment operations:

- Desaturation (lime addition);
- Primary clarification;
- Equalization;
- Ferric chloride addition;
- Polymer addition; and
- Secondary clarification.

Figure 2-1 presents a process flow diagram of the FGD wastewater treatment system, as well as the sampling locations for EPA's sampling episode. The Mitchell wastewater treatment system was built with some redundancy to allow for one piece of equipment to be out of service and still allow the system to operate; therefore, the Mitchell FGD wastewater treatment system has two of the following pieces of equipment operating in parallel:

- Desaturation tank;
- Primary clarifier;
- Equalization tank; and
- Secondary clarifier.

During normal operation, Mitchell operates all of the tanks and clarifiers even though only one of each pair of tanks and clarifiers is needed. When one of the pair is taken out of service, the other redundant unit is still capable of handling the maximum flow through the system.

The wastewater from the dewatering hydroclone overflow head tank is transferred to the two desaturation tanks if the chloride levels in the wastewater are greater than 8,000 ppm.

This wastewater is expected to be 5.7 percent solids and the pH is approximately 6.5 to 7.0. Mitchell adds hydrated lime to the wastewater to increase the pH to approximately 9.2, which results in the precipitation of the calcium sulfate. [QUESTION FOR MITCHELL: Why is 9.2 the target pH in the desaturation tanks? What range of variability can the plant operate within?]

From the desaturation tanks, the wastewater flows to the primary clarifiers. The primary clarifiers remove most of the solids present in the wastewater. According to the plant's design specifications, the primary clarifiers are designed to reduce the solids concentration in the wastewater from 5.6 to 0.1 percent solids. The underflow from the primary clarifier is either transferred to the sludge feed tanks or recycled back to the primary clarifier influent to improve solids formation by providing seed crystals for nucleation, which improves settling of the suspended solids.

The two overflow streams from the primary clarifiers are first commingled with each other, and then they are split again prior to entering the two equalization tanks. The equalization tanks also receive recycled water from the effluent storage tank when the treatment system is not discharging, as well as filter press filtrate. The equalization tanks equalize the flow prior to the ferric chloride addition step and secondary clarification. The flow from the tanks is controlled based on the level in the tank. Some of the water from the equalization tanks is also used to flush the sludge lines from the primary and secondary clarifiers when the sludge pumps are shut down for an extended period of time. [QUESTION FOR MITCHELL: Are all the flows split evenly between the two equalization tanks? If a sample was collected from one of the equalization tanks, would the characteristics be the same as the other equalization tank?]

In the ferric chloride mix tank, the plant adds ferric chloride to the wastewater to coagulate the fine particles in the solution and make them easier to remove in the secondary clarifier. The wastewater from the ferric chloride mix tank is split and transferred to the two secondary clarifiers. As the wastewater is pumped to the clarifier, Mitchell adds an anionic polymer to the wastewater. The polymer helps the solids in the wastewater settle more easily in the secondary clarifier. The underflow from the secondary clarifiers is completely recycled within the treatment system, with the majority of it being recycled to the primary clarifier. In addition, some of the sludge is recycled to the ferric chloride mix tank to provide seed crystals to improve the coagulation/agglomeration. The secondary clarifiers are designed to reduce the solids concentration from 0.3 to 0.003 percent solids in the wastewater.

The overflow from the secondary clarifiers is commingled together and transferred to the effluent storage tank. When the effluent storage tank is full, the plant discharges the wastewater to the bottom ash pond. In the bottom ash pond, the FGD wastewater is commingled with bottom ash sluice water, cooling tower blowdown, storm water runoff, and low-volume wastewater. However, when the effluent tank is not full, which typically occurs when the plant is not purging the hydroclone overflow to the FGD wastewater treatment system, then the plant recycles the treated effluent in the storage tank back to the equalization tanks to enable continuous flow through the treatment system components.

The influent sampling point at Mitchell's FGD wastewater treatment system is located downstream of the dewatering hydroclone overflow head tank and upstream of the desaturation tanks. Thus, the influent sampling point is upstream of any chemical addition. The in-process sampling point within Mitchell's FGD wastewater treatment system is located downstream of the primary clarifiers and upstream of the equalization tanks. The effluent sampling point at Mitchell's FGD wastewater treatment system is located at the effluent storage tank.

2.3 Particulate Control Systems

As the coal is combusted in the boilers, solid, non-combustible constituents of the coal, referred to as ash, are generated. The heavier ash particles collect on the bottom of the boiler and are referred to as bottom ash. The finer ash particles are light enough to be transferred out of the boiler with the flue gas exhaust and are referred to as fly ash. The bottom ash is removed from the bottom of the boiler using a stream of sluice water that transports the particles to the bottom ash pond. The fly ash flows with the flue gas through the SCRs and are removed from the flue gas in the ESP (the fly ash bypasses the SCRs when the SCRs are not in operation).

[QUESTION FOR MITCHELL: Does the flue gas bypass the SCR when they are not in operation?]

The ESP systems use high voltage to generate an electric charge on the particles contained in the flue gas. The charged particles then collect on a metal plate with an opposite electric charge. As the particles begin to layer on the metal plates, the plates are tapped/rapped to loosen the particles, which fall into collection hoppers. Each unit has multiple hoppers that collect ash from different places in the ESP. The hoppers located closer to the inlet of the ESP collect the larger fly ash particles that are removed more easily and the hoppers located closer to the outlet of the ESP collect the finer fly ash particles that are more difficult to remove. In addition, the hoppers at the inlet typically collect more fly ash than the hoppers at the outlet of the ESP.

Mitchell continually sluices the fly ash from the collection hoppers with cooling tower blowdown water or river water. The plant cycles through the collection hoppers based on which hopper needs to be sluiced. Because the hoppers at the inlet collect more fly ash than the hoppers at the outlet, the inlet hoppers are sluiced more frequently. [QUESTION FOR MITCHELL: Are Units 1 and 2 sluiced simultaneously, or it there one sluice system from both units? Approximately how long does it take to cycle through all of the hoppers for each unit?]

2.4 Fly Ash Pond System

The fly ash pond system at Mitchell receives the fly ash sluice water from Mitchell as well as the fly ash sluice water from Kammer, another Ohio Power Company power plant located one mile north of Mitchell. In addition, the fly ash pond receives wastewater from a nearby coal washing preparation plant and treated acid mine drainage. The Mitchell and Kammer ash sluice waste stream contribute approximately 40 percent of the wastewater to the fly ash pond, based on volumetric flow rate. The flow rates of the influent streams to the Mitchell fly ash pond are as follows:

- Mitchell fly ash sluice stream - 3.0 MGD
- Kammer fly ash sluice stream - 1.4 MGD

- Coal washing preparation plant - 2.8 MGD
- AMD treatment plant - X.X MGD
- Stormwater runoff - X.X MGD

[QUESTION FOR MITCHELL: The flow rates listed are based on the spreadsheet provided by Jeff Palmer. In the spreadsheet, there was no flow listed for the AMD treatment plant, it was only listed as "High Flow." If the Kammer and Mitchell sluice streams are only 40% of the influent, then the total influent for all streams would be approximately 11 MGD, which would make the AMD treatment and stormwater runoff approximately 3.8 MGD. How much of the remaining 3.8 MGD is from the AMD treatment plant vs stormwater runoff?]

The open water area of the fly ash pond is approximately 63.5 acres, with a volume of approximately 1,863,000 cubic yards. Based on 2007 data, the nominal retention time of the pond is approximately 38 days. Mitchell does not dredge the fly ash from the pond. [QUESTIONS FOR MITCHELL: Is the pond lined? When did the plant start filling the pond? How much longer does the plant expect to continue using the pond until it is filled?]

The four waste streams that enter the fly ash pond all enter at different locations in the pond. The two fly ash sluice waste streams enter the pond the furthest downstream, and therefore, have the shortest residence time in the pond. The wastewater flows through the pond system and the solids and particulates settle out of the wastewater. In addition, the plant controls the cenospheres, floating solids, using booms. The plant collects the cenospheres from the pond and sells them for beneficial reuse. As the wastewater reaches the end of the pond, there is a dam that controls the flow from the pond out to the channel where the wastewater is discharged to Fish Creek.

The effluent sampling point at Mitchell's fly ash pond is located along the channel that discharges to Fish Creek. ERG will collect the samples from the platform that protrudes over the channel. [QUESTION FOR MITCHELL: Is this the location where the plant collects its NPDES monitoring samples?] EPA is not collecting samples from the influent to the fly ash pond.

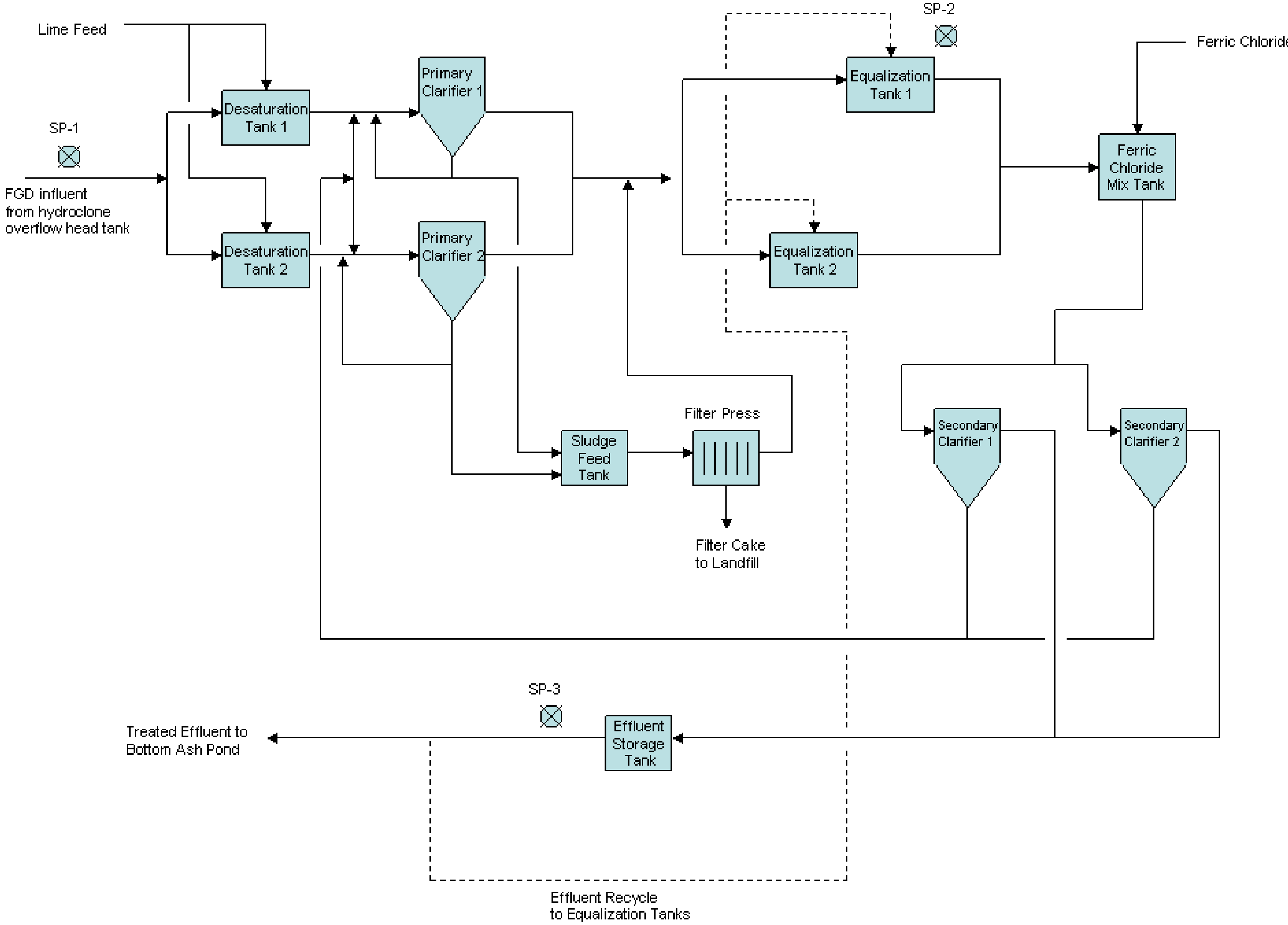

Figure 2-1. FGD Wastewater Treatment System, Mitchell Power Plant

3.0 SAMPLING PROCEDURES

This section discusses the planned sampling procedures to be followed during the sampling episode at Mitchell. This section also provides the necessary information to plan for the logistics of this sampling episode. All tables and figures in this section are presented at the end of the section.

3.1 Sampling Point Selection

Figure 2-1 shows the three sampling point locations for Mitchell's FGD wastewater treatment system. Note that the sampling point at the effluent of Mitchell's ash pond is not shown on Figure 2-1. The four proposed sampling points and the related Quality Assurance / Quality Control (QA/QC) samples result in a total of nine sampling points, defined as follows:

- SP-1 Influent to FGD Wastewater Treatment System;
- SP-2 FGD Primary Clarifier Effluent;
- SP-3 Effluent from FGD Wastewater Treatment System;
- SP-4 Effluent from Fly Ash Pond;
- SP-5 Duplicate of Effluent from FGD Wastewater Treatment System (SP-3);
- SP-6 Influent to FGD Wastewater Treatment System (SP-1) Field Blank;
- SP-7 FGD Primary Clarifier Effluent (SP-2) Field Blank;
- SP-8 Effluent from FGD Wastewater Treatment System (SP-3) Field Blank; and
- SP-9 Effluent from Ash Pond (SP-4) Field Blank.

3.2 Analyte Selection

Analytes in EPA's Mitchell sampling episode include those in the following classes of pollutants:

- Classicals:
  - Biochemical oxygen demand, 5-day (BOD_5),
  - Total suspended solids (TSS),
  - Total dissolved solids (TDS),
  - Sulfate,
  - Chloride,
  - Total Kjeldahl nitrogen (TKN),
  - Ammonia as nitrogen,
  - Nitrate/nitrite as nitrogen,
  - Total phosphorus,
  - Hexane extractable material (HEM),
  - Silica-gel treated hexane extractable material (SGT-HEM), and
  - Routine hexavalent chromium;

- Metals:
  - Routine total metals (27 metals: aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, selenium, silver, sodium, thallium, tin, titanium, vanadium, yttrium, and zinc),
  - Routine dissolved metals (27 metals),
  - Low-level total mercury,
  - Low-level dissolved mercury,
  - Low-level hexavalent chromium,
  - Low-level total metals (11 metals: antimony, arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, zinc), and
  - Low-level dissolved metals (11 metals).

The analytes selected reflect the current understanding of coal-fired power plant APC wastewaters, including contributions from coal, scrubber sorbents, treatment chemicals, and other sources. Table 3-1 lists the potential analytes for each sampling point, Table 3-2 lists the analytical methods that will be used, and Table 3-3 lists the sample container and volume and on-site preservation for each parameter or parameter group. Appendix A lists the individual parameters for each group of analytes.

EPA plans to analyze all of the waste streams for the routine metals using the 200-series analytical methods as well as the low-level metals using the 1600-series analytical methods.

3.3 Sample Collection Procedures

To characterize the influent to FGD wastewater treatment system (SP-1), the FGD primary clarifier effluent (SP-2), the effluent from FGD wastewater treatment system (SP-3), and the effluent from the fly ash pond (SP-4) at Mitchell, the sampling team will employ varying methods of sample collection depending on the sampling point and pollutant parameters. This section describes in detail the sample collection techniques.

Samples are collected as a series of "fractions," or bottles designated for particular analyses requiring the same preservation. The comprehensive sample set consists of sample fractions for all pollutant classes listed in Section 3.2. Note that some sample fractions will be collected in the same sample bottle. These include Group I (TSS, TDS, sulfate, and chloride); and Group II (ammonia as nitrogen, nitrate/nitrite as nitrogen, TKN, and total phosphorus). All other parameters will be collected in individual bottles.

In general, samplers will work in teams of two to ensure that proper sampling techniques are followed and adequate notes are taken at each sampling location. Samplers will wear disposable gloves, Tyvek® suits, masks (when sampling for low-level mercury), steel-toed boots, hard hats, and safety eyewear, and will observe precautions while collecting samples, remaining aware of his/her surroundings.

Sample containers and bottles will be purchased pre-cleaned and certified and will not require rinsing with sample. The sample bottles for the low-level metals analyses will be cleaned according to EPA Method 1669. For this sampling episode, all samples will be collected directly from the waste stream of interest into specification-cleaned sample containers. Thus, all samples will be "grab samples." No composite samples will be collected.

Samplers will take care not to touch the insides of bottles or lids/caps during sampling. Samples that require cooling to ≤6°C for preservation will be cooled immediately in an ice-water bath to ≤6°C and then placed into coolers containing bagged ice to maintain a sample temperature of ≤6°C throughout sample storage, shipment, and receipt at the analytical laboratories.

3.3.1 Influent to the FGD Wastewater Treatment System (SP-1)

The influent to FGD wastewater treatment system (SP-1) has a sample tap located on the wastewater piping downstream of the dewatering hydroclone overflow head tank and upstream of the desaturation tanks. Mitchell does not have an equalization tank prior to the first chemical addition in the wastewater treatment system; therefore, to characterize the raw influent to the FGD wastewater treatment system, ERG will collect the sample prior to the desaturation tanks before the wastewater has been equalized. Because the flow to the desaturation tanks is not continuous, ERG will need to coordinate with Mitchell to determine when wastewater is being transferred to the FGD wastewater treatment system. ERG will follow protocols described in EPA Method 1669 to collect low-level metal sample fractions from SP-1.

ERG plans to collect split samples with Mitchell (or its representative), where possible; therefore, ERG plans to attach a piece of silicone tubing to the end of the sample tap with a "Y" splitter at the other end of the tubing to allow ERG and Mitchell (or its representative) collect samples simultaneously. If problems occur during the collection of split samples (e.g., the splitters become clogged and the flow is split unevenly between the sampling crews), then EPA may stop the split sample collection and offer instead to collect duplicate samples with Mitchell or its representative. For all analyses (except routine dissolved metals, routine hexavalent chromium, low-level dissolved metals, and HEM/SGT-HEM), the samplers will collect samples through the tubing directly into the specified containers. For the HEM/SGT-HEM samples, the bottles will be filled directly from the sample tap to avoid the oil and grease adhering to the sides of the tubing. For the dissolved metals and routine hexavalent chromium samples, the samplers will fill two 10-L containers, allow the solids to settle for one hour, and then pump the aqueous portion of the sample through a 0.45 μm filter and then through a "Y" splitter into the specified containers; therefore, the dissolved metals and routine hexavalent chromium samples will be collected as split samples.

Due to the high solids content of the samples collected at the influent to the FGD wastewater treatment system, EPA will analyze the samples as bi-phasic samples. The laboratory will separate the aqueous portion of the sample from the solid portion of the sample and analyze both for the analyte of interest. Group I (chloride and sulfate only), Group II, routine total metals, low-level total metals, and low-level total mercury samples will be analyzed as bi-phasic samples. Group I (TSS and TDS only), BOD_5, HEM/SGT-HEM, routine hexavalent chromium, routine dissolved metals, low-level dissolved metals, and low-level dissolved mercury samples will not be analyzed as bi-phasic samples.

The samples for the influent to the FGD wastewater treatment system (SP-1) will be collected from a sample tap. The sampling equipment will consist of the following:

- Colorless, electronic-grade, non-nitrile gloves;
- Silicone tubing with "Y" splitter;
- 10-L containers;
- Teflon® tubing;
- Silicone tubing;
- 0.45 um filter;
- Funnel;
- Peristaltic pump;
- Small table;
- Cleanbox;
- Tyvek® suits (for mercury samples);
- Masks (for mercury samples); and
- Sample containers.

All low-level metals sampling equipment will be specially-cleaned according to the procedures described in EPA Method 1669. ERG will follow protocols described in EPA Method 1669 to collect low-level metal sample fractions. Two ERG samplers ("clean hands" and "dirty hands") will follow the protocols described in the steps below to set up the sampling point, collect the field blank samples, and collect wastewater samples. This section only describes the set up of the sample point and collection of the EPA samples, and does not describe the collection of the split samples.

1. Samplers remove the bags containing the gloves and HDPE plastic wrap from the coolers or storage containers in which they are packed. Samplers identify which coolers or boxes contain the double-bagged sample bottles, pre-cleaned tubing, blank water, and cleanbox. Depending on the condition of the sample tap, it may be necessary to wipe the tap with a clean paper towel to remove any build up on the tap that could potentially fall in the sample bottles during sample collection.

2. Both samplers put on Tyvek® suits, masks, and gloves. "Dirty hands" covers work surfaces (ground or table) with HDPE plastic wrap and places the double-bagged sample bottles within easy access on the covered surface.

3. "Dirty hands" opens the outer bag of the cleanbox and "clean hands" opens the inner bag and the translucent bag. "Clean hands" places the cleanbox at the point of sample collection. "Clean hands" opens the cleanbox and secures it open with the clips located inside the box.

4. "Dirty hands" opens the outer bag containing a length of pre-cleaned silicone tubing. "Clean hands" opens the inner bag inside of the cleanbox and removes the tubing, holding the two ends pointing downward to reduce atmospheric contamination. "Clean hands" places clean plastic bags over the ends of the silicone tubing.

5. "Dirty hands" opens the outer bag of the funnel and "clean hands" opens the inner bag inside of the cleanbox. "Clean hands" attaches the funnel to the tubing.

6. "Dirty hands" opens the outer bags of the low-level total mercury field blank water and low-level total mercury field blank sample bottles. "Clean hands" opens the inner bag for the field blank water, unscrews the lid and places it in the inner bag. "Clean hands" passes the funnel end of the tubing with a plastic bag shrouding the funnel to another "clean hands" person to hold outside the cleanbox. "Clean hands" removes the inner bag for the low-level total mercury field blank sample bottle and places it in the cleanbox. "Clean hands" holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing. "Dirty hands" pours field blank water through the funnel and tubing. After the tubing has been purged with sufficient volume, "clean hands" places the silicone tubing back in the cleanbox. Working inside the cleanbox, "clean hands" unscrews the lid of the field blank sample bottle, removes the tubing from the plastic bag, and prepares to fill the field blank sample bottle. "Dirty hands" pours field blank water into the funnel and tubing, and "clean hands" fills the field blank sample bottle. "Clean hands" places the end of the silicone tubing into the plastic bag, replaces the lid on the sample bottle, and closes the inner bag. "Clean hands" removes the bottle from the cleanbox and places it in the outer bag. "Dirty hands" closes the outer bag. The samplers repeat this procedure for the low-level total metals field blank[1].

[1] ERG will collect the low-level dissolved mercury sample using the same technique as the low-level total mercury sample, but the dissolved sample will be filtered at the laboratory. A low-level dissolved mercury field blank will be performed by the laboratory to assess any mercury contamination from the filtering performed at the laboratory.

7. After collecting the field blank samples, "clean hands" removes the funnel from the tubing. "Clean hands" and "dirty hands" work to attach the end of the silicone tubing to the sample tap.

8. "Clean hands" holds the opposite end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag covering the end of the tubing. "Dirty hands" opens the valve to the sample tap to purge the piping for a minimum of 2 minutes. "Clean hands" places the end of the silicone tubing back in the cleanbox.

9. "Dirty hands" opens the outer bag for a pre-cleaned 10-L container. "Clean hands" opens the inner bag and loosens the lid. "Clean hands" holds the end of the silicone tubing at the mouth of the 10-L container and removes the lid. "Dirty hands opens the sample valve to allow sample to flow into the 10-L container. Samplers fill two 10-L containers for the collection of low-level dissolved metals, routine dissolved metals, and routine hexavalent chromium, which are all required to be filtered. The samplers will allow the solids to settle for one hour while collecting the remaining samples. "Clean hands" places the plastic bag over the end of the silicone tubing. Both samplers change their gloves.

10. "Dirty hands" opens the outer bag for the low-level total metals sample bottle. "Clean hands" removes the inner bag and bottle and places it in the cleanbox. "Clean hands" opens the inner bag and bottle lid. "Clean hands" removes the plastic bag from the tubing and fills the sample bottle. "Clean hands" places the tubing back in the plastic bag, replaces the lid on the sample bottle and closes the inner bag. "Clean hands" removes the sample bottle from the cleanbox and places it in the outer bag. "Dirty hands" closes the outer bag. The samplers repeat this procedure for the low-level total and dissolved mercury and routine total metals samples.

11. "Dirty hands" places an ERG label on the outer bags of the sample bottles.

12. Samplers fill a 1-L jar for the field measurements. The samplers will give the jar to another sampling team member to measure the temperature, pH, and free and total chlorine.

13. Both samplers collect the BOD_5, Group I, and Group II samples from the sample location.

14. Samplers remove the tubing from the sample tap and collect the HEM/SGT-HEM samples.

Therefore, ERG does not need to collect a low-level dissolved mercury field blank sample in the field. In addition, a routine total metals field blank will be collected at the effluent from the FGD wastewater treatment system (SP-3) and not from the influent to the FGD wastewater treatment system (SP-1).

Dissolved Metals Sample Collection

15. Samplers allow the two 10-L sample containers to continue to settle if one hour has not elapsed since the collection of the sample.

16. "Dirty hands" covers the work surfaces (ground or table) with HDPE plastic wrap and places the double-bagged sample bottles within easy access on the covered surface.

17. "Dirty hands" opens the outer bag of the clean box and "Clean hands" opens the inner bag and the translucent bag. "Clean hands" places the cleanbox at the point of sample collection. "Clean hands" opens the cleanbox and secures it open with the clips located inside the box.

18. "Dirty hands" opens the opening on the peristaltic pump head so the tubing can be placed in the pump head. "Dirty hands" opens the outer bag containing a length of pre-cleaned Teflon® tubing attached to a 5-foot length of pre-cleaned silicone tubing, a "Y" splitter, and two additional pieces of pre-cleaned silicone tubing. "Clean hands" opens the inner bag and removes the tubing, holding the two ends pointing downward to reduce atmospheric contamination. "Clean hands" places a clean plastic bag over the end of the silicone tubing and places the end of the tubing in the cleanbox.

19. "Dirty hands" threads the silicone tubing into the peristaltic pump head.

20. Both samplers change gloves.

21. "Dirty hands" opens the outer bag of a capsule filter. "Clean hands" opens the inner bag and removes the capsule filter. "Clean hands" attaches the capsule filter to the silicone tubing just before the "Y" splitter.

22. "Dirty hands" opens the outer bag of the low-level dissolved metals field blank water and low-level dissolved metals field blank sample bottle. "Clean hands" removes the low-level dissolved metals field blank sample bottle and places it in the cleanbox. "Clean hands" opens the inner bags of the field blank water and the waste bottle. "Clean hands" removes the lid from the low-level dissolved metals field blank water, places it in the inner bag, and places the end of the Teflon® tubing in the blank water. "Clean hands" holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing and "dirty hands" operates the pump to pump about 750 mL of blank water from the field blank water bottle. "Clean hands" places the end of the silicone tubing in the cleanbox, opens the inner bag of the low-level dissolved metals field blank sample bottle, and removes the lid. "Dirty hands" operates the pump to collect the low-level dissolved metals field blank sample. "Dirty hands" stops the pump. If a new filter is needed, "clean hands" removes the used filter and samplers following step 21 to replace the filter.

23. Both samplers change gloves.

24. “Dirty hands” opens the outer bag of one of the 10-L specially-cleaned containers. “Clean hands” opens the inner bag, removes the lid, and places the end of the Teflon® tubing into the container. “Clean hands” holds the end of the silicone tubing outside the cleanbox, with the plastic bag still covering the end of the tubing. “Dirty hands” starts the pump and passes approximately 500 mL through the tubing and filter. “Dirty hands” stops the pump.

25. “Dirty hands” opens the outer bag of the low-level dissolved metals sample bottle. “Clean hands” removes the inner bag and bottle and places it in the cleanbox. “Clean hands” opens the inner bag and removes the lid. “Dirty hands” operates the pump to collect the low-level dissolved metals sample. “Dirty hands” stops the pump. “Clean hands” closes the lid on the sample bottle and closes the inner bags. “Clean hands” places the inner bag and bottle in the outer bag and “dirty hands” closes the outer bag. The samplers repeat this procedure for the routine dissolved and routine hexavalent chromium samples.

26. “Dirty hands” places an ERG label on the outer bags of the sample bottles.

The influent to the FGD wastewater treatment system is estimated to contain approximately 5.7% solids. The pH of the wastewater is estimated at approximately 6.5 to 7.0 S.U. Mitchell continuously records the dewatering hydroclone overflow blow down flow rate to the desaturation tanks.

3.3.2 FGD Primary Clarifier Effluent (SP-2)

The effluent from each primary clarifier in the FGD wastewater treatment system (SP-2) is collected in the overflow weirs of each of the two primary clarifiers, commingled, and split again before entering the two equalization tanks operating in parallel. At the time that sampling is expected to occur, one of the primary clarifiers will be out of service for maintenance; therefore, only one clarifier will be operating. Mitchell has a sample tap located on the wastewater piping after the two primary clarifier effluent streams are commingled, and prior to them splitting again. ERG will follow protocols described in EPA Method 1669 to collect low-level metal sample fractions at SP-2.

ERG plans to collect split samples with Mitchell (or its representative), where possible; therefore, ERG plans to attach a piece of silicone tubing to the end of the sample tap with a “Y” splitter at the other end of the tubing to allow ERG and Mitchell (or its representative) collect samples simultaneously. If problems occur during the collection of split samples (e.g., the splitters become clogged and the flow is split unevenly between the sampling crews), then EPA may stop the split sample collection and offer instead to collect duplicate samples with Mitchell or its representative. For all analyses (except routine dissolved metals, routine hexavalent chromium, low-level dissolved metals, low-level hexavalent chromium, and HEM/SGT-HEM), the samplers will collect samples through the tubing directly into the specified containers. For the HEM/SGT-HEM samples, the bottles will be filled directly from the sample tap to avoid the oil and grease adhering to the sides of the tubing. For the dissolved metals and hexavalent chromium samples, the samplers will fill one 10-L container and then pump the sample through a 0.45 μm filter and then through a “Y” splitter into the specified containers; therefore, the dissolved metals and hexavalent chromium samples will be collected as split samples.

The samples for FGD primary clarifier effluent (SP-2) will be collected from a sample tap. The sampling equipment will consist of the following:

- Colorless, electronic-grade, non-nitrile gloves;
- Silicone tubing with “Y” splitter;
- 10-L container;
- Funnel;
- Peristaltic pump;
- Tyvek® suits (for mercury samples);
- Masks (for mercury samples);
- PVC piping;
- Bottle dipper;
- 0.45 um filter;
- “Y” splitter;
- Teflon® tubing;
- Silicone tubing;
- Cleanbox; and
- Sample containers.

All low-level metals sampling equipment will be specially-cleaned according to procedures described in EPA Method 1669. ERG will follow protocols described in EPA Method 1669 to collect low-level metal sample fractions. Two ERG samplers (“clean hands” and “dirty hands”) will follow the protocol described in the steps below to set up the sampling point, collect the equipment field blank samples, and collect wastewater samples. This section only describes the set up of the sample point and collection of the EPA samples, and does not describe the collection of the split samples.

1. Samplers remove the bags containing the gloves and HDPE plastic wrap from the coolers or storage containers in which they are packed. Samplers identify which coolers or boxes contain the double-bagged sample bottles, pre-cleaned tubing, blank water, and cleanbox. Depending on the condition of the sample tap, it may be necessary to wipe the tap with a clean paper towel to remove any build up on the tap that could potentially fall in the sample bottles during sample collection.

2. Both samplers put on Tyvek® suits, masks, and gloves. "Dirty hands" covers work surfaces (ground or table) with HDPE plastic wrap and places the double-bagged sample bottles within easy access on the covered surface.

3. "Dirty hands" opens the outer bag of the cleanbox and "clean hands" opens the inner bag and the translucent bag. "Clean hands" places the cleanbox at the point of sample collection. "Clean hands" opens the cleanbox and secures it open with the clips located inside the box.

4. "Dirty hands" opens the outer bag containing a length of pre-cleaned silicone tubing. "Clean hands" opens the inner bag inside of the cleanbox and removes the tubing, holding the two ends pointing downward to reduce atmospheric contamination. "Clean hands" places clean plastic bags over the ends of the silicone tubing.

5. "Dirty hands" opens the outer bag of the funnel and "clean hands" opens the inner bag inside of the cleanbox. "Clean hands" attaches the funnel to the tubing.

6. "Dirty hands" opens the outer bags of the low-level total mercury field blank water and low-level total mercury field blank sample bottles. "Clean hands" opens the inner bag for the field blank water, unscrews the lid and places it in the inner bag. "Clean hands" passes the funnel end of the tubing with a plastic bag shrouding the funnel to another "clean hands" person to hold outside the cleanbox. "Clean hands" removes the inner bag for the low-level total mercury field blank sample bottle and places it in the cleanbox. "Clean hands" holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing. "Dirty hands" pours field blank water through the funnel and tubing. After the tubing has been purged with sufficient volume, "clean hands" places the silicone tubing back in the cleanbox. Working inside the cleanbox, "clean hands" unscrews the lid of the field blank sample bottle, removes the tubing from the plastic bag, and prepares to fill the field blank sample bottle. "Dirty hands" pours field blank water into the funnel and tubing, and "clean hands" fills the field blank sample bottle. "Clean hands" places the end of the silicone tubing into the plastic bag, replaces the lid on the sample

bottle, and closes the inner bag. “Clean hands” removes the bottle from the cleanbox and places it in the outer bag. “Dirty hands” closes the outer bag. The samplers repeat this procedure for the low-level total metals field blank[2].

7. After collecting the field blank samples, “clean hands” removes the funnel from the tubing. “Clean hands” and “dirty hands” work to attach the end of the silicone tubing to the sample tap.

8. “Clean hands” holds the opposite end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag covering the end of the tubing. “Dirty hands” opens the valve to the sample tap to purge the piping for a minimum of 2 minutes. “Clean hands” places the end of the silicone tubing back in the cleanbox.

9. “Dirty hands” opens the outer bag for the low-level total metals sample bottle. “Clean hands” removes the inner bag and bottle and places it in the cleanbox. “Clean hands” opens the inner bag and bottle lid. “Clean hands” removes the plastic bag from the tubing and fills the sample bottle. “Clean hands” places the tubing back in the plastic bag, replaces the lid on the sample bottle and closes the inner bag. “Clean hands” removes the sample bottle from the cleanbox and places it in the outer bag. “Dirty hands” closes the outer bag. The samplers repeat this procedure for the low-level total and dissolved mercury and routine total metals samples.

10. “Dirty hands” places an ERG label on the outer bags of the sample bottles.

11. “Dirty hands” opens the outer bag for a pre-cleaned 10-L container. “Clean hands” opens the inner bag and loosens the lid. “Clean hands” holds the end of the silicone tubing at the mouth of the 10-L container and removes the lid. “Dirty hands opens the sample valve to allow sample to flow into the 10-L container. Samplers fill two 10-L containers for the collection of low-level dissolved metals, routine dissolved metals, and routine hexavalent chromium, which are all required to be filtered. The samplers will allow the solids to settle for one hour while collecting the remaining samples. “Clean hands” places the plastic bag over the end of the silicone tubing. Both samplers change their gloves.

12. Samplers fill a 1-L jar for the field measurements. The samplers will give the jar to another sampling team member to measure the temperature, pH, and free and total chlorine.

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[2] ERG will collect the low-level dissolved mercury sample using the same technique as the low-level total mercury sample, but the dissolved sample will be filtered at the laboratory. A low-level dissolved mercury field blank will be performed by the laboratory to assess any mercury contamination from the filtering performed at the laboratory. Therefore, ERG does not need to collect a low-level dissolved mercury field blank sample in the field. In addition, a routine total metals field blank will be collected at the effluent from the FGD wastewater treatment system (SP-3) and not from the FGD primary clarifier effluent (SP-2).[2] ERG will use blank water from the clean metals supplier for the routine total metals field blank to prevent contamination so two different sets of sampling equipment are not required.

13. Both samplers collect the BOD_5, Group I, and Group II samples from the sample location.

14. Samplers remove the tubing from the sample tap and collect the HEM/SGT-HEM samples.

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15. "Dirty hands" covers the work surfaces (ground or table) with HDPE plastic wrap and places the double-bagged sample bottles within easy access on the covered surface.

16. "Dirty hands" opens the outer bag of the clean box and "Clean hands" opens the inner bag and the translucent bag. "Clean hands" places the cleanbox at the point of sample collection. "Clean hands" opens the cleanbox and secures it open with the clips located inside the box.

17. "Dirty hands" opens the opening on the peristaltic pump head so the tubing can be placed in the pump head. "Dirty hands" opens the outer bag containing a length of pre-cleaned Teflon® tubing attached to a 5-foot length of pre-cleaned silicone tubing, a "Y" splitter, and two additional pieces of pre-cleaned silicone tubing. "Clean hands" opens the inner bag and removes the tubing, holding the two ends pointing downward to reduce atmospheric contamination. "Clean hands" places a clean plastic bag over the end of the silicone tubing and places the end of the tubing in the cleanbox.

18. "Dirty hands" threads the silicone tubing into the peristaltic pump head.

19. Both samplers change gloves.

20. "Dirty hands" opens the outer bag of a capsule filter. "Clean hands" opens the inner bag and removes the capsule filter. "Clean hands" attaches the capsule filter to the silicone tubing just before the "Y" splitter.

21. "Dirty hands" opens the outer bag of the low-level dissolved metals field blank water and low-level dissolved metals field blank sample bottle. "Clean hands" removes the low-level dissolved metals field blank sample bottle and places it in the cleanbox. "Clean hands" opens the inner bags of the field blank water and the waste bottle. "Clean hands" removes the lid from the low-level dissolved metals field blank water, places it in the inner bag, and places the end of the Teflon® tubing in the blank water. "Clean hands" holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing and "dirty hands" operates the pump to pump about 750 mL of blank water from the field blank water bottle. "Clean hands" places the end of the silicone tubing in the cleanbox, opens the inner bag of the low-level dissolved metals field blank sample bottle, and removes the lid. "Dirty hands" operates the pump to collect the low-level dissolved metals field blank sample. The samplers

repeat this for the low-level hexavalent chromium field blank sample. "Dirty hands" stops the pump. If a new filter is needed, "clean hands" removes the used filter and samplers following step 21 to replace the filter.

22. Both samplers change gloves.

23. "Dirty hands" opens the outer bag of one of the 10-L specially-cleaned containers. "Clean hands" opens the inner bag, removes the lid, and places the end of the Teflon® tubing into the container. "Clean hands" holds the end of the silicone tubing outside the cleanbox, with the plastic bag still covering the end of the tubing. "Dirty hands" starts the pump and passes approximately 500 mL through the tubing and filter. "Dirty hands" stops the pump.

24. "Dirty hands" opens the outer bag of the low-level dissolved metals sample bottle. "Clean hands" removes the inner bag and bottle and places it in the cleanbox. "Clean hands" opens the inner bag and removes the lid. "Dirty hands" operates the pump to collect the low-level dissolved metals sample. "Dirty hands" stops the pump. "Clean hands" closes the lid on the sample bottle and closes the inner bags. "Clean hands" places the inner bag and bottle in the outer bag and "dirty hands" closes the outer bag. The samplers repeat this procedure for the low-level hexavalent chromium, routine dissolved metals, and routine hexavalent chromium samples.

25. "Dirty hands" places an ERG label on the outer bags of the sample bottles.

The primary clarifier effluent is estimated to remove the majority (approximately 99 percent) of the solids entering the FGD wastewater treatment system; therefore, the primary clarifier effluent is expected to contain approximately 0.1 percent solids. The pH of the wastewater should be approximately 9.2. The plant does not have a flow meter that measures the primary clarifier effluent flow rate; therefore, the samplers will estimate the flow rate based on the other associated flow rates through the system.

3.3.3 Effluent from the FGD Wastewater Treatment System (SP-3)

The effluent from FGD wastewater treatment system (SP-3) has a sample tap located on the wastewater piping downstream of the effluent storage tank. Mitchell continuously pumps wastewater from the effluent storage tank; however, when the plant is not feeding water into the wastewater treatment system, they are typically recycling the effluent wastewater back to the equalization tanks instead of discharging it to the bottom ash pond. The sample tap on the effluent storage tank is located upstream of the valve that directs the effluent flow to the bottom ash pond or the equalization tank; therefore, a sample can be collected from the effluent storage tank at any time. Because the characteristics of the wastewater that is discharged to the bottom ash pond do not vary from the wastewater that is recycled back to the equalization tanks, ERG will collect a sample of the effluent from the FGD wastewater treatment system regardless of whether it is being discharged to the bottom ash pond or is being recycled. ERG will follow protocols described in EPA Method 1669 to collect low-level metal sample fractions from SP-3.

ERG plans to collect split samples with Mitchell (or its representative), where possible; therefore, ERG plans to attach a piece of silicone tubing to the end of the sample tap with a "Y" splitter at the other end of the tubing to allow ERG and Mitchell (or its representative) collect samples simultaneously. If problems occur during the collection of split samples (e.g., the splitters become clogged and the flow is split unevenly between the sampling crews), then EPA may stop the split sample collection and offer instead to collect duplicate samples with Mitchell or its representative. For all analyses (except routine dissolved metals, routine hexavalent chromium, low-level dissolved metals, and HEM/SGT-HEM), the samplers will collect samples through the tubing directly into the specified containers. For the HEM/SGT-HEM samples, the bottles will be filled directly from the sample tap to avoid the oil and grease adhering to the sides of the tubing. For the dissolved metals samples, the samplers will fill two 10-L containers and then pump the aqueous portion of the sample through a 0.45 μm filter and then through a "Y" splitter into the specified containers; therefore, the dissolved metals samples will be collected as split samples.

For all analytes, ERG will collect QC samples at the effluent from the FGD wastewater treatment system (SP-3). In addition, for all analytes except HEM/SGT-HEM, ERG will collect a duplicate sample of the effluent from FGD wastewater treatment system (SP-5).

The sample of the effluent from the FGD wastewater treatment system (SP-3) will be collected from a sample tap. The sampling equipment will consist of the following:

- Colorless, electronic-grade, non-nitrile gloves;
- Silicone tubing with "Y" splitter;
- 10-L containers;
- Teflon® tubing;

- Silicone tubing;
- 0.45 um filter;
- Funnel;
- Peristaltic pump;
- Small table;
- Cleanbox;
- Tyvek® suits (for mercury samples);
- Masks (for mercury samples); and
- Sample containers.

All low-level metals sampling equipment will be specially-cleaned according to the procedures described in EPA Method 1669. ERG will follow protocols described in EPA Method 1669 to collect low-level metal sample fractions. Two ERG samplers ("clean hands" and "dirty hands") will follow the protocols described in the steps below to set up the sampling point, collect the field blank samples, and collect wastewater samples. This section only describes the set up of the sample point and collection of the EPA samples, and does not describe the collection of the split samples.

1. Samplers remove the bags containing the gloves and HDPE plastic wrap from the coolers or storage containers in which they are packed. Samplers identify which coolers or boxes contain the double-bagged sample bottles, pre-cleaned tubing, blank water, and cleanbox. Depending on the condition of the sample tap, it may be necessary to wipe the tap with a clean paper towel to remove any build up on the tap that could potentially fall in the sample bottles during sample collection.

2. Both samplers put on Tyvek® suits, masks, and gloves. "Dirty hands" covers work surfaces (ground or table) with HDPE plastic wrap and places the double-bagged sample bottles within easy access on the covered surface.

3. "Dirty hands" opens the outer bag of the cleanbox and "clean hands" opens the inner bag and the translucent bag. "Clean hands" places the cleanbox at the point of sample collection. "Clean hands" opens the cleanbox and secures it open with the clips located inside the box.

4. "Dirty hands" opens the outer bag containing a length of pre-cleaned silicone tubing. "Clean hands" opens the inner bag inside of the cleanbox and removes the tubing, holding the two ends pointing downward to reduce atmospheric contamination. "Clean hands" places clean plastic bags over the ends of the silicone tubing.

5. "Dirty hands" opens the outer bag of the funnel and "clean hands" opens the inner bag inside of the cleanbox. "Clean hands" attaches the funnel to the tubing.

6. “Dirty hands” opens the outer bags of the low-level total mercury field blank water and low-level total mercury field blank sample bottle. “Clean hands” opens the inner bag for the field blank water, unscrews the lid and places it in the inner bag. “Clean hands” passes the funnel end of the tubing with a plastic bag shrouding the funnel to another “clean hands” person to hold outside the cleanbox. “Clean hands” removes the inner bag for the low-level total mercury field blank sample bottle and places it in the cleanbox. “Clean hands” holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing. “Dirty hands” pours field blank water through the funnel and tubing. After the tubing has been purged with sufficient volume, “clean hands” places the silicone tubing back in the cleanbox. Working inside the cleanbox, “clean hands” unscrews the lid of the field blank sample bottle, removes the tubing from the plastic bag, and prepares to fill the field blank sample bottle. “Dirty hands” pours field blank water into the funnel and tubing, and “clean hands” fills the field blank sample bottle. “Clean hands” places the end of the silicone tubing into the plastic bag, replaces the lid on the sample bottle, and closes the inner bag. “Clean hands” removes the bottle from the cleanbox and places it in the outer bag. “Dirty hands” closes the outer bag. The samplers repeat this procedure for the low-level total metals and routine total metals field blank[3].

7. After collecting the field blank samples, “clean hands” removes the funnel from the tubing. “Clean hands” and “dirty hands” work to attach the end of the silicone tubing to the sample tap.

8. “Clean hands” holds the opposite end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag covering the end of the tubing. “Dirty hands” opens the valve to the sample tap to purge the piping for a minimum of 2 minutes. “Clean hands” places the end of the silicone tubing back in the cleanbox.

9. “Dirty hands” opens the outer bag for the low-level total metals sample bottle. “Clean hands” removes the inner bag and bottle and places it in the cleanbox. “Clean hands” opens the inner bag and bottle lid. “Clean hands” removes the plastic bag from the tubing and fills the sample bottle. “Clean hands” places the tubing back in the plastic bag, replaces the lid on the sample bottle and closes the inner bag. “Clean hands” removes the sample bottle from the cleanbox and places it in the outer bag. “Dirty hands” closes the outer bag. The samplers repeat this procedure for the low-level total and dissolved mercury and routine total metals samples, as well as the QC and duplicate samples for each analyte.

10. “Dirty hands” opens the outer bag for a pre-cleaned 10-L container. “Clean hands” opens the inner bag and loosens the lid. “Clean hands” holds the end of the silicone tubing at the mouth of the 10-L container and removes the lid. “Dirty

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[3] ERG will collect the low-level dissolved mercury sample using the same technique as the low-level total mercury sample, but the dissolved sample will be filtered at the laboratory. A low-level dissolved mercury field blank will be performed by the laboratory to assess any mercury contamination from the filtering performed at the laboratory. Therefore, ERG does not need to collect a low-level dissolved mercury field blank sample in the field.

hands opens the sample valve to allow sample to flow into the 10-L container. Samplers fill two 10-L containers for the collection of low-level dissolved metals, routine dissolved metals, and routine hexavalent chromium, which are all required to be filtered. The samplers will allow the solids to settle for one hour while collecting the remaining samples. "Clean hands" places the plastic bag over the end of the silicone tubing. Both samplers change their gloves.

11. "Dirty hands" places an ERG label on the outer bags of the sample bottles.

12. Samplers fill a 1-L jar for the field measurements. The samplers will give the jar to another sampling team member to measure the temperature, pH, and free and total chlorine.

13. Both samplers collect the BOD_5, Group I, and Group II samples, as well as the QC and duplicates samples for each analyte, from the sample location.

14. Samplers remove the tubing from the sample tap and collect the HEM/SGT-HEM and the HEM/SGT-HEM QC samples.

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15. Samplers move the two 10-L sample containers to the sample pump-off location.

16. "Dirty hands" covers the work surfaces (ground or table) with HDPE plastic wrap and places the double-bagged sample bottles within easy access on the covered surface.

17. "Dirty hands" opens the outer bag of the clean box and "Clean hands" opens the inner bag and the translucent bag. "Clean hands" places the cleanbox at the point of sample collection. "Clean hands" opens the cleanbox and secures it open with the clips located inside the box.

18. "Dirty hands" opens the opening on the peristaltic pump head so the tubing can be placed in the pump head. "Dirty hands" opens the outer bag containing a length of pre-cleaned Teflon® tubing attached to a 5-foot length of pre-cleaned silicone tubing, a "Y" splitter, and two additional pieces of pre-cleaned silicone tubing. "Clean hands" opens the inner bag and removes the tubing, holding the two ends pointing downward to reduce atmospheric contamination. "Clean hands" places a clean plastic bag over the end of the silicone tubing and places the end of the tubing in the cleanbox.

19. "Dirty hands" threads the silicone tubing into the peristaltic pump head.

20. Both samplers change gloves.

21. "Dirty hands" opens the outer bag of a capsule filter. "Clean hands" opens the inner bag and removes the capsule filter. "Clean hands" attaches the capsule filter to the silicone tubing just before the "Y" splitter.

22. "Dirty hands" opens the outer bag of the low-level dissolved metals field blank water and low-level dissolved metals field blank sample bottle. "Clean hands" removes the low-level dissolved metals field blank sample bottle and places it in the cleanbox. "Clean hands" opens the inner bag of the field blank water. "Clean hands" removes the lid from the low-level dissolved metals field blank water, places it in the inner bag, and places the end of the Teflon® tubing in the blank water. "Clean hands" holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing and "dirty hands" operates the pump to pump about 750 mL of blank water from the field blank water bottle. "Clean hands" places the end of the silicone tubing in the cleanbox, opens the inner bag of the low-level dissolved metals field blank sample bottle, and removes the lid. "Dirty hands" operates the pump to collect the low-level dissolved metals field blank sample. "Dirty hands" stops the pump. "Clean hands" closes the lid on the sample bottle and closes the inner bag. "Clean hands" places the inner bag and bottle in the outer bag and "dirty hands" closes the outer bag. The samplers repeat this procedure for the low-level hexavalent chromium, routine dissolved metals and routine hexavalent chromium field blank samples[4]. Note: 750 mL of blank water does not need to be purged into the waste bottle for each sample, just at the beginning of each new filter. If a new filter is needed, "clean hands" removes the used filter and samplers following step 21 to replace the filter.

23. Both samplers change gloves.

24. "Dirty hands" opens the outer bag of one of the 10-L specially-cleaned containers. "Clean hands" opens the inner bag, removes the lid, and places the end of the Teflon® tubing into the container. "Clean hands" holds the end of the silicone tubing outside the cleanbox, with the plastic bag still covering the end of the tubing. "Dirty hands" starts the pump and passes approximately 500 mL through the tubing and filter. "Dirty hands" stops the pump.

25. "Dirty hands" opens the outer bag of the low-level dissolved metals sample bottle. "Clean hands" removes the inner bag and bottle and places it in the cleanbox. "Clean hands" opens the inner bag and removes the lid. "Dirty hands" operates the pump to collect the low-level dissolved metals sample. "Dirty hands" stops the pump. "Clean hands" closes the lid on the sample bottle and closes the inner bags. "Clean hands" places the inner bag and bottle in the outer bag and "dirty hands" closes the outer bag. The samplers repeat this procedure for the low-level hexavalent chromium, routine dissolved metals, and routine hexavalent chromium samples, as well as the QC and duplicate samples for each analyte.

[4] ERG will use blank water from the clean metals supplier for the routine dissolved metals field blank and routine hexavalent chromium field blank to prevent contamination so two different sets of sampling equipment are not required.

26. “Dirty hands” places an ERG label on the outer bags of the sample bottles.

The effluent from the FGD wastewater treatment system should contain very little solids. The pH of the wastewater should be between 6.5 and 9.0. Mitchell continuously records the flow from the effluent tank to the bottom ash pond, as well as the flow rate of the recycle from the effluent tank to the equalization tank.

3.3.4 Effluent from the Fly Ash Pond (SP-4)

The wastewater from the fly ash pond at Mitchell is transferred to a channel and ultimately discharged to Fish Creek. For all analytes (except HEM/SGT-HEM), the samplers will collect samples from the channel that discharges to Fish Creek. Along the channel is a steel platform that protrudes over the flowing water and will allows samplers easy access to the wastewater. Samplers will pump the samples directly from the flowing stream into the specified containers using a peristaltic pump and tubing. ERG will follow protocols described in EPA Method 1669 to collect low-level metal sample fractions at SP-4. ERG plans to collect split samples with Mitchell or its representative, where possible; therefore, a “Y” splitter will be placed on the end of the silicone tubing after the peristaltic pump with two pieces of silicone tubing attached to the “Y” splitter. The routine and low-level dissolved metals samples will be collected by attaching a capsule filter onto the silicone tubing, prior to the “Y” splitter to allow for in-line filtration in addition to split sample collection. For HEM/SGT-HEM samples, the bottle will be filled by dipping the bottles directly into the waste stream. The HEM/SGT-HEM samples will not be collected as “splits”. For all metal analytes, ERG will collect QC samples at the effluent from the fly ash pond (SP-4)

For the collection of the fly ash pond effluent, the samplers will be accessing the waste stream from a platform along the side of the channel. Because the platform may be made of steel, there is the possibility for metals contamination from the surroundings; therefore, the samplers will use care when setting up the sample point to avoid any contamination. The sampling equipment will consist of the following:

- Peristalic pump;
- Colorless, electronic-grade, non-nitrile gloves;

- Tyvek® suits (for mercury samples);
- Masks (for mercury samples);
- PVC piping;
- Bottle dipper;
- 0.45 um filter;
- "Y" splitter;
- Teflon® tubing;
- Silicone tubing;
- Cleanbox; and
- Sample containers.

All low-level metals sampling equipment will be specially-cleaned according to procedures described in EPA Method 1669. ERG will follow protocols described in EPA Method 1669 to collect low-level metal sample fractions. Two ERG samplers ("clean hands" and "dirty hands") will follow the protocol described in the steps below to set up the sampling point, collect the equipment field blank samples, and collect wastewater samples. This section only describes the set up of the sample point and collection of the EPA samples, and does not describe the collection of the split samples.

1. Samplers remove the bags containing the gloves and HDPE plastic wrap from the coolers or storage containers in which they are packed. Samplers identify which coolers or boxes contain the double-bagged sample bottles, pre-cleaned tubing, and cleanbox.

2. Both samplers put on Tyvek® suits, gloves, and masks. "Dirty hands" covers work surfaces (tables and platform) with HDPE plastic wrap and places the double-bagged sample bottles and Teflon® tubing within easy access on the covered surface.

3. "Dirty hands" opens the outer bag of the cleanbox and "clean hands" opens the inner bag and the translucent bag. "Clean hands" places the cleanbox at the point of sample collection. "Clean hands" opens the cleanbox and secures it open with the clips located inside the box.

4. "Dirty hands" opens the opening on the peristaltic pump head so the tubing can be placed in the pump head. "Dirty hands" opens the outer bag containing a length of pre-cleaned Teflon® tubing attached to a 5-foot length of pre-cleaned silicone tubing with a "Y" splitter and two separate pieces of silicone tubing attached to the "Y" splitter. "Clean hands" opens the inner bag and removes the tubing, holding the ends pointing downward to reduce atmospheric contamination. "Clean hands" places a clean plastic bag over the end of the silicone tubing and places the end of the tubing in the cleanbox.

5. “Dirty hands” threads the silicone tubing into the peristaltic pump head.

6. Both samplers change gloves.

7. “Dirty hands” opens the outer bags of the low-level total mercury field blank water and low-level total mercury field blank sample bottles. “Clean hands” opens the inner bag for the field blank water, unscrews the lid and places it in the inner bag. “Clean hands” then places the Teflon® end of the tubing into the blank water. “Clean hands” removes the inner bag for the low-level total mercury field blank sample bottle and places it in the cleanbox. Working inside the cleanbox, “clean hands” unscrews the lid. “Clean hands” holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing. “Dirty hands” operates the pump to pump blank water through the tubing. After the tubing has been purged with sufficient volume, “clean hands” places the silicone tubing back in the cleanbox, removes the plastic bag, and fills the low-level total mercury field blank sample bottle. “Dirty hands” stops the pump. “Clean hands” places the plastic bag over the end of the silicone tubing, replaces the lid on the sample bottle, and closes the inner bag. “Clean hands” removes the bottle from the cleanbox and places it in the outer bag. “Dirty hands” closes the outer bag. Because splits are being collected, two low-level total mercury field blank waters will need to be pumped through the tubing to collect both samples. The samplers repeat this procedure for the low-level total metals field blank[5] and the routine total metals field blank[6].

8. “Dirty hands” opens the outer bag of a capsule filter. “Clean hands” opens the inner bag and removes the capsule filter. “Clean hands” attaches the capsule filter to the end of the silicone tubing, prior to the “Y” splitter.

9. “Dirty hands” opens the outer bag of the low-level dissolved metals field blank water and low-level dissolved metals field blank sample bottle. “Clean hands” removes the low-level dissolved metals field blank sample bottle and places it in the cleanbox. “Clean hands” opens the inner bag of the field blank water. “Clean hands” removes the lid from the low-level dissolved metals field blank water, places it in the inner bag, and places the end of the Teflon® tubing in the blank water. “Clean hands” holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing and “dirty hands” operates the pump to purge about 750 mL of blank water from the field blank water bottle through the tubing and filter. “Clean hands” places the end of the silicone tubing in the cleanbox, opens the inner bag of the low-level dissolved metals field blank sample bottle, and removes the lid. “Clean hands” holds the silicone tubing over the bottle and “dirty hands” operates the pump to collect the

[5] ERG will collect the low-level dissolved mercury sample using the same technique as the low-level total mercury sample, but the dissolved sample will be filtered at the laboratory. A low-level dissolved mercury field blank will be performed by the laboratory to assess any mercury contamination from the filtering performed at the laboratory. Therefore, ERG does not need to collect a low-level dissolved mercury field blank sample in the field.
[6] ERG will use blank water from the clean metals supplier for the routine total metals field blank to prevent contamination so two different sets of sampling equipment are not required.

low-level dissolved metals field blank sample. “Dirty hands” stops the pump. “Clean hands” closes the lid on the sample bottle and closes the inner bag. “Clean hands” places the inner bag and bottle in the outer bag and “dirty hands” closes the outer bag. The samplers repeat this procedure for the low-level hexavalent chromium, routine dissolved metals, and routine hexavalent chromium field blank samples[7]. Note: 750 mL of blank water does not need to be purged into the waste bottle for each sample, just at the beginning of each new filter. If a new filter is needed, “clean hands” removes the used filter and samplers follow step 9 to replace the filter.

10. Both samplers change gloves.

11. After collecting all of the total and dissolved metals field blank samples, “clean hands” and “dirty hands” work together to place the Teflon® end of the tubing into the sample water, taking care that the end of the tubing does not touch anything other than the sample water. The samplers will secure the Teflon® tubing to a piece of PVC piping so the samplers can easily control the position of the tubing in the tank. The upper portion of the PVC.

12. “Clean hands” holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing and “dirty hands” operates the pump to purge the tubing for a minimum of 2 minutes. After the tubing is purged, “Dirty hands” turns off the pump. “Clean hands” places the end of the silicone tubing back in the cleanbox. .

13. “Dirty hands” opens the outer bag of the low-level dissolved metals sample bottle. “Clean hands” removes the inner bag and bottle and places it in the cleanbox. “Clean hands” opens the inner bag and removes the lid. “Clean hands” holds the silicone tubing over the bottle and “dirty hands” operates the pump to collect the low-level dissolved metals sample. “Clean hands” closes the lid on the sample bottle and closes the inner bag. “Clean hands” places the inner bag and bottle in the outer bag and “dirty hands” closes the outer bag. The samplers repeat this procedure for the low-level hexavalent chromium, routine dissolved metals, and routine hexavalent chromium samples, as well as the QC for each analyte.

14. Both samplers change gloves.

15. “Clean hands” removes the capsule filter from the silicone tubing and reattaches the tubing to the “Y” splitter.

16. “Clean hands” holds the end of the silicone tubing outside the cleanbox over a bucket, with the plastic bag still covering the end of the tubing. “Dirty hands” operates the pump to purge the tubing for at least 2 minutes.

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[7] ERG will use blank water from the clean metals supplier for the routine dissolved metals field blank and routine hexavalent chromium field blank to prevent contamination so two different sets of sampling equipment are not required.

17. “Dirty hands” opens the outer bag for the low-level total metals sample bottle. “Clean hands” removes the inner bag and bottle and places it in the cleanbox. “Clean hands” opens the inner bag and bottle lid. “Clean hands” removes the plastic bag from the tubing and fills the sample bottle. “Clean hands” places the tubing back in the plastic bag, replaces the lid on the sample bottle and closes the inner bag. “Clean hands” removes the sample bottle from the cleanbox and places it in the outer bag. “Dirty hands” closes the outer bag. The samplers repeat this for the low-level total and dissolved mercury and routine total metals samples.

18. “Dirty hands” places an ERG label on the outer bags of the sample bottles.

19. Samplers fill a 1-L jar for the field measurements. The samplers will give the jar to another sampling team member to measure the temperature, pH, and free and total chlorine.

20. Both samplers collect the BOD_5, Group I, and Group II samples from the sample location. Samples will be pumped directly into sample bottles.

21. For the HEM/SGT-HEM samples, tubing should not be used to collect the samples because the oil and grease adheres to the sides of the tubing. Therefore, the samplers will collect the HEM/SGT-HEM samples using a bottle dipper, which will be dipped into the flowing waste stream.

The effluent from the fly ash pond is discharged to Fish Creek; the facility’s permit limit is less than 30 mg/L monthly average TSS; therefore, the wastewater should have relatively low solids. The pH of the fly ash pond effluent should be between 6.0 and 9.0 S.U. Mitchell has a flow meter that monitors the effluent flow rate from the fly ash pond, which samplers will use to record the flow rate during the sampling episode.

3.4 Sample Preservation, Shipping, and Analysis

All samples will be maintained on ice immediately upon collection (except routine metals and all low-level metals samples which do not require cooling). In addition, all samples, except metals, will be preserved on site according to method-specified protocols. The dissolved routine metals, low-level metals (except low-level mercury), and hexavalent chromium samples will be filtered in the field. All metals samples, except hexavalent chromium, will be acid preserved prior to extraction at the laboratory. Routine and low-level hexavalent chromium samples will be preserved on site, according to the method-specified protocols. Samplers will filter samples within 15 minutes of grab collection or sample fraction preparation (or as soon thereafter as possible). For the FGD influent, filtration of dissolved samples will occur an hour after sample collection to allow for solids settling because it has a high solids content.

Table 3-3 lists the parameters, bottle types, sample volume, and on-site preservation requirements for each type of analysis. The type and amount of preservation used will be recorded on sample preservation log sheets (Figure 3-1). Preservation will be discontinued and noted on the traffic report if 10 percent of the sample volume is added and the required pH is not achieved. The wastewater samples, except routine and low-level metals, will be packed in ice chests with a sufficient quantity of ice to maintain a temperature of ≤6°C. All samples can be prepared for overnight shipment via Federal Express to laboratories specified by EPA's Sample Control Center (SCC).

3.5 Field Measurements and Engineering Data Collection

Temperature, pH, and total and free chlorine will be measured and recorded by the sampling crew at each sampling point (SP-1, SP-2, SP-3, and SP-4) when each grab sample is collected. A 1-liter glass jar will be filled during collection of each grab sample set for field measurements. Temperature and pH will be measured immediately after the collection of the field measurement aliquot; the other field measurements will be conducted shortly thereafter, either in the field (preferably) or in the sample staging area. Samplers will follow applicable test kit calibration procedures specified by the manufacturer. Table 3-4 summarizes the field measurements, the method to be used for the measurement, and the detection range of each field test instrument. In addition, EPA will collect flow rate data for each sampled waste stream. The flow rates for the influent to and the effluent from the FGD wastewater treatment system, as well as the effluent from the fly ash pond, will be collected from the plant's existing flow recorders. The flow rate of the primary clarifier effluent will be estimated based on the other flow rates available for the FGD wastewater treatment system.

Field sampling log sheets (Figure 3-2) will be completed at each sampling point. This sheet will record the sampling methodology, names of the samplers, sample collection time, field measurements, and any notes and observations.

During each sampling episode, engineering information will be collected with regard to design and operation of the plant being sampled. For example, information such as coal usage, plant capacity, wastewater flow rates, sludge generation rates (if applicable), and retention times in wastewater treatment process stages. Engineering data collection sheets (Figures 3-3, 3-4, 3-5, and 3-6) will be completed for each plant. This information will be used to determine if the specific design or operational criteria of the steam electric operations affect the wastewater characteristics.

3.6 Sample Labeling

Each sample will be coded with a unique sample number and labeled at the time of collection. Typically, labels are printed prior to arrival in the field, though they may also be completed by hand. Each self-adhesive label is completed in indelible ink and contains the following information:

- Sample number (i.e., SCC number);
- Sampling episode number;
- Sampling point/description;
- Date of sample collection;
- Analysis to be performed;
- Sample bottle type; and
- Required preservation.

If any of the pre-printed information is incorrect, it will be revised using indelible ink. In particular, if a required preservation is not used, it will be marked out (additional preservation details will be noted on the traffic report). Once applied to the sample container, labels are covered with clear tape to prevent tampering, abrasion, smearing, or loss during transit. For low-level metal samples, the samplers will not label the sample bottles, but will label the outer plastic bag of the sample bottle.

3.7 Traffic Reports

To maintain a record of sample collection, transfer between personnel, shipment, and receipt by the laboratory, a SCC traffic report is completed for each sample set at each sampling location. These forms are used to document sample custody transfer from the field to the laboratory. SCC traffic report forms are completed for all samples sent to all laboratories. Figure 3-7 includes an example SCC traffic report. At the time of sample shipment, a copy of the traffic report is sent to SCC, another copy is kept by sampling personnel, and two copies are transmitted with the samples to the analytical laboratory.

In addition to the transfer of custody, the traffic report provides information to the analytical laboratory on the sample number, type of water sample (in-line process, untreated wastewater, treated effluent), sample description, whether the sample is preserved, pH of the sample after preservation, type of sample (grab, composite), sample collection date and time, and the analyses requested. The comment section is used to provide special notes or instructions to the laboratory, such as whether samples have been filtered on site or how to composite separate samples prior to analysis. The sampling team will also comment if sample bottles are not completely filled (i.e., less than 75 percent full). In addition, the comments section will be used to note deviations from standard sampling protocols (for example, if a sample could not be acid-preserved because of excessive buffering).

3.8 Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) procedures applicable to this project are outlined in the *Quality Assurance Project Plan for the Steam Electric Detailed Study* [2]. The QA/QC program for sample collection at Mitchell will include the following:

- Documentation for samples through laboratory traffic reports;
- Collection of duplicate samples;
- Collection of bottle blank(s) for low-level metals;
- Collection of field blank(s) for routine total metals, routine dissolved metals, low-level total metals, and low-level dissolved metals.
- Collection of equipment blank(s) for low-level metals;
- Collection of laboratory QC samples for matrix spike/matrix spike duplicate analyses and serial dilutions.

Duplicate sample sets will be collected as part of the quality assurance program for sampling. EPA will collect one duplicate sample (SP-5) at the effluent from the FGD wastewater treatment system (SP-3). The duplicate samples will be collected as separate aliquots at the sampling point, filled immediately after the original sample fraction. Results of the duplicate analyses will be used to evaluate precision, including variability in sample collection, handling, preparation, and analysis.

Bottle blanks will be used to evaluate possible contamination from the sample bottles. Bottle blanks will be prepared and analyzed for low-level metals. The supplier of the low-level metals bottles will prepare and analyze the bottle blanks for low-level metals.

Field blanks will be used to evaluate possible contamination caused by sampling equipment or by sampling equipment decontamination procedures. Field blanks will be prepared in the field prior to sample collection and analyzed for all sampling equipment, other than sample bottles, that come into direct contact with samples (e.g., tubing or filters).

EPA will prepare field blanks for each of the low-level total and dissolved metals analyses at each of the four sampling points and routine total and dissolved metals at the effluent from the FGD wastewater treatment system (SP-3), and the effluent from the ash pond (SP-4)[8]. ERG samplers will use "clean hands / dirty hands" sampling techniques to prepare the low-level metals field blanks. Section 3.3 discusses the details of the field blank collection techniques. The field blanks at each of the sampling points for the low-level total metals and routine total metals will be prepared by pumping or gravity feeding ASTM Type 1 water through Teflon® and/or silicone tubing into the sample bottles. The field blanks at each of the sampling points for routine dissolved metals, routine hexavalent chromium, low-level hexavalent chromium, and low-level dissolved metals will be prepared by pumping ASTM Type 1 water through the Teflon® and silicone tubing, through a 0.45 um filter, and into the sample bottles before filtering the samples. The field blanks will evaluate if there is any contamination from the sampling equipment, atmospheric contamination or other contamination from the surroundings.

[8] For routine total and dissolved metals, EPA is collecting field blanks for each different type of sampling technique; therefore, only one field blank is needed for the influent to the FGD wastewater treatment system, the FGD primary clarifier effluent, and the effluent from the FGD wastewater treatment system because a similar technique is used to collect the samples.

EPA Method 1669 requires that equipment blanks also be prepared and analyzed for low-level metals. The supplier of the tubing and composite containers will prepare and analyze these equipment blanks and provide a report certifying the equipment as clean.

As part of standard laboratory quality control (QC), matrix effects on analytical performance are assessed through the analysis of matrix spikes and laboratory duplicates. Consequently, additional sample volume must be collected for these QC analyses. The ERG sampling team will collect, label, and ship the laboratory QC volumes. Laboratory QC volumes will be collected as duplicate samples collected immediately after the original sample aliquot. For metals analyses, the sampling team will collect QC sample volume from the effluent from the FGD wastewater treatment system (SP-3), and the effluent from the ash pond (SP-4). For classicals analyses, the sampling team will collect QC sample volume at the effluent from the FGD wastewater treatment system (SP-3).

3.9 <u>Sample Splitting</u>

Mitchell or its representative has elected to collect split samples at each of the sampling points. Mitchell or its representative will supply all of the personnel, equipment, glassware, and reagents required to collect the split samples and to coordinate the analysis of samples. For each of the sampling points, the sampling crew will attempt to collect split samples with Mitchell or its representative as described in this plan; however, if problems occur (e.g., the splitters become clogged and the flow is split unevenly between the sampling crews), then EPA may stop the split sample collection and offer instead to collect duplicate samples with Mitchell or its representative.

3.10 <u>Speciation Sampling</u>

EPA plans to collect samples for the analysis of arsenic and selenium speciation. For this analysis, ERG will collect two 125-mL samples in amber glass containers at each sample point. One sample bottle, the duplicate sample, will be preserved to a pH less than 2 with hydrochloric acid. The other sample bottle will not be preserved. The samples will be collected leaving little head space in the bottles. Once collected, the samples will be placed on ice and cooled to less than 6°C. ERG will ship the samples, on ice, for analysis.

Table 3-1. Sample Collection at the Mitchell Plant

Sampling Point Number	Sampling Point Name	Low-Level Total Metals (11 analytes)	Low-Level Dissolved Metals (11 analytes)	Low-Level Total Mercury	Low-Level Dissolved Mercury	Low-Level Hexavalent Chromium	Routine Total Metals (27 analytes)	Routine Dissolved Metals (27 analytes)	BOD_5	Group I (a)	Group II (b)	HEM / SGT-HEM	Routine Hexavalent Chromium	Selenium/arsenic Speciation
SP-1	Influent to FGD Wastewater Treatment System	1	1	1	1		1	1	1	1	1	1	1	1+dup
SP-2	Primary Clarifier Effluent in FGD Wastewater Treatment System	1	1	1	1	1	1	1	1	1	1	1	1	1+dup
SP-3	Effluent from FGD Wastewater Treatment System	1+QC	1+QC	1+QC	1+QC	1+QC	1+QC	1+QC	1+QC	1+QC	1+QC	1+QC	1+QC	1+dup
SP-4	Effluent from Fly Ash Pond	1+QC	1+QC	1+QC	1+QC	1+QC	1+QC	1+QC	1	1	1	1	1	1+dup
SP-5	Duplicate of Effluent from FGD Wastewater Treatment System	1	1	1	1	1	1	1	1	1	1		1	
SP-6	Influent to FGD Wastewater Treatment System Field Blank	1	1	1										
SP-7	Primary Clarifier Effluent in FGD Wastewater Treatment System Field Blank	1	1	1		1								
SP-8	Effluent from FGD Wastewater Treatment System Field Blank	1	1	1		1	1	1					1	
SP-9	Effluent from Ash Pond Field Blank	1	1	1		1	1	1					1	
Total Number of Samples		9+2QC	9+2QC	9+2QC	5+2QC	4+2QC	7+2QC	7+2QC	5+1QC	5+1QC	5+1QC	4+1QC	7+1QC	4+4dup

(a) Group I includes total suspended solids (TSS), total dissolved solids (TDS), sulfate and chloride.
(b) Group II includes ammonia as nitrogen, nitrate/nitrite as nitrogen, total Kjeldahl nitrogen (TKN), and total phosphorus.

Table 3-2. Analytical Methods and Procedures for Samples Collected at Mitchell

Method Number	Parameter	Method Type
Classicals		
SM 5210 B	Biochemical Oxygen Demand (BOD_5)	Probe
SM 2540 D	Total Suspended Solids (TSS)	Gravimetric
SM 2540 C	Total Dissolved Solids (TDS)	Gravimetric
ASTM D516-90	Sulfate	Turbidimetric
SM 4500–Cl–C	Chloride	Titrimetric, mercuric nitrate
SM 4500—NH3 B, F (18th ed.)	Ammonia as Nitrogen	Distillation, potentiometric
SM 4500—NO3 -H	Nitrate/Nitrate as Nitrogen	Autoanalyzer
SM 4500—NH3 B or C, F (18th ed.)	Total Kjeldahl Nitrogen (TKN)	Digestion, distillation, potentiometric
EPA 365.3 (Rev 1978)	Total phosphorus	Digestion, spectrophotometric
EPA 1664A	Hexane Extractable Material (HEM)	Gravimetric
EPA 1664A	Silica Gel Treated Hexane Extractable Material (SGT-HEM)	Gravimetric
ASTM D1687-92	Hexavalent Chromium	Colorimetric
Metals		
EPA 1631	Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry	Oxidation, Purge and Trap, and CVAFS
EPA 1636	Determination of Hexavalent Chromium by Ion Chromatography	Ion Chromatography
EPA 1638	Determination of Trace Elements in Ambient Waters by Inductively Coupled Plasma – Mass Spectroscopy (includes antimony, arsenic, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, and zinc)	ICP/MS
EPA 200.7, 200.8, 200.9, 245.2	Metals by Inductively Coupled Plasma Atomic Emission Spectrometry, Mass Spectrometry, and Atomic Absorption Spectroscopy	GFAA, ICP, ICP/MS, and CVAA

CVAFS - Cold vapor atomic fluorescence spectrometry.
AA - Atomic Adsorption.
ICP/MS - Inductively coupled plasma with mass spectrometry.
GFAA - Graphite furnace atomic adsorption.
ICP - Inductively coupled plasma.
CVAA - Cold vapor atomic adsorption.

Table 3-3. Summary of Sample Container and Preservation Requirements

Parameter	Sample Container and Volume	On-Site Preservation
Classicals		
BOD_5	One 1-L plastic bottle	≤6°C
Group I (a)	Two 1-L plastic bottle	≤6°C
Group II (b)	Two 1-L plastic bottle	H_2SO_4 to pH <2, ≤6°C
HEM/SGT-HEM	Two 1-L wide mouth glass jar	H_2SO_4 to pH <2, ≤6°C
Routine hexavalent chromium	One 250-mL plastic bottle	0.45 µm filter (performed in field) Ammonium sulfate buffer to pH 9.3 – 9.7, ≤6°C
Metals		
Routine total metals, 27 element quantitation (Method 200.7, 200.8, 200.9, 245.2)	One 500-mL plastic bottle	None (acid preserve at laboratory)
Routine dissolved metals, 27 element quantitation (Method 200.7, 200.8, 200.9, 245.2)	One 500-mL plastic bottle	0.45 µm filter (performed in field) (acid preserve at laboratory)
Low-level total mercury (Method 1631)	One 250-mL glass (ultraclean), fluoropolymer lined caps	None (acid preserve at laboratory)
Low-level dissolved mercury (Method 1631)	Two 250-mL glass (ultraclean), fluoropolymer lined caps	None (acid preserve and filter at laboratory)
Low-level total elements by ICP/MS (11 elements, Method 1638)	One 250-mL LDPE (ultraclean), fluoropolymer lined caps	None (acid preserve at laboratory)
Low-level dissolved elements by ICP/MS (11 elements, Method 1638)	Two 250-mL LDPE (ultraclean), fluoropolymer lined caps	0.45 µm filter (performed in field) (acid preserve at laboratory)
Low-level hexavalent chromium (Method 1636)	One 250-mL LDPE (ultraclean), fluoropolymer lined caps	0.45 µm filter (performed in field) 2 mL 50% NaOH per 250 mL sample (performed in field)
Selenium/arsenic speciation	Two 125-mL amber glass (ultraclean)	None for original sample, ≤6°C Duplicate: HCl to pH <2, ≤6°C

(a) Group I includes TSS, TDS, sulfate, and chloride.
(b) Group II includes ammonia as nitrogen, nitrate/nitrite as nitrogen, TKN, and total phosphorus.

Table 3-4. Sampling Point Field Measurements

Field Measurements	Method	Detection Range (or Gradation of Scale)
Temperature	Thermometer	-20 to 150 ± 1°C
pH (Standard Units)	Four color indicator strip pH meter	0 to 12 ± 1 pH S.U. -1.0 to 15.0 ± 0.1 pH S.U.
Chlorine, free and total	Colorimetric test kit	0 to 2.00 mg/L

Sampling Episode ____________

Preservation Chemicals - List Strength of Solution from Bottle and Lot Number								
H_2SO_4 ____________________ NH_4SO_4 ____________________								
NaOH ____________________								
Sample Number	**Analysis**	**Date**	**Time**	**Name**	**Chemical**	**Initial pH**	**Final pH**	**Number of Drops**

Figure 3-1. Sample Preservation Log Sheet

Sampling Episode: ______________________________

Sampling Point: ______________________________

Sample Numbers: ______________________________

Date: ______________________________

Manual Composite ☐ Grab ☐

Automatic Composite ☐

Time of Grab Sample Collection:

Start Time ________ ☐ AM ☐ PM

End Time _________ ☐ AM ☐ PM

Equipment Used: ____

Samplers' Names: ____

Sample Point	**Time**	**Temp °C**	**pH (S.U.) meter / strips**	**Free Chlorine (mg/L)**	**Total Chlorine (mg/L)**	**Manganese Interference Reading (mg/L)**	**Waste Stream Flow Rate (MGD)**
1							
2							
3							
4							
5							
6							
7							

Notes: (include observations of odor and color of each aliquot, take pictures if necessary)

____

____

____

____

____

____

Figure 3-2. Field Sampling Log Sheet

Plant Name: ____

Plant Contact: ____

Date of Sample Collection: ____

Time(s) of Sample Collection: ____

Data Collected by: ____

Instruction: Provide actual data if possible. If not, provide estimated data. Some of the data requested may not be susceptible to estimation. Enter "URE" for "unable to reasonably estimate." Otherwise, specify whether data provided are actual or estimated by writing in "ACT" or EST" wherever appropriate.

Unit Operating Characteristics During Sample Collection

Unit ID	Boiler Type	Coal type	Amount of Coal Used	Source of Coal (coal region and/or state)	Percent Sulfur in Coal	Capacity (MW)	Electricity Production (or percent capacity)	SCR (No, On, Off)	Particulate Control System (HS/CS ESP, or BH)	Wet FGD System (Yes/No)

Note changes in operation over the past month (e.g., turned off SCRs on October 1 or burned 5% petroleum coke previous week):

____

____

____

____

____

Figure 3-3. Engineering Data Collection Sheet (Page 1 of 4)

Plant Name: ____________________
Plant Contact: ____________________
Date of Sample Collection: ____________________
Time(s) of Sample Collection: ____________________
Data Collected by: ____________________

Instruction: Provide actual data if possible. If not, provide estimated data. Some of the data requested may not be susceptible to estimation. Enter "URE" for "unable to reasonably estimate." Otherwise, specify whether data provided are actual or estimated by writing in "ACT" or EST" wherever appropriate.

Ash System Information

Unit ID	Type of Scrubber	Sorbent	Source of Fly Ash Sluice Water	FGD Make-up Water Source	SO_2 Removal Percentage	Forced Oxidation (Yes/No)	Percent Solids in Absorber Blowdown	Type of Solids Separation

Note changes in operation over the past month (e.g., turned off SCRs on October 1 or burned 5% petroleum coke previous week) as well as conditions and changes during the sampling episode:

____
____
____
____
____

FGD Solids Dewatering (for last cycle prior to sampling or while sampling):

Scrubber slurry flow rate ____________
Scrubber slurry duration ____________
Scrubber slurry percent solids ____________
Dewatering cycle frequency ____________
Time since last cycle ____________
Percent filtrate recycled back to scrubber ____________

FGD Wastewater Treatment System Operation During Sample Collection:

Scrubber purge flow rate ____________
Scrubber purge duration ____________
Lime usage ____________
Ferric chloride usage ____________
Polymer Type ____________ Polymer Usage (amt) ____________
Acid Type ____________ Acid usage (amt) ____________
Amount of solids generated ____________
Effluent flow rate ____________
Effluent duration ____________
Retention time of desaturation tank ____________ ____________
Retention time of equalization tank ____________ ____________
Retention time of primary clarifier ____________ ____________
Retention time of ferric chloride mix tank ____________
Retention time of secondary clarifier ____________ ____________

Figure 3-4. Engineering Data Collection Sheet (Page 2 of 4)

Plant Name: ____
Plant Contact: ____
Date of Sample Collection: ____
Time(s) of Sample Collection: ____
Data Collected by: ____

Instruction: Provide actual data if possible. If not, provide estimated data. Some of the data requested may not be susceptible to estimation. Enter "URE" for "unable to reasonably estimate." Otherwise, specify whether data provided are actual or estimated by writing in "ACT" or EST" wherever appropriate.

Ash System Information

Unit ID	Fly Ash Generation (tph)	Fly Ash Sluice Water Flow Rate (gph)	Source of Fly Ash Sluice Water	Sluice Cycle Duration and Frequency	Continuous Sluicing (Yes/No)	Bottom Ash Generation (tph)	Bottom Ash Sluice Water Flow Rate (gph)	Source of Bottom Ash Sluice Water	Sluice Cycle Duration and Frequency	Continuous Sluicing (Yes/No)

Other information and observations (e.g., presence of emergent vegetation or floating vegetation, other factors influencing ammonia). Provide photos.

____
____
____
____
____

Figure 3-5. Engineering Data Collection Sheet (Page 3 of 4)

Plant Name: ______________________________
Plant Contact: ______________________________
Date of Sample Collection: ______________________________
Time(s) of Sample Collection: ______________________________
Data Collected by: ______________________________

Instruction: Provide actual data if possible. If not, provide estimated data. Some of the data requested may not be susceptible to estimation. Enter "URE" for "unable to reasonably estimate." Otherwise, specify whether data provided are actual or estimated by writing in "ACT" or EST" wherever appropriate.

Fly Ash Pond Detailed Information:

Influent
List all waste stream(s) entering pond (e.g., Mitchell fly ash, Kammer fly ash, AMD treatment system, coal preparation plant, stormwater runoff, etc.)

____
____
____

Waste stream, flow rate, and frequency ________/________/________
Waste stream, flow rate, and frequency ________/________/________
Waste stream, flow rate, and frequency ________/________/________
Waste stream, flow rate, and frequency ________/________/________
Waste stream, flow rate, and frequency ________/________/________
Waste stream, flow rate, and frequency ________/________/________

Total influent flow rate ________
pH control system? (If yes, list type) ________
Other chemicals added for ash pond treatment (e.g., coagulants)? If so, list type. ________
Has there been a recent rain event? If so, list date of event, estimate of rain, duration.________
____
How much drainage (acres) is routed to the ash pond? ________

Pond Design
Size of pond ________ (acres) ________(gallons)
Pond retention time ________ (measured or estimated?)
Frequency of pond dredging/date of last dredging ________
Sections of Pond (number and size of each) ________
____
Discharge structure type between ponds (e.g., skimmer weirs, curtain, etc.) ________
Are baffles or dikes present to increase hydraulic retention time? Describe ________

Effluent
Effluent flow rate ________
Effluent duration ________
Final discharge structure type (e.g., skimmer weir, inverted pipe, diffuser, etc.)

Notes:
____
____
____
____

Figure 3-6. Engineering Data Collection Sheet (Page 4 of 4)

EPA

United States
Environmental Protection Agency
Washington, DC 20460

EPISODE NO:

RANGE OF SAMPLE NOS:

TRAFFIC REPORT
USEPA ENGINEERING AND ANALYSIS DIVISION
SAMPLE CONTROL CENTER

Return completed form to: P.O. BOX 1407
ALEXANDRIA, VA 22313
(703) 519-1140

INDUSTRIAL FIRM SAMPLED	SHIPPING & INFORMATION
NAME:	SHIP TO:
CITY:	ATTN:
STATE:	CARRIER:
INDUSTRIAL CATEGORY:	AIRBILL:
	DATE SHIPPED:
CONFIDENTIAL (Y/N):	SAMPLING OFFICE/SAMPLER:

SAMPLE POINT DESCRIPTION											SAMPLE ANALYSES						
SAMPLE NUMBER	SOURCE WATER (city, river, well)	IN LINE PROCESS	UNREATED EFFLUENT (raw wastewater)	TREATED EFFLUENT	OTHER (specify)	ADDITIONAL SAMPLE DESCRIPTION	PH LEVEL	PRESERVED (Y/N)	G=GRAB / C=COMPOSITE	SAMPLE COLLECTION TIME / DATE							

Comments:

Figure 3-7. Example SCC Traffic Report

4.0 SAMPLING ACTIVITIES

This section discusses the sampling team organization, sampling preparation, and sampling activities.

4.1 Sampling Team Organization

The sampling crew will consist of a crew chief and two crew members from ERG, and two EPA representatives. The crew chief will be responsible for all health and safety, sample collection, preservation, and shipping activities while at Mitchell. After completion of the visit, the analytical results from each laboratory will be collated. This information will be summarized and transmitted in a trip report to EPA. After EPA review, the report will be forwarded to Mitchell for review.

4.2 Pre-Sampling Preparation

On May 15, 2007, ERG and EPA conducted a site visit at Mitchell. The site visit and subsequent telephone calls provided ERG and EPA the necessary information to prepare for the sampling episode. The information collected during the site visit and telephone calls was used to create this sampling plan.

As part of preparing the team for the sampling event at Mitchell, the ERG crew chief will distribute this sampling plan to each team member and make sure they are completely familiar with the sampling plan and the health and safety requirements specific to Mitchell. The crew chief will also give copies of this sampling plan to Mitchell personnel before sampling begins.

The ERG crew chief will also coordinate the procurement and shipment of all necessary sampling and health and safety equipment.

4.3 Field Sampling Activities

Upon arrival at Mitchell, the ERG crew chief, in conjunction with the EPA representatives, will meet with Mitchell personnel to determine whether samples can be collected as planned at each of the planned sampling points. Upon confirming the methods to collect samples, the ERG crew chief will update the descriptions of the proposed sampling points, if necessary, in consultation with EPA and Mitchell personnel. If necessary, the crew chief will obtain additional equipment and glassware. The revised sampling description will include:

- A sampling point description and collection procedure for each sampling point;
- A list of the sample fractions to be collected at each point:
- A list of potential physical hazards (e.g., pH, temperature, and potentially hazardous equipment);
- A list of potential chemical hazards associated with each sampling point; and
- A list of proposed health and safety procedures.

Prior to sampling, the ERG crew chief will notify the ERG Health and Safety Coordinator (HSC) of any revised sampling activity descriptions along with recommended revisions to the proposed health and safety procedures. Together, the crew chief and HSC will review the proposed health and safety procedures. The crew chief will incorporate any plant-specific changes indicated by the HSC and receive approval for sampling from the HSC before proceeding with sampling activities.

All sample bottles will be labeled, collected, and preserved, according to method protocols. Sample fractions requiring $\leq 6^{o}C$ preservation will be placed on ice until desired temperature is reached. Sample fractions will then be sealed, and placed in coolers for shipment to the laboratory. The SCC Traffic Report forms will be completed and placed in plastic sleeves inside the coolers. The coolers will then be taken to the nearest Federal Express office and shipped to the SCC laboratories. At the conclusion of the sampling episode, the sampling equipment will be prepared for return shipping.

The ERG crew chief will contact SCC prior to sampling in order to confirm the laboratories and to communicate the number of samples being collected. The crew chief will also contact SCC after shipping samples to communicate shipping information.

4.4 Logistics

This subsection summarizes Mitchell contacts, analytical laboratory contacts and addresses, and sampling team personnel and support functions.

4.4.1 Mitchell Power Plant Contacts

Tim Lohner
Principal Environmental Specialist
American Electric Power
1 Riverside Plaza
Columbus, OH 43215
(614) 716-1255

Jeff Palmer
AEP Mitchell Plant
Rt. 2 South
Moundsville, WV 26041
(304) 843-6848

Christine King
AEP Mitchell Plant
Rt. 2 South
Moundsville, WV 26041
(304) 843-6848

4.4.2 EPA Contacts

Ron Jordan
Engineering and Analysis Division
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, NW (4303T)
Washington, D.C. 20460
(202) 566-1003

Josh Hall
Engineering and Analysis Division
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, NW (4303T)
Washington, D.C. 20460
(202) 566-1002

4.4.3 Analytical Laboratories

Sample Control Center
Barb Beard
Computer Sciences Corporation
6101 Stevenson Avenue
Alexandria, VA 22304
Phone: (703) 461-2154
Fax: (703) 461-8056

Classicals and Routine Metals
ProChem Analytical (QBC)[9]
6040 North Fork Road
Elliston, VA 24087
Phone: (540) 268-9884
Contact: Cheryl Daniel

Low-Level Metals
Battelle Marine Sciences Laboratory (BWA)
1529 West Sequim Bay Road
Sequim, WA 98382
Phone: (360) 681-3650
Contact: Brenda Lasorsa

Arsenic and Selenium Speciation
Nick Hutson
U. S. Environmental Protection Agency
Bldg E - Chemical Receiving
109 T. W. Alexander Drive (E305-01)
Durham, NC 27709

4.4.4 ERG Contacts

TJ Finseth (Crew Chief)
Eastern Research Group, Inc.
14555 Avion Parkway, Suite 200
Chantilly, VA 20151
(703) 633-1698

[9] When shipping to ProChem Analytical (QBC) for all next-day deliveries, mark the "Hold for Pickup" box on the FedEx airbill and fill in the following FedEx office address: **3875 Thirlane Road, Roanoke, VA 24019.** For Saturday deliveries, mark the "Hold for Pickup Saturday" box on the FedEx airbill and fill in the following FedEx office address: **3875 Thirlane Road, Roanoke, VA 24019.**

Sarah Holman (Crew member)
Eastern Research Group, Inc.
14555 Avion Parkway, Suite 200
Chantilly, VA 20151
(703) 633-1661

Deborah Bartram (Work Assignment Manager)
Eastern Research Group, Inc.
14555 Avion Parkway, Suite 200
Chantilly, VA 20151
(703) 633-1669

4.4.5 Freight Forwarders

Federal Express (FedEx)
General Information (800) 238-5355

FedEx World Service Center (21 miles from plant)
120 N. River Road
Wheeling, WV 26003
Hours of Operation: Mon. – Fri.: 9:00 a.m. to 7:00 p.m. (Fri. 8:00 a.m.)
Last Express Drop-off: Mon. – Fri.: 7:00 p.m.

5.0 SAMPLE SHIPMENT

All sample containers will be labeled with ERG's standard address labels. All samples will be tracked using SCC Traffic Report forms. Custody will be maintained by the sampling crew chief from sample collection until samples are delivered to Federal Express.

All samples will be packaged and shipped in accordance with DOT or IATA regulations. The general IATA packaging requirements for air shipment are as follows:

- "Inner packaging must be so packed, secured or cushioned as to prevent their breakage or leakage and so as to control their movement within the outer packaging during normal conditions of transport. Cushioning material must not react dangerously with the contents of the inner packaging. Any leakage of the contents must not substantially impair the protective properties of the cushioning material. Unless otherwise provided in this paragraph or in the Packing Instructions, liquids in Classes, 3, 4, 5, 6, or 8 of Packing Groups I or II in glass or earthenware inner packaging, must be packaged using material capable of absorbing the liquid. Absorbent material must not react dangerously with the liquid. Absorbent material is not required..." (IATA Dangerous Goods Regulations, 5.0.16).

- "When filling receptacles for liquids, sufficient ullage (outage) must be left to ensure that neither leakage nor permanent distortion of the receptacle will occur as a result of an expansion of the liquid caused by temperatures likely to prevail during transport. Liquids must not completely fill a receptacle at a temperature of 55°C (130°F)." (IATA Dangerous Goods Regulations, 5.0.12).

The packing and labeling procedures in the following subsections may be used for nonhazardous samples. Hazardous samples will be identified based on consultation with the hazardous shipments contact, and appropriate hazardous shipping procedures will be followed. Based on process considerations, samples collected at Mitchell will not be classified as IATA dangerous goods.

5.1 Sample Set Preparation

Samples are collected as a series of "fractions," or bottles designated for particular analyses requiring the same preservation. The comprehensive water sample set consists of sample fractions for all pollutants listed in Section 3.2, collected as one-time grab samples directly into the individual sample containers.

5.2 Sample Packing

All dilute samples from the plant will be packed according to the following guidelines (there is no limit on the amount of liquid each sample container may contain):

1. Label each sample bottle. If a required preservation is not used, cross it off with indelible ink. Cover the label with clear tape to protect this information. Low-level metal sample bottles will not be labeled; instead, the outer plastic bag for each bottle will be labeled.

2. Tighten the lid on each filled sample bottle, being careful not to overtighten the lid. If bottle threads are dirty to where the lid is impeded from closing, clean the threads on the bottle being careful to not introduce contamination into the sample. Clean the sample bottle with a cloth rag or paper towel. The bottle threads will not be cleaned for the low-level sample bottles.

3. Place each sample bottle requiring $\leq 6^\circ C$ preservation into an ice chest with wet ice prior to packaging to cool.

4. When each sample requiring $\leq 6^\circ C$ preservation has reached the desired temperature, wrap each glass sample bottle with two layers of "bubble wrap" (or place bottle in two "bubble bags"). The bubble wrap must fit snugly and completely cover the sample bottle. Each "bubble-wrapped" container and plastic container must then be enclosed in an individual sealable plastic freezer bag. VOA vials may be placed in VOA bricks and placed in a freezer bag.

5. Place two garbage bags inside each other in the cooler.

6. Place sample bottles in garbage bags in the cooler with proper end up, close the interior garbage bag by tying, or with a twist-tie.

7. Add ice to cooler to keep samples cold during shipment. Arrange blue ice or sealed plastic freezer bags filled with wet ice on top of the sample bottles (if samples require $\leq 6^\circ C$ preservation). If using wet ice, place the ice inside two one-gallon sealable freezer bags. Put at least 4 × ½ gallons of ice (4 × 2.5 lbs of ice) in each large cooler and 2 × ½ gallons of ice (2 × 2.5 lbs of ice) in each small cooler. More ice should be used when ambient temperatures are very high. The ice should be placed inside the second garbage bag. Close the second garbage bag with a twist-tie.

8. Fill in around the bottles and any free space with additional cushioning material. Sufficient packing material should be used so that the sample containers will not shift during shipment.

9. Seal the SCC Traffic Report form in a plastic zip-lock bag and tape securely to the inside of the cooler lid.

10. Place a "Return to ..." label on the inside of the cooler lid.

11. Close cooler.

12. Make several wraps with tape around the cooler perpendicular to the seal to ensure that the lid will remain closed if the latch is accidentally released or damaged.

13. Tape the cooler drain plug so it will not open.

14. Place a completed address label on the lid of the cooler including name, address, and telephone number of the receiving laboratory and the return address and telephone number of the shipper.

6.0 SITE-SPECIFIC HEALTH AND SAFETY PROCEDURES

This section specifies the health and safety procedures and practices to be used by the sampling team during sampling at Mitchell. This section provides general health and safety information for this sampling episode. The sampling team is obligated to follow all safety procedures specified in this section.

6.1 Emergency/Medical Procedures

The following procedures will be followed in the event of a medical or other emergency situation.

6.1.1 First Aid

Mitchell has first aid kits available throughout the plant. In addition, ERG will also bring a first aid kit. The ERG crew chief will coordinate with the plant personnel to determine if ERG personnel will have access to the plant's first aid provisions.

6.1.2 Site Evacuation/Emergency Response Plan

The sampling team will be informed of the Mitchell evacuation procedures and routes by plant personnel.

6.1.3 Emergency Showers and Eye Washes

Emergency showers and eye wash stations are located throughout the plant. Before collecting samples at any point, sampling team members will locate the nearest operating safety shower and eye wash station.

6.1.4 Local Hospital

The nearest hospital is Reynolds Memorial Hospital, located in Glendale, WV. This hospital is approximately 15 miles from Mitchell Power Plant. The hospital address is:

Reynolds Memorial Hospital
800 Wheeling Avenue
Glendale, WV 26038
(304) 845-3211

The local emergency phone number in Moundsville, WV is 911.

6.2 ERG Health and Safety Responsibilities and Authority

The ERG Work Assignment Manager (WAM), crew chief, and sampling team members have different responsibilities to maintain a safe sampling environment. These responsibilities are described below.

6.2.1 Work Assignment Manager

The WAM, Deborah Bartram, has the overall responsibility to ensure that this health and safety plan is developed and implemented in accordance with regulations and corporate guidelines, that proper health and safety procedures have been initiated, and that all ERG activities are conducted in accordance with the health and safety plan. The WAM will also ensure that proper resources are allocated so that the project is conducted in a safe manner, and that the crew chief is competent in his ability to oversee health and safety during the sampling episode.

6.2.2 Crew Chief

The ERG crew chief, TJ Finseth, is responsible for ensuring that ERG sampling team members adhere to this plan. The crew chief must report any accident, near miss, or injury to any sampling team member to the ERG Chantilly Office Health and Safety Coordinator (HSC), Kevin Sikora, verbally within 8 hours, or sooner. The HSC will investigate the incident to identify the cause of the accident, near miss, or injury. If sufficient cause exists, ERG's general health and safety plan and in-house training program will be modified to avoid similar accidents in the future.

At the start of the sampling visit, the crew chief will inspect all sampling points and review sample collection procedures with the Mitchell personnel to ensure that all potential hazards have been identified.

The crew chief has the authority to enforce ERG's health and safety requirements contained in this plan, and any facility-specific requirements. Changes to this plan or the sampling plan can be made if both the crew chief and the Chantilly HSC agree that the changes are appropriate.

6.2.3 Sampling Team Members

All field personnel are responsible for following the requirements of this plan, for adhering to plant-specific procedures, and donning required/recommended PPE. They are also responsible for bringing health and safety issues to the attention of the crew chief.

6.3 <u>Briefings</u>

ERG sampling team personnel will attend on- and off-site health and safety briefings.

6.3.1 Off-Site Briefings

All members of the sampling team will receive a copy of this sampling plan prior to arriving onsite. All ERG employees will be required to sign a health and safety sign-off sheet stating that they have read, understood, and agree with this health and safety plan prior to participating in field sampling activities.

6.3.2 On-Site Briefings

ERG sampling team personnel must attend a one- to two-hour safety course prior to conducting sampling activities at Mitchell. This safety course will review plant-specific health and safety procedures, including:

- Locating on-site first aid/emergency medical procedures;
- Required PPE;
- High hazard areas and other specific areas or hazards of concern;
- Emergency alarms and evacuation procedures; and
- Other site safety requirements and procedures that ERG personnel must follow.

6.4 <u>Safety Procedures</u>

ERG personnel will follow general safety procedures, which include wearing PPE and engaging in safe work practices.

6.4.1 Personal Protective Equipment (PPE)

The PPE listed below will be worn by ERG personnel at all times while inside the premises of Mitchell:

- Steel-toed safety shoes;
- Long sleeves (when sampling) and pants;
- Hard hat, where required by Mitchell;
- Hearing protection, where needed;
- Nitrile or non-colored, electronic grade gloves, when collecting or preserving; and
- Safety glasses with side shields or chemical splash goggles, when collecting or preserving samples.

For all phases of sample collection, decontamination of the PPE may not be necessary because disposable PPE will be used. If gloves become torn or degraded, they will be thrown away and replaced with a new pair. Disposable PPE, including gloves, will be removed, bagged, and left at the site in a controlled manner.

6.4.2 Safety Practices

ERG personnel will conduct themselves at all times in a manner judged to be safe by site supervisors.

All sample collection will be scheduled so that no ERG employee collects samples alone. Each worker will maintain visual contact with at least one other worker at all times. This buddy system will ensure against an employee becoming injured or contaminated with chemicals without a co-worker being aware of his or her condition. Workers should "watch out" for each other while working close to potential chemical and physical hazards. A Mitchell or EPA employee may be used as a buddy by ERG personnel. This arrangement will be agreed to and acknowledged by the employee.

ERG employees will not enter any permit-required confined space areas.

6.4.3 Safe Work Practices

The following safety rules will be obeyed while working in the facility:

- Wearing PPE, where required;
- Staying within designated areas;
- Not wearing loose clothing or jewelry;
- Keeping long hair in hard hat or tied back;
- Not eating in the sampling or staging areas; and
- Not smoking in the sampling or staging areas.

6.5 Sampling Point-Specific Safety Procedures

All sampling team members will be advised of any sampling point-specific safety protocols during the on-site health and safety briefing. Table 6-1 summarizes all potential sampling point-specific safety hazards as well as the personal protective equipment (PPE) required at each sampling point. The sampling team health and safety officer (HSO) for this sampling episode is the crew chief, TJ Finseth (ERG). The HSO and the sampling team will inspect each sampling point area to identify unique or additional hazards not already covered in this plan or during the formal health and safety briefing. If additional hazards are found, the sampling team will be informed of each hazard and required control measures prior to the start of work. Where identified hazards may affect the plant's personnel, the HSO will notify the appropriate Mitchell personnel.

6.5.1 Physical Hazards

ERG personnel will be alert for all physical hazards present while on site. Physical hazards may arise from using catwalks, hitting low hanging overhead piping, and working around moving equipment or vehicles. In addition, samples may require pumping from a platform. Sampling personnel are to be aware of the platform and its surroundings and will not lean over the platform railings. ERG personnel will be aware of the potential splash hazards at SP-1, SP-2, and SP-3 due to the location of the sample taps. To prevent splashing, ERG personnel will ensure that the sample tubing is connected securely to the sample tap and will open the sample valve slowly when collecting samples. Other potential hazards may include falling hazards during sample collection, tripping on metal grates, or operation of large trucks and machinery in the vicinity of the sample collection area. See Table 6-1 for potential hazards that may be associated with specific sampling points.

Noise may be a hazard in certain areas of the facility. Hearing protection will be used by the sampling team where required by the plant, when sampling members are having trouble hearing or being heard when standing 3 feet or less away from another person, or when deemed necessary by the Mitchell personnel or ERG crew chief.

6.5.2 Thermal Hazards

Heat stress may be a concern during the sampling episode. Samplers may be suited in Tyvek® and temperatures could reach extremes. Of particular concern are SP-1 and SP-4, which are located outside. The sampling team members are to consume plenty of fluids prior to the start of sampling, and will monitor each other for symptoms of heat stress.

Wastewater sampling points are not expected to be too hot for safe handling using typical PPE. Thicker nitrile gloves may be used during sampling if sample bottles are too hot to hold. If extremely hot samples are encountered, samplers will handle samples with heat-resistant gloves.

6.5.3 Chemical Hazards

The only chemical hazards expected are chemicals used to preserve samples. All sampling team members will be advised of any potential chemical hazards at each sampling point as well as any special PPE recommendations during the formal health and safety briefing. If the sample tap (i.e., the point from which the wastewater flows) is above waist height, a face shield or goggles must be worn during sample collection. To avoid ingesting chemicals, sampling team members will be required to wash hands thoroughly before eating or drinking. ERG personnel will not be permitted to enter areas where the facility has determined that respiratory protection equipment is necessary to protect against inhalation hazards.

6.6 Temperature Extremes

Extremely hot temperatures can be a health and safety hazard for this sampling episode. ERG personnel will take precautions to avoid injuries due to extreme temperatures.

6.6.1 Heat Stress

Heat stress is not only a concern in hot/humid outdoor environments, it is a concern due to the thermal or radiant heat generated by equipment and/or processes. Sampling team personnel will monitor each other for the following symptoms:

- Heat rash that may result from continuous exposure to heat or humid air. Treatment: Wear cotton clothing under coveralls or Tyvek®.

- Heat cramps which are caused by heavy sweating and inadequate electrolyte replacement. Many times, cramps may not occur until after work or until the worker is sleeping. Signs and symptoms include:

  — Muscle spasms
  — Pain in the hands, feet, and abdomen

  Treatment: Gently stretch and massage muscles and replace fluids. Rest in a cool shaded area.

- Heat exhaustion which occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

  — Pale, cool, moist, clammy skin
  — Heavy sweating
  — Headache and dizziness
  — Nausea
  — Fainting or fatigue
  — Elevated pulse rate (above 150)

  Treatment: Replace fluids, pour cool water over face, neck, hands, arms, and legs. Place worker in cool air and seek medical care.

- Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help **must** be obtained. Signs and symptoms are:

  — Red, hot, usually dry skin, body core temperature 108°F (oral)
  — Lack of or reduced perspiration
  — Nausea

— Headache, dizziness, and confusion
— Strong, rapid pulse
— Coma

Treatment: Remove worker to cool area, saturate clothes with cold water, wrap worker in wet cold sheets (if possible), monitor ABC (airway, breathing, circulation), treat for shock, and call emergency services for basic life support (BLS) or advanced life support (ALS).

6.6.2 Heat Stress Monitoring

A worker who exhibits any of the above symptoms will be immediately relieved of responsibilities and requested to consume electrolyte fluid or cool water while resting in a shaded area. The individual should not return to work until symptoms are no longer recognizable. If symptoms appear critical, persist, or get worse, the crew chief will seek immediate medical attention for the employee. If the individual does resume work, he/she will be monitored for any increase in heart rate for the remainder of their shift. In addition, the worker will be requested to consume electrolyte fluid or cool water every hour.

The crew chief will visually monitor workers hourly when:

- Symptoms of heat stress are reported or observed;
- Ambient temperatures exceed 70°F and workers are dressed in impervious clothing; or
- Ambient temperatures exceed 90°F and workers are dressed in normal clothing.

For sampling on this project, work periods will be considered to be approximately two hours in length.

At ambient temperatures of 87°F and above, workers will be monitored for heat stress conditions by measuring the heart rate (HR) by radial (wrist) pulse for 30 seconds after one minute of rest. The HR after one minute of rest should not exceed 110 beats per minute. If higher, the next work period shall be shortened by 33 percent, while the length of rest period remains the same. If the pulse rate is still 110 beats per minute after one minute of rest in the next rest period, the following work cycle will be shortened by another 33 percent. This shortening of the work period must continue until the worker's HR is no greater than 110 beats per minute.

6.7 **<u>First Aid</u>**

First aid procedures in response to chemical exposures will be conducted in accordance with the appropriate MSDS for the chemical involved. If an incident occurs and MSDSs are not available for a particular hazardous chemical (e.g., wastewater), the following general first aid procedures will be performed:

- Skin Contact - The affected area will be rinsed thoroughly and copiously with clean water. Seek medical attention if irritation is experienced after cleaning.
- Eye Contact - The eyes will be flushed thoroughly at the nearest eyewash station for 15 minutes. Follow up with medical attention.
- Ingestion - The hospital will be notified and any procedures recommended will be carried out.

The first aid kit will be maintained on each site in the equipment staging area. The contents of the first aid kit include at a minimum:

- Adhesive bandages;
- Antiseptic wipes;
- A compress;
- An eyewash solution;
- Gauze pads;
- A cold pack; and
- A triangular bandage.

The injuries most likely to be encountered at Mitchell are cuts and bruises; the first aid kit will be maintained and stocked accordingly.

6.8 Sample Preservation and Safety Considerations

Water samples to be analyzed for various contaminants may be preserved with sulfuric acid (H_2SO_4), hydrochloric acid (HCl), sodium hydroxide (NaOH), or an ammonium sulfate buffer solution (NH_4SO_4) before shipment to the analytical laboratory. Nitrile gloves and splash goggles must be worn when handling these corrosive chemicals to prevent chemical burns. Sample preservation must be performed in a well-ventilated area (preferably an operational lab hood) to avoid potential accumulation and inhalation of any toxic vapors. When pouring samples, skin protection must also be worn (long-sleeved cotton coveralls or uncoated Tyvek®, safety glasses with side shields or splash goggles, and nitrile gloves).

In some instances, the use of these preservation chemicals could create a chemical reaction (i.e., generation of heat or release of toxic vapors). For instance, if acids are added to a wastewater sample containing cyanide or sulfides, dangerous and toxic vapors will be emitted. If the sample reacts violently, notify the crew chief and stop preserving the sample immediately.

In the case of a chemical spill, the following procedures must be followed:

- Don protective clothing (nitrile gloves as a minimum).
- Ventilate area (open doors, windows, or turn on ventilation).
- Use spill control pillows or prepared neutralizers to contain/clean up spill. Do not add water to acid.
- Place spilled material in a heavy plastic container, label the container, and contact site for disposal information.
- Notify crew chief of the spill and the procedures used.

At any time, if personnel do not feel comfortable about cleaning up the spilled material or if a large quantity has been spilled, notify site personnel. The site may have an emergency response team who will respond to the chemical spill.

In the case of fire, notify the site contact. If the fire can be easily extinguished using a portable fire extinguisher, and personnel have received fire extinguisher training, extinguish the fire using the portable extinguisher.

6.9 Training and Medical Monitoring Requirements

All ERG sampling crew personnel have participated in ERG's annual 8-hour health and safety training program as specified by ERG's Corporate Health and Safety Policy. This training includes:

- Toxicology;
- Exposure limits;
- Chemical, biological, and physical hazards;
- Heat and cold stress;
- Confined spaces;
- PPE;
- Decontamination; and
- Emergency plans and procedures.

All ERG personnel involved with sample collection and preservation are active participants in the Medical Monitoring Program. Field sampling personnel have received a baseline medical information review and undergo a clinical assessment every one to two years.

6.10 Shift Work Protocol

This section provides guidance for field personnel project schedules and field work, particularly overtime. It is important to remember extended work schedules will contribute to poor production and motivation. All field teams will rotate to ensure that sampling team members receive sufficient rest to avoid injuries resulting from fatigue or inattention.

It is common practice to perform 12-hour work days under project management direction. If this work schedule is exceeded the following guidelines will be recognized:

1. A 15-hour maximum work day, provided that it does not occur on consecutive days, or more than three times in ANY SEVEN-DAY PERIOD.

2. Each shift should be followed by nine hours off per 24-hour period, excluding driving time to and from the hotel.

3. No more than seven consecutive days of work allowed without a minimum of 24 hours off.

4. Each work day will be reviewed as a 24-hour cycle to assure all field workers receive adequate time off.

Table 6-1. Sample-Point-Specific Personal Protective Equipment and Potential Hazards

Sampling Point Number	Sampling Point Description	Personal Protective Equipment Required (a)	Potential Physical Hazards (b)
SP-1	Influent to FGD Wastewater Treatment System	Steel-toed boots, hard hats, gloves and safety glasses.	Splash hazard: Potential for splashing from the sample tap. Sample tap will be below waist level.
SP-2	Primary Clarifier Effluent in FGD Wastewater Treatment System	Steel-toed boots, hard hats, gloves, and safety glasses.	Splash hazard: Potential for splashing from the sample tap. Sample tap will be below waist level.
SP-3/SP-5	Effluent from FGD Wastewater Treatment System	Steel-toed boots, hard hats, gloves, and safety glasses.	Head-level piping or beams.
SP-4	Effluent from Fly Ash Pond	Steel-toed boots, hard hats, gloves, and safety glasses.	Falling hazard while sampling near side of ash pond channel.

(a) Splash protection (face shield) required if sampling port is waist high or above. Hearing protection (ear plugs) will be worn if needed.
(b) Additional physical hazards, if any, will be identified during the formal on-site health and safety briefing. Updates to this table will be made as needed.

7.0 REFERENCES

1. U.S. Environmental Protection Agency, 2006. Interim Detailed Study Report for the Steam Electric Power Generating Point Source Category, EPA/821-R-06-015, November.

2. Eastern Research Group, Inc., 2007. Quality Assurance Project Plan for the Steam Electric Detailed Study. May.

3. Eastern Research Group, Inc., 2007. Generic Sampling and Analysis Plan for Coal-Fired Steam Electric Power Plants. May.

Appendix A

LIST OF METALS CONSTITUENTS FOR ANALYSIS

Table A-1

List of Constituents for Analysis - Metal Analytes

CAS Number	Common Name	Technique	Method
7429905	ALUMINUM	ICP, GFAA	200.7, 200.8, 200.9
7440360	ANTIMONY	ICP, GFAA	200.7, 200.8, 200.9
7440382	ARSENIC	ICP, GFAA	200.7, 200.8, 200.9
7440393	BARIUM	ICP, GFAA	200.7, 200.8
7440417	BERYLLIUM	ICP, GFAA	200.7, 200.8, 200.9
7440428	BORON	ICP, GFAA	200.7
7440439	CADMIUM	ICP, GFAA	200.7, 200.8, 200.9
7440702	CALCIUM	ICP, GFAA	200.7, 200.8
7440473	CHROMIUM	ICP, GFAA	200.7, 200.8, 200.9
7440484	COBALT	ICP, GFAA	200.7, 200.8, 200.9
7440508	COPPER	ICP, GFAA	200.7, 200.8, 200.9
7439896	IRON	ICP, GFAA	200.7, 200.9
7439921	LEAD	ICP, GFAA	200.7, 200.8, 200.9
7439954	MAGNESIUM	ICP, GFAA	200.7
7439965	MANGANESE	ICP, GFAA	200.7, 200.8, 200.9
7439976	MERCURY	CVAA	245.1
7439987	MOLYBDENUM	ICP, GFAA	200.7, 200.8
7440020	NICKEL	ICP, GFAA	200.7, 200.8, 200.9
7782492	SELENIUM	ICP, GFAA	200.7, 200.8, 200.9
7440224	SILVER	ICP, GFAA	200.7, 200.8, 200.9
7440235	SODIUM	ICP, GFAA	200.7
7440280	THALLIUM	ICP, GFAA	200.7, 200.8, 200.9
7440315	TIN	ICP, GFAA	200.7, 200.9
7440326	TITANIUM	ICP, GFAA	200.7
7440622	VANADIUM	ICP, GFAA	200.7, 200.8
7440655	YTTRIUM	ICP, GFAA	200.7
7440666	ZINC	ICP, GFAA	200.7, 200.8

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Table A-2

List of Constituents for Analysis - Low-Level Metal Analytes

CAS Number	Common Name	Technique	Method
7440360	ANTIMONY	ICP/MS	1638
7440382	ARSENIC	ICP/MS	1638
7440439	CADMIUM	ICP/MS	1638
7440473	CHROMIUM	ICP/MS	1638
7440473	CHROMIUM-HEXAVALENT	IC	1636
7440508	COPPER	ICP/MS	1638
7439921	LEAD	ICP/MS	1638
7439976	MERCURY	OPT/CVAFS	1631
7440020	NICKEL	ICP/MS	1638
7782492	SELENIUM	ICP/MS	1638
7440224	SILVER	ICP/MS	1638
7440280	THALLIUM	ICP/MS	1638
7440666	ZINC	ICP/MS	1638

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