# Draft
# Sampling Episode Report
# EME Homer City Generation L.P.’s
# Homer City Power Plant
# Homer City, PA
## Episode 6548

Prepared for:

**U.S. Environmental Protection Agency**
Engineering and Analysis Division
Office of Water
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Prepared by:

**Eastern Research Group, Inc.**
14555 Avion Parkway
Suite 200
Chantilly, VA 20151

17 June 2008

EPA Contract No. 68-C02-095
Work Assignment 5-22

# CONTENTS

**Page**

## LIST OF TABLES

**Page**

## LIST OF FIGURES

**Page**

# 1. INTRODUCTION

The Engineering and Analysis Division (EAD) of the U.S. Environmental Protection Agency (EPA) has been conducting a program that consists of site visits and sampling at steam electric power plants to characterize raw wastewaters generated by coal-fired steam electric power plants, as well as to evaluate treatment technologies and best management practices used to reduce pollutant discharges. This Sampling Episode Report (SER) describes the sampling activities that took place on 21 August 2007 through 23 August 2007 at EME Homer City Generation L.P.'s Homer City Power Plant (Homer City), located in Homer City, Pennsylvania (Sampling Episode 6548). The focus of Episode 6548 was to characterize the influent to and effluent from the flue gas desulfurization (FGD) wastewater treatment system, as well as the second stage clarifier overflow within the FGD wastewater treatment system and the effluent from the bottom ash ponds at Homer City.

## 1.1 Background of Detailed Study

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) was the second-largest discharger of toxic-weighted pollutants. EPA's analyses indicated that the toxic-weighted loadings were 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. Other potential sources of metals include coal pile runoff, metal/chemical cleaning wastes, coal washing, and certain low-volume wastes.

In the 2005/2006 study, EPA noted certain data limitations that affected the Agency's estimate of the potential hazards posed by discharges from this category. Therefore, EPA determined that further review of these discharges during the 2007/2008 ELG planning cycle was warranted. EPA has concentrated 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 and available pollution control technologies/practices for steam electric plants.

## 1.2 Power Plant Site Selection

EPA selected six coal-fired steam electric plants for wastewater sampling. EPA based 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 (not listed in any priority order) were used to select plants for sampling:

- 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;
- NOx controls;
- Ash handling systems;
- Ash treatment system; and
- Mercury air controls.

EPA selected Homer City 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 three generating units;
- The plant operates a wet FGD system that is a limestone forced oxidation system;
- The plant adds formic acid to the FGD system to increase the sulfur dioxide removal efficiency;
- The plant operates a segregated FGD wastewater treatment system, which includes the following steps:
    - Equalization;
    - First-stage chemical precipitation;
    - First-stage clarification;
    - Second-stage chemical precipitation;
    - Second-stage clarification;
    - Nutrient/phosphoric acid addition;
    - Heat exchange;
    - Biological treatment; and
    - Sand filtration.
- The plant operates an SCR on the scrubbed unit (Unit 3); and
- The plant produces a commercial-grade gypsum by-product.

## 1.3 Sampling Episode Overview

On February 6, 2007, EPA and its technical contractor, Eastern Research Group, Inc. (ERG), conducted a site visit at Homer City. The purpose of the site visit was to learn about the wastewater treatment operations, regarding the FGD scrubber purge, and to gather information in order to collect wastewater samples at Homer City. Information collected during the site visit is documented in *Engineering Site Visit Report for EME Homer City Generation L.P.'s Homer City Power Plant* [1] and was used to create *Sampling Plan, EME Homer City Generation L.P.'s Homer City Power Plant* (Sampling Plan) [2], which describes the sample collection procedures used during the sampling episode.

For this sampling episode, EPA arrived at Homer City on Tuesday, August 21, 2007, to review the sampling points, determine the set up for the sample collection, label sample bottles, and purchase any additional supplies needed for the sampling episode. EPA then collected the samples specified in the Sampling Plan on Wednesday, August 22, and Thursday, August 23, 2007. The following personnel participated in EPA's sample collection activities:

- Ron Jordan, EPA/EAD;
- Josh Hall, EPA/EAD;
- TJ Finseth, ERG;
- Sarah Holman, ERG; and
- Jessica Wolford, ERG.

In addition, during the sample collection, EPA collected split samples with the Utility Water Act Group (UWAG), acting on behalf of the plant.

## 2. PLANT OVERVIEW

Homer City operates three coal-fired steam electric generating units. Homer City burns approximately five million tons of eastern bituminous coal per year. Units 1 and 2, which came on line in 1969, each have a capacity of 650 megawatts (MW) and burn mid-sulfur coal. Unit 3, which came on line in 1977, has a capacity of 700 MW and burns high-sulfur coal. Typically, Homer City produces between 13 and 14 million MW-hrs annually. The Homer City plant is located on approximately 2,400 acres near Homer City, Pennsylvania, near Two Lick Creek and Blacklick Creek.

Homer City is part of the Pennsylvania, New Jersey, and Maryland (PJM) electricity grid and adjusts its MW output based on the grid's needs (typical fluctuation may be 20 to 30 MW). During the summer and winter, Homer City typically operates at maximum or close to maximum load 24 hours per day. During the spring and fall, the plant may reduce its load at night to 50 percent of its capacity.

Units 1 through 3 have the following configuration:

- Boiler;
- SCR system;
- Air preheater;
- Electrostatic precipitator (ESP); and
- FGD system (Unit 3 only).

In 2001, Homer City retrofitted Unit 3 with a wet FGD scrubber system to control the sulfur dioxide releases from the plant. Unit 3 is subject to New Source Performance Standards (NSPS) air regulations. Plant personnel report that, after installing the FGD scrubber on Unit 3, the total plant sulfur dioxide emissions were reduced by 40 percent to comply with new permit limits, and the mercury emissions were reduced by 55 percent. The mercury reductions are based on the mercury removal across the Unit 3 FGD scrubber as tested by the Department of Energy (DOE) during 2001. At the time the FGD scrubber was installed on Unit 3, Homer City also installed an FGD wastewater treatment system to control the discharges from the wastewater generated during the operation of the FGD scrubber. Section 2.1 discusses the FGD system and Section 2.2 discusses the FGD wastewater treatment system.

Between 2000 and 2001, Homer City retrofitted Units 1 through 3 with selective catalytic reduction (SCR) systems to control nitrogen oxide (NOx) releases from the plant. Plant personnel report that, after installing the SCR systems, the total plant NOx emissions were reduced by 80 percent to comply with new permit limits. Plant personnel estimate that the SCR systems on Units 1 through 3 remove approximately 60 to 90 percent of the NOx from the flue gas. Homer City currently operates the SCR systems from May 1 through September 30 each year.

In the SCR systems, the plant injects only the amount of ammonia needed to convert the NOx in the flue gas to nitrogen and water. Excess unreacted ammonia from the SCR system, caused by flue gas fluctuations, is known as "ammonia slip." As the flue gas passes over the catalyst in the SCR process, some of the sulfur dioxide is oxidized to sulfur trioxide, which combines with unreacted ammonia to form ammonium bisulfate. Ammonium bisulfate can cause fouling and corrosion in air preheaters. The plant typically operates the SCR systems with less than two percent ammonia slip to avoid fouling the air preheater with the ammonium bisulfate by-product. Typically, without bisulfate fouling, air preheaters are washed once a year for 8 to 12 hours using ash recycle water at a flow rate of 1,000 gallons per minute (gpm).

Homer City has taken steps to reduce air emissions beyond installing FGD and SCR systems. Homer City also cleans the coal used in Units 1 and 2 in an on-site process that reduces the sulfur content of the coal. The boilers in Units 1 through 3 are equipped with low NOx burners and separated overfire air (SOFA) systems, which limit the production of NOx.

Homer City utilizes electrostatic precipitators (ESPs) to remove greater than 99.8 percent of the fly ash from the flue gas emitted from Units 1 through 3. There is no wastewater generated from the operation of the ESPs or fly ash handling system at Homer City. Fly ash is pneumatically transferred to silos where it is stored until it is trucked to the on-site, unlined ash landfill or beneficially used at the on-site, lined coal refuse site.

## 2.1 FGD Scrubber System

Homer City operates one wet FGD scrubber system on Unit 3, downstream of the ESP, to control the emission of sulfur dioxide from the unit. The FGD system is a five-level spray tower that uses limestone as the sorbent.

The plant has a limestone storage pile on site that contains approximately 30,000 tons of Pennsylvania limestone. The plant uses a ball mill to crush the limestone prior to mixing it with blowdown water from the Unit 3 cooling tower to create the absorbent limestone slurry used in the FGD scrubber. Storm water from the limestone storage and handling area drains to a pond and the water is pumped into the FGD make up water tank.

The limestone slurry is pumped to the various levels of the scrubber tower (typically three or four levels out of the five are operated at one time) and sprayed downward into the scrubber. As the flue gas flows up through the tower, countercurrent to the spray, droplets of the absorbent slurry absorbs and reacts with the sulfur dioxide in the flue gas to produce calcium sulfite. To increase the sulfur dioxide removal efficiency of the scrubber, the plant adds formic acid to the system, which buffers the solution and aids in dissolution of the calcium carbonate. The plant previously used dibasic acid (DBA), but found that it reduced the selenium removal efficiency of the FGD wastewater treatment system. According to Homer City personnel, the FGD system removes approximately 97 to 99 percent of the sulfur dioxide from the Unit 3 flue gas. Adding the formic acid increases the sulfur dioxide removal by approximately two percent and allows the plant to operate the system with one less spray level (i.e., up to four levels instead of all five). The reduction in the FGD operating cost outweighs the additional cost to operate a biological reactor to remove the formic acid in the FGD wastewater treatment system, which is discussed in Section 2.2.

The slurry that collects at the bottom of the FGD scrubber is agitated to keep the solids in suspension. A forced oxidation system, in which compressed air is introduced into the bottom slurry, further oxidizes calcium sulfite to calcium sulfate (gypsum). The slurry is recycled up to the various spray levels until the chlorides concentration in the slurry reaches approximately 15,000 to 20,000 ppm. The spray tower is constructed of Inconel, a superalloy used in high-temperature applications that is resistant to oxidation and corrosion. This material can withstand up to 25,000 ppm chlorides. When the slurry reaches the maximum allowable solids concentration, the plant blows down some of the slurry from the scrubber and adds fresh make-up limestone slurry to the scrubber. Homer City personnel estimate that blowdown occurs daily for approximately 12 to 18 hours. During blowdown, the solids level of the slurry typically decreases from 15 to 13 percent.

During blowdown, the gypsum slurry is sent to primary hydrocyclones, in which solid gypsum is separated from the water by centrifugal force. The solid gypsum is forced outward to the walls of the hydrocyclones and falls downward, while the water exits the top of the hydrocyclones. The gypsum from the primary hydrocyclones is transferred to vacuum filter belts. Approximately 80 percent of the supernatant overflow from the primary hydrocyclones is recycled back to the scrubber and the remaining 20 percent is transferred to secondary hydrocyclones. Homer City recently brought the secondary hydrocyclones on line to further reduce the solids content of the supernatant overflow before it is transferred to the FGD wastewater treatment system. A portion of the supernatant overflow from the secondary hydrocyclones is transferred to the FGD wastewater treatment system and a portion is recycled back to the scrubber.

The gypsum is rinsed on the vacuum filter belt to reduce the chloride concentration using blowdown from Unit 3's cooling tower as rinse water. As the gypsum is rinsed and dried, water that falls through or around the belt is collected and recycled back to the absorber. There is an optimal gypsum crystal size range for manufacturing wallboard, and the pores of the vacuum filter belts are sized accordingly. If the gypsum crystals are too small, they pass through the pores and are recycled back to the scrubber where they continue to grow. The gypsum typically contains 30 to 40 percent moisture at the beginning of the vacuum filter belt and 10 percent moisture in the final gypsum product. The gypsum falls off the vacuum filter belt and is conveyed to a domed structure for storage. Homer City produces gypsum that is light in color and contains less than one percent impurities, which is mostly fly ash. Homer City produces about 1,000 tons of gypsum per day and sells it to a wallboard manufacturer in Pittsburgh for about $1/ton.

## 2.2 FGD Wastewater Treatment System

The FGD wastewater treatment system is designed to receive intermittent discharges of FGD wastewater from the secondary hydrocyclones at a flow rate of approximately 220 gpm. The intermittent discharges typically occur for 12 to 18 hours per day. The plant operates the FGD wastewater treatment system 24 hours per day. The Homer City FGD wastewater treatment system contains the following treatment operations:

- Equalization;
- First-stage chemical precipitation:
    - Lime addition for pH adjustment, and
    - Ferric chloride, cationic polymer, and air addition for metals precipitation/coagulation;
- First-stage clarification with anionic polymer addition;

- Second-stage chemical precipitation:
  - Lime addition for pH adjustment, and
  - Ferric chloride, cationic polymer, and air addition for metals precipitation/coagulation;
- Second-stage clarification with anionic polymer addition;
- Micronutrient (typically urea), phosphoric acid, and corn syrup addition for biological treatment;
- Heat exchange;
- Aerobic biological treatment; and
- Sand filtration.

Figure 2-1 presents a process flow diagram of the FGD wastewater treatment system, as well as the sampling locations for three of the four sampling points for EPA's sampling episode.

Overflow from the FGD hydrocyclones is transferred directly to the feed tank of the FGD wastewater treatment system, where the intermittent flows from the hydrocyclones are equalized, allowing the plant to pump a constant flow rate of FGD wastewater through the treatment system. The flow rate exiting the feed tank of the FGD wastewater treatment system is typically about 110 gpm. Homer City typically adds about 10 to 20 gpm of chemical feed (i.e., lime, ferric chloride, and polymer) to the FGD wastewater treatment system; therefore, the flow rate exiting the FGD wastewater treatment system averages about 120 gpm. The hydraulic residence time for the entire FGD wastewater treatment system is about 3.5 days. The flow rate into the wastewater treatment system from the equalization tank during the sampling episode was approximately 109 gpm (based on one measurement recorded from the flow meter at 1:11 PM on 22 August 2007, during sample collection). In addition, the flow rate into the wastewater treatment system from the equalization tank on 21 August 2007, ranged from 105 gpm to 113 gpm (based on continuous electronic flow monitoring provided to EPA by Homer City).

The feed tank is agitated to prevent calcium from settling and scaling the tank. The hydraulic residence time in the 150,000-gallon feed tank is about 22 hours. Homer City typically maintains the wastewater volume in the feed tank at about 40 to 80 percent of the total tank volume. Water from the feed tank is transferred continuously (24 hours per day) to a first-stage chemical precipitation tank (referred to hereinafter as the "first-stage neutralization tank", as named by Homer City), in which lime is added to adjust the pH of the wastewater from 6.0 to 8.1. The plant also adds ferric chloride for metals precipitation, and cationic polymer and air to further enhance the precipitation/coagulation. From the first-stage neutralization tank, the wastewater is transferred to the first-stage clarifier, in which anionic polymer is added for coagulation. The majority of the heavy solids (mainly calcium sulfate and calcium carbonate) are removed in the first-stage clarifier.

Homer City personnel indicated that excess solids entering the first-stage clarifier can interfere with metals precipitation and removal. In particular, Homer City is concerned about interference with selenium removal, which affects the plant's ability to meet its NPDES permit limit of 0.8 mg/L total selenium. In an attempt to reduce this interference, Homer City recently added a second set of hydrocyclones to the gypsum dewatering system for additional gypsum solids removal upstream of the FGD wastewater treatment system, as discussed in Section 2.1. With the secondary hydrocyclones operating, the wastewater entering the FGD wastewater treatment system contains less than one percent solids.

Water from the first-stage clarifier is transferred to the second-stage chemical precipitation tank (referred to hereinafter as the "second-stage neutralization tank", as named by Homer City), in which lime is added to adjust the wastewater pH to 8.1. The plant also adds ferric chloride for metals precipitation, and air and occasionally cationic polymer to further enhance the precipitation/coagulation. When the plant initially began operating the FGD wastewater treatment system, it also added organosulfide to the second-stage neutralization tank for mercury removal; however, the plant has since determined that sufficient mercury removal can be achieved without the addition of organosulfide.

From the second-stage neutralization tank, wastewater is transferred to the second-stage clarifier, in which anionic polymer is added for coagulation. The hydraulic residence time across each of the 50,000-gallon first- and second-stage clarifiers is approximately 7.5 hours. Prior to adding the secondary hydrocyclones, Homer City removed more metals in the second-stage clarifier than the first-stage clarifier, due to a better iron hydroxide floc, which plant personnel attribute to the lower solids content in the second-stage clarifier. Sludge from the clarifiers is transferred to a thickener and then to a vacuum filter. Some sludge from the clarifiers and thickener is recycled to the 1st stage neutralization tank to prevent scaling on the tank walls. Recycling the sludge introduces crystals into the tank and scaling preferentially occurs on the crystal surfaces.

Overflow from the second-stage clarifier is transferred to the pH adjustment tank, in which micronutrients (typically urea), phosphoric acid, and corn syrup are added to ensure growth of microorganisms in the biological reactor. In the past, Homer City has added HCl or lime to adjust the pH to 7.5 to 8.0 prior to biological treatment; however, the overflow from the second-stage clarifier is typically at the appropriate pH and adjustment is not necessary. From the pH adjustment tank, water is transferred through a heat exchanger to the biological reactor. The microorganisms in the aerobic biological reactor reduce the organic content and the associated biochemical oxygen demand (BOD) of the wastewater. BOD in the FGD wastewater is a result of the formic acid that is added to the limestone slurry in the FGD scrubber system. Flow through the biological reactor is continuous. The hydraulic residence time in the 350,000-gallon biological reactor is about 2 days. Sludge from the biological reactor is transferred to the thickener, where it is combined with the clarifier sludge and then transferred to the vacuum filter. The vacuum filter reduces the sludge moisture content from approximately 60 to 70 percent down to 20 percent. Homer City generates 25 tons per day of filter cake (mostly calcium sulfate/gypsum) from the vacuum filters, which the plant tests to ensure compliance with leachability requirements, and then disposes of this sludge in the on-site, unlined fly ash landfill. [QUESTION FOR HOMER CITY: Where does the plant send the filtrate from the vacuum filters? Is it upstream or downstream of the SP-1 sample point (which was between the feed tank and 1st stage neutralization tank)? If sent to the feed tank, please estimate the total daily volume of filtrate and the percentage of the FGD treatment system influent flow it represents.]

Wastewater from the biological reactor is transferred through sand filters. Wastewater from the sand filters is transferred continuously to an effluent tank, except when the filters are backwashed. Homer City backwashes the sand filters once every 12 hours for about 15 minutes. The backwash is directed to a sump, which also collects all floor drain wastewater. Wastewater from the sump is transferred to the FGD wastewater treatment system feed tank a few times per day (about 4,000 gallons per transfer). [QUESTION FOR HOMER CITY: Please estimate the total daily volume of sand filter backwash sent to the feed tank. What percentage of the FGD treatment system influent flow does it represent?]

Wastewater from the effluent tank is discharged through NPDES Outfall #027 to Blacklick Creek. The flow rate exiting the effluent tank varies from about 70 to 170 gpm due to the operation of the variable frequency drive that maintains a constant level in the effluent tank; the average flow rate is about 120 gpm. Homer City estimates that the hydraulic residence time in the 3,000-gallon, agitated effluent tank is about 12 to 13 minutes. The flow rate of the effluent from the wastewater treatment system during the sampling episode was approximately 107 gpm (based on the average of 12 measurements recorded randomly at different frequencies from the flow meter during sample collection on August 22, 2007).

Table 2-1 presents Homer City's NPDES permit requirements for effluent from the FGD wastewater treatment system, which is Outfall #027.

**Table 2-1. Homer City NPDES Monitoring Requirements for the FGD Effluent**

| Parameter | Daily Minimum | Daily Maximum | Monthly Average |
|---|---|---|---|
| Total Suspended Solids (TSS) | NA | 100 mg/L | 30 mg/L |
| Carbonaceous Biochemical Oxygen Demand (CBOD5) | NA | 50 mg/L | 25 mg/L |
| Oil & Grease | NA | 20 mg/L | 15 mg/L |
| Temperature | NA | 110 | NA |
| pH | 6.0 s.u. | 9.0 s.u. | NA |
| Beryllium | NA | 1.6 mg/L | 0.8 mg/L |
| Lead | NA | 0.2 mg/L | 0.1 mg/L |
| Selenium | NA | 1.6 mg/L | 0.8 mg/L |
| Boron | Monitor and Report | | |
| Methylene Blue Active Substances (MBAS) | Monitor and Report | | |
| Osmotic Pressure | Monitor and Report | | |
| Total Dissolved Solids (TDS) | Monitor and Report | | |
| Flow Rate | Monitor and Report | | |

NA – Not applicable.

EPA collected a sample of the influent to Homer City's FGD wastewater treatment system downstream of the feed tank and upstream of the first-stage neutralization tank (i.e., the sample was collected prior to any chemical addition). EPA collected an interim sample within Homer City's FGD wastewater treatment system at the overflow of the second-stage clarifier. EPA also collected a sample of the effluent from Homer City's FGD wastewater treatment system directly from the effluent tank.

## 2.3 Bottom Ash Treatment System

Homer City uses water to sluice the bottom ash and other slag produced from the bottom of each boiler. Homer City sluices the bottom ash from the boilers for approximately XX hours, XX times per day. [QUESTION FOR HOMER CITY: How often does the plant sluice the bottom ash from the boiler?]

The bottom ash sluice water is piped from the boilers to hydrobins, which remove 90 to 95 percent of the solids. The dewatered bottom ash from the hydrobins is either used locally for antiskid and road construction or placed in the on-site, unlined ash landfill. The supernatant overflow from the hydrobins drains to ash settling ponds.

Homer City operates four ash settling ponds. The plant typically operates two ash settling ponds at one time, which are operated in parallel. Each ash pond has an approximate volume of 1.76 million gallons. The ash settling ponds receive overflow from the bottom ash hydrobins, as well as stormwater runoff. Approximately six acres of storm water drains into the ponds from the ash handling and precipitator areas. Water is transferred from the ash settling ponds to a clear well via weirs, which are on the opposite side of the ponds from the inlet pipes. From the clear well, water is recycled for use as bottom ash sluice. There is a periodic discharge from the clear well through the NPDES Outfall #005, the frequency of which depends on the amount of rainfall that has been received. The discharge from the clear well is limited to less than 30 mg/L average TSS and a pH of 6.0 to 9.0 s.u. The ash settling ponds are cleaned every six to eight months. The recovered solids are transported to the on-site, unlined fly ash landfill.

EPA collected a sample of the effluent from Homer City's bottom ash ponds directly from the clear well.

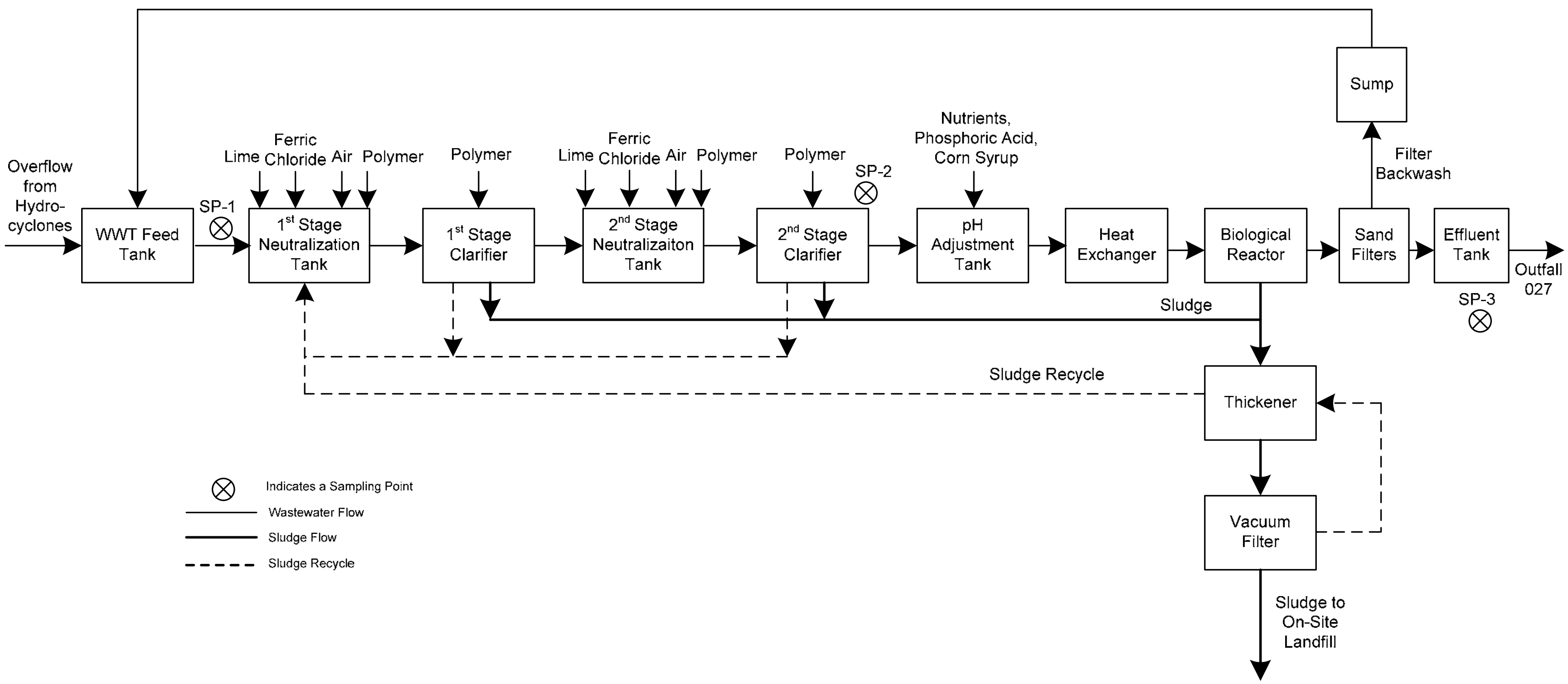


**Figure 2-1. FGD Wastewater Treatment System, Homer City Power Plant**

# 3. SAMPLE COLLECTION

During the Homer City sampling episode, the sampling team followed the sample collection protocols specified in the Sampling Plan [2]. Section 3.1 describes the sampling points, sample collection methods, and field measurements. Section 3.2 describes the list of analytes and the sample preservation procedures. Section 3.3 discusses the plant operational data collected during the sampling episode. Finally, Section 3.4 discusses any deviations from the planned sampling activities described in the Sampling Plan.

## 3.1 Sampling Points, Sample Collection Methods, and Field Measurements

This section describes the sampling points, sample collection methods followed, and the field measurements obtained for this sampling episode. Additional details are available in Section 3 of the Sampling Plan. Figure 2-1 presents a flow diagram of the FGD wastewater treatment plant including sampling point locations. Note that the sampling point at the effluent of Homer City's bottom ash ponds is not shown in Figure 2-1.

Table 3-1 lists the sampling points, sampling point descriptions, type of sample collection, sample collection dates and times, and the EPA Sample Control Center (SCC) sample numbers. Table 3-2 lists the sampling point numbers and descriptions, the number of samples collected, and the pollutant parameters analyzed for this sampling episode. Table 3-3 presents the field measurement data collected from each of the sampling points.

The sampling points collected during this episode were:

- SP-1: Influent to FGD Wastewater Treatment System;
- SP-2: Second-Stage Clarifier Overflow in FGD Wastewater Treatment System;
- SP-3: Effluent from FGD Wastewater Treatment System;
- SP-4: Effluent from Bottom 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: Second-Stage Clarifier Overflow in FGD Wastewater Treatment System (SP-2) Field Blank;
- SP-8: Effluent from FGD Wastewater Treatment System (SP-3) Field Blank; and
- SP-9: Effluent from Bottom Ash Pond (SP-4) Field Blank.

For all the sampling points (except the total mercury and low-level total metals field blank samples at SP-6), EPA collected split samples with Homer City's representative. Prior to the sampling episode, Homer City personnel installed a splitter on the sampling tap at the influent to the FGD wastewater treatment system (SP-1), which allowed for split sample collection. At all of the other sampling points, EPA inserted a "Y" splitter into the sample tubing configuration to allow for split sample collection. For this sampling episode, all analytes, other than HEM/SGT-HEM were collected as "true" splits (i.e., samples for the same analyte were collected simultaneously). The HEM/SGT-HEM samples were either collected using a bottle dipper, or directly from a sample tap; therefore, EPA and Homer City's representative collected duplicate samples, with one filling the bottle immediately after the other. However, for the influent to the FGD wastewater treatment system, SP-1, because the splitter was installed in the sample tap, EPA and Homer City's representative were able to collect "true" splits for the HEM/SGT-HEM sample.

The field blank samples at the influent to the FGD wastewater treatment system (SP-6) for the low-level total mercury and low-level total metals samples were not collected as split samples between EPA and Homer City's representative. These samples were collected using separate blank water and separate tubing. However, the field blank samples for the low-level dissolved metals samples were collected as "true" split samples. For a description of the field blank sample collection procedures, see Section 5.2.3.

At each of the nine sampling points, EPA collected low-level metals sample fractions following EPA Method 1669 collection protocols. To collect low-level metals samples, EPA samplers donned Tyvek® suits and dust masks (dust masks were worn until all low-level mercury samples had been collected) during sample collection. In addition, EPA set up a "cleanbox," which consists of a portable plastic rectangular box with a shallow lip and a flip-top lid that secures itself open with clips. The "cleanbox" is double-bagged with a clear inner bag, enclosed in a translucent outer bag. The "cleanbox" is handled using "clean hands / dirty hands" techniques, whereby the inner bag is handled only by the "clean hands" sampler. When the "cleanbox" is opened, the sampler is able to position his/her hands in the box and pull the bag over the opening of the box, but is still able to see the sample bottles and tubing. The "cleanbox" minimizes potential atmospheric contamination during sample collection. Figure D-1, in Appendix D, presents a picture of a sampler working inside a "cleanbox." To collect samples, EPA placed the sample bottles and the inner bag into the "cleanbox" following the protocols specified in Method 1669, also referred to as "clean hands / dirty hands" protocols. Sampling staff filled the sample container and closed the sample bottle lid and inner bag as quickly as possible within the "cleanbox." The sample bottles were then placed into the outer bag following the "clean hands / dirty hands" protocols.

### *3.1.1 Influent to FGD Wastewater Treatment*

The influent to FGD wastewater treatment system (SP-1) was collected from a sample tap located on the wastewater piping downstream of the feed tank on the discharge side of the transfer pump, and upstream of the first-stage neutralization tank. The sample point thus represents a mixture of FGD purge and backwash from the sand filters. Based on average flow rates and frequency of the FGD purge and filter backwash, the effluent from the feed tank is comprised of approximately XX percent FGD purge and XX percent filter backwash. [QUESTION FOR HOMER CITY: Please estimate the percent flows for the preceding sentence.]

Homer City's sample tap and valve at SP-1 (as normally configured) is located approximately 15 feet above the ground. To aid in sample collection, Homer City installed a length of stainless steel pipe (Swagelok tubing) from the sample tap (15 feet above the ground) to just below waist level. In addition, Homer City installed a stainless steel splitter, with sample valves, to allow split samples to be collected. Figure 2-1 identifies the sampling location for SP-1. This sample was collected as a grab sample because the batch discharges from the gypsum dewatering process were equalized in the feed tank prior to sample collection and were expected to be fairly homogeneous. The sampling point was located inside; therefore, there were no wind or rain concerns during the sample collection.

Prior to collecting the samples at the influent to the FGD wastewater treatment system (SP-1), the sampling team purged the newly installed stainless steel piping for five minutes (about 10 gallons of wastewater purged). The sampling team then collected field blanks (SP-6) for low-level total mercury and low-level total metals. See Section 5.2.3 for a description of the field blank sample collection procedures at the influent to the FGD wastewater treatment system.

EPA collected the wastewater samples at the influent to the FGD wastewater treatment system by attaching a 5-foot length of silicone tubing to one of the fittings on the splitter at the sample location (Homer City's representative attached an identical piece of silicone tubing to the other fitting). Figure D-2, in Appendix D, presents a picture of the sample tap splitter installed at the influent to the FGD wastewater treatment system by Homer City. After the samplers attached the silicone tubing, they opened the valves of the sample tap to purge the tubing. While the tubing was being purged, the end of the EPA tubing fell on the ground. EPA removed the previous piece of tubing from the tap and attached a new, identical piece of precleaned tubing to the tap. Although this newly attached piece of tubing was not used to collect the field blanks, EPA does not expect it to be an issue because the tubing sets were identical and were cleaned during the same batch. In addition, the supplier of the tubing provided equipment blank results for the tubing sets (see Section 5.2.2).

After the new tubing was attached, EPA purged the new tubing for four minutes before beginning sample collection. Flow from the tap did not stop until all samples were collected (except HEM/SGT-HEM and the dissolved metals samples).

After the four-minute purge time had elapsed, the samplers filled three 10-liter containers with sample, which were later used to pump off the low-level and routine dissolved metals sample fractions. Once the 10-liter containers were filled, one member of the sampling team transported the three 10-liter containers to the staging area to allow the solids in the wastewater to settle while the remainder of the sampling team stayed at the sampling point and continued sample collection. Figure D-3, in Appendix D, presents a picture of the sampling set up at the influent to the FGD wastewater treatment system.

EPA then collected the low-level total metals, low-level total mercury, low-level dissolved mercury, routine total metals, as well as the QC samples for each analyte, and the arsenic/selenium speciation samples in a "cleanbox," as described in Section 3.1. The sampling team then collected BOD, Group I, and Group II samples by pouring the sample directly from the tubing into the sample bottles without using a "cleanbox." To collect the HEM/SGT-HEM samples, the samplers shut off the valve for the sample tap, removed the tubing from the fitting, reopened the valve, and filled the sample bottles directly from the tap to prevent any oil and grease adhering to the sides of the tubing.

During the sample collection, the sampling team collected an aliquot of sample for field testing. Sample pH and temperature were measured immediately at the sampling point using a pH meter and four-color pH paper. The four-color pH paper was used as an independent check of the pH meter to ensure that similar results were measured. After returning to the staging area, the sampling team took measurements of free and total residual chlorine using a colorimeter. Table 3-3 presents the field measurement data for the influent to the FGD wastewater treatment system. The samplers noted that the field test jar was initially cloudy and had a brownish-gray appearance when collected. However, the solids in the sample settled quickly, leaving a layer of solids at the bottom of the jar.

The sampling team then moved to the staging area, where a pump-off station was set up, to collect the low-level and routine dissolved metals samples. The pump-off station consisted of a length of Teflon® tubing attached to a length of silicone tubing, which was threaded through an ISCO peristaltic pump. The sampling team attached a capsule filter to the silicone tubing, which was a short distance downstream of the pump. The sampling team attached another short length of silicone tubing to the capsule filter effluent, which was attached to a "Y" splitter and two lengths of silicone tubing. This set-up allowed EPA to collect "true" split samples with Homer City's representatives. Prior to collecting any dissolved metals samples of the FGD wastewater influent, the samplers collected a field blank sample (SP-6) for low-level dissolved metals. See Section 5.2.3 for a description of the dissolved metals field blank sample collection at the influent to the FGD wastewater treatment system.

After the field blank sample was collected, the sampling team transferred the end of the Teflon® tubing into one of the 10-liter containers filled with wastewater from the influent to the FGD wastewater treatment system. By this time, the solids in the wastewater had been settling for approximately 2.5 hours, and there was approximately a one-inch layer of solids at the bottom of the container.

The sampling team first purged the tubing and filter with sample for 30 seconds (approximately 1 L). The samplers then collected the low-level dissolved metals sample, as well as the low-level dissolved metals QC sample. After the low-level dissolved metals samples were collected, the samplers transferred the end of the Teflon® tubing into another 10-liter container, installed a new capsule filter, and purged the tubing and filter for 30 seconds (approximately 1 L of sample). The samplers then collected the routine dissolved metals sample, the routine dissolved metals QC sample, and the routine hexavalent chromium sample.

### *3.1.2 Second-Stage Clarifier Overflow in FGD Wastewater Treatment*

The second-stage clarifier overflow in the FGD wastewater treatment system (SP-2) was collected from the overflow weir of the clarifier, at the point where the wastewater enters the pipe to transfer the wastewater to the pH adjustment tank. To aid in sample collection, Homer City constructed scaffolding directly against the clarifier to allow the samplers easy access the overflow weir. Figure 2-1 identifies the sampling location for SP-2. This sample was collected as a grab sample, because the flow through the FGD wastewater treatment system is continuous; therefore, the wastewater characteristics should be fairly homogeneous.

During the sample collection at the second-stage clarifier in the FGD wastewater treatment system, the sampling team covered the sample collection area with a tarp to cover the samplers and sample bottles in case of rain, and prevent debris from falling on the sample collection area. There was no rain during the sample collection period.

Prior to collecting the samples for the second-stage clarifier overflow in the FGD wastewater treatment system (SP-2), the sampling team collected field blanks (SP-7) for low-level total mercury, low-level total metals, routine total metals, low-level dissolved metals, low-level hexavalent chromium, routine dissolved metals, and routine hexavalent chromium. See

Section 5.2.3 for a description of the field blank sample collection procedures for the second-stage clarifier overflow in the FGD wastewater treatment system.

EPA collected the wastewater samples for the second-stage clarifier overflow in the FGD wastewater treatment system by pumping samples from the overflow weir into the sample containers. EPA attached one end of a 25-foot length of Teflon® tubing to a piece of PVC pipe. A sampling team member stood on the scaffolding and submerged the open end of the PVC pipe and tubing in the overflow weir. Figure D-4, in Appendix D, presents a picture of the tubing submerged in the second-stage clarifier weir. The sampling team positioned the tubing along the side of the scaffolding to reach the sampling team at ground level and attached it to a piece of silicone tubing, which was threaded through an ISCO peristaltic pump. The sampling team attached a "Y" splitter to the end of the silicone tubing, with two additional pieces of silicone tubing attached to the "Y" splitter. The length of silicone tubing between the pump and the "Y" splitter consisted of two pieces with a small connector, which allowed EPA to attach and detach a capsule filter inline with the tubing configuration. The "Y" splitter allowed EPA to collect "true" split samples with Homer City's representative. Figure D-5, in Appendix D, presents a picture of the sampling set up for the second-stage clarifier overflow in the FGD wastewater treatment system.

After EPA configured the tubing for the sampling point, the samplers purged the tubing with sample. After approximately 20 seconds of purging, the tubing detached from the filter due to backpressure. The samplers were able to recover the filter and tubing without contaminating any equipment. The samplers reattached the tubing to the filter and continued purging for two minutes.

After the tubing was purged, the samplers first collected the low-level dissolved metals and low-level hexavalent chromium samples because the capsule filter was already inline with the tubing configuration from the dissolved metals field blank sample collection. The sampling team then installed a new capsule filter, purged the filter for one minute, and collected the routine dissolved metals and routine hexavalent chromium samples. Each of these samples was collected in a "cleanbox," as described in Section 3.1.

After collecting the routine hexavalent chromium sample, the samplers dropped EPA's silicone tubing on the ground. The samplers recovered the tubing from the ground, but the end of tubing was contaminated. The sampling team removed the connector piece on the end of the tubing and used Homer City's representatives' tubing to pour sample over the end of EPA's tubing for two minutes. EPA did not replace the sample tubing, but rather continued to use the tubing for the remainder of the sample collection.

After collecting all the dissolved metals samples, the sampling team removed the capsule filter from the tubing configuration, and purged the tubing for one minute. The samplers then collected the low-level total metals, low-level total mercury, low-level dissolved mercury, routine total metals, and arsenic/selenium speciation samples in a "cleanbox," as described in Section 3.1. The sampling team then collected the BOD, Group I, and Group II samples by pouring the samples directly from the tubing into the samples bottles without using a "cleanbox." To collect the HEM/SGT-HEM samples, the samplers dipped the sample bottles directly into the overflow weir to prevent any oil and grease adhering to the sides of the tubing. Therefore, EPA did not collect split samples with Homer City's representative for the HEM/SGT-HEM samples, but instead, collected duplicate samples with Homer City's representative.

During the sample collection, the sampling team collected an aliquot of sample for field testing. Sample pH and temperature were measured immediately at the sampling point using a pH meter and four-color pH paper. The four-color pH paper was used as an independent check of the pH meter to ensure that similar results were measured. After returning to the staging area, the sampling team took measurements of free and total residual chlorine using a colorimeter. Table 3-3 presents the field measurement data for the second-stage clarifier overflow in the FGD wastewater treatment system.

### *3.1.3 Effluent from FGD Wastewater Treatment*

The effluent from the FGD wastewater treatment system (SP-3) was collected directly from the effluent tank. Figure 2-1 identifies the sampling location for SP-3. This sample was collected as a grab sample, because all the wastewater entering the effluent tank has been treated in the FGD wastewater treatment system and is discharged from the tank; therefore, the wastewater characteristics should be fairly homogeneous. The sampling point was located inside, next to the staging area; therefore, there were no wind or rain concerns during the sample collection.

Prior to collecting samples at the effluent from the FGD wastewater treatment system (SP-3), the sampling team collected field blanks (SP-8) for low-level total mercury, low-level total metals, routine total metals, low-level dissolved metals, low-level hexavalent chromium, routine dissolved metals, and routine hexavalent chromium. See Section 5.2.3 for a description of the field blank sample collection at the effluent from the FGD wastewater treatment system.

EPA collected the wastewater samples for the effluent from the FGD wastewater treatment system by pumping samples from the effluent tank into the sample containers. The sampling team attached one end of a 25-foot length of Teflon® tubing to a piece of PVC pipe and inserted the PVC pipe tubing into the effluent tank through a hole in the top of the tank. The sampling team positioned the tubing to reach the sampling team at the staging area and attached it to a piece of silicone tubing, which was threaded through an ISCO peristaltic pump. The sampling team attached a "Y" splitter to the other end of the silicone tubing, with two additional pieces of silicone tubing attached to the "Y" splitter. The length of silicone tubing between the pump and the "Y" splitter consisted of two pieces with a small connector, which allowed EPA to attach and detach a capsule filter inline with the tubing configuration. The "Y" splitter allowed EPA to collect "true" split samples with Homer City's representative. Figures D-6 and D-7, in Appendix D, present pictures of the sampling set up for the effluent from the FGD wastewater treatment system.

After EPA configured the tubing for the sampling point, the samplers purged the tubing and filter with sample for approximately one minute. The samplers first collected the low-level dissolved metals sample, as well as the QC and duplicate samples because the capsule filter was already inline with the tubing configuration from the dissolved metals field blank sample collection. The sampling team then installed a new capsule filter and purged the filter with approximately one-half liter of sample. After purging the filter, the samplers collected the low-level hexavalent chromium, routine dissolved metals, and the routine hexavalent chromium samples, as well as the QC and duplicate samples for each analyte. Each of these samples was collected in a "cleanbox," as described in Section 3.1.

After collecting all the dissolved metals samples, the sampling team removed the capsule filter from the tubing configuration, and purged the tubing for one minute. The samplers then collected the low-level total metals, low-level total mercury, low-level dissolved mercury, routine total metals, and arsenic/selenium speciation samples, as well as the QC and duplicate samples for each analyte in a "cleanbox," as described in Section 3.1. The sampling team then collected the BOD, Group I, and Group II samples, as well as the QC and duplicate samples for each analyte, by pouring the samples directly from the tubing into the samples bottles without using a "cleanbox." To aid in the collection of the HEM/SGT-HEM samples, Homer City installed a stainless steel tap off of the effluent tank to allow EPA to collect samples without using tubing. The samplers flushed the stainless steel tap for four minutes, because the initial 20 seconds of sample from the tap appeared to contain high solids, but by the end of the four minutes, the sample looked similar to the effluent collected for the other samples. EPA then collected the HEM/SGT-HEM samples directly from the stainless steel sample tap to prevent any oil and grease adhering to the sides of the tubing. Therefore, EPA did not collect split samples with Homer City's representative for the HEM/SGT-HEM samples, but instead, collected duplicate samples with Homer City's representative.

During the sample collection, the sampling team collected an aliquot of sample for field testing. Sample pH and temperature were measured immediately at the sampling point using a pH meter and four-color pH paper. The four-color pH paper was used as an independent check of the pH meter to ensure that similar results were measured. After returning to the staging area, the sampling team took measurements of free and total residual chlorine using a colorimeter. Table 3-3 presents the field measurement data for the effluent from the FGD wastewater treatment system.

### *3.1.4 Effluent from Bottom Ash Pond*

EPA collected the effluent from the bottom ash pond (SP-4), from the clear well, which receives water from the two bottom ash ponds. Homer City collects its bottom ash effluent monitoring samples at the clearwell overflow weir. However, EPA collected samples from the middle area of the clear well, away from the skimmer and overflow weir, which were rusty and had the potential to contaminate the samples with metal. Figure D-8, in Appendix D, shows the sampling point location upstream of the skimmer. EPA felt that the sampling point selected, although prior to the skimmer and weir, still represented the effluent from a bottom ash pond. The sample was collected as a grab sample because the residence time of the ash ponds and the clear well equalize the wastewater discharges.

The sampling point for the effluent from the bottom ash pond was located outside near the clear well. At the time the sampling team went out to the sampling point, a vacuum truck was skimming solids from the surface of the clear well. According to the truck operator, the skimming had started approximately two hours before the samplers arrived at the sampling point. After approximately 10 minutes, the vacuum truck left the sampling area. At the time the truck finished skimming, Unit 3 was sluicing the bottom ash to the ash ponds. Because the plant uses water from the clear well as the source for bottom ash sluice water, water was being removed from the clear well, and therefore, the plant was not discharging. The sampling team waited approximately one hour before setting up the sampling point so that none of the three units were sluicing bottom ash and the plant was discharging from the clear well.

Prior to collecting samples at the effluent from the bottom ash pond (SP-4), the sampling team collected field blanks (SP-9) for low-level total mercury, low-level total metals, routine total metals, low-level dissolved metals, low-level hexavalent chromium, routine dissolved metals, and routine hexavalent chromium. See Section 5.2.3 for a description of the field blank sample collection at the effluent from the bottom ash pond.

EPA collected the wastewater samples for the effluent from the bottom ash pond by pumping samples from the clear well into the sample containers. EPA attached one end of a 25-foot length of Teflon® tubing to a piece of PVC pipe and inserted the tubing into the clear well at a point where there was no residue floating on the top of the water. The sampling team secured the PVC pipe along a rail, so that the tubing was approximately two feet below the surface of the water (the clearwell has a depth of XX feet). [QUESTION FOR HOMER CITY: What is the depth of the clearwell?] The sampling team positioned the tubing to reach the set-up location near the clear well and attached it to a piece of silicone tubing, which was threaded through an ISCO peristaltic pump. The sampling team attached a "Y" splitter to the end of the silicone tubing, with two additional pieces of silicone tubing attached to the "Y" splitter. The length of silicone tubing between the pump and the "Y" splitter consisted of two pieces with a small connector, which allowed EPA to attach and detach a capsule filter inline with the tubing configuration. The "Y" splitter allowed EPA to collect "true" split samples with Homer City's representative. Figure D-8, in Appendix D, presents a picture of the sampling set up for the effluent from the bottom ash pond.

After EPA configured the tubing for the sampling point, the samplers purged the tubing and filter with sample for approximately 1.5 minutes. The samplers first collected the low-level dissolved metals sample and the QC sample because the capsule filter was already inline with the tubing configuration from the dissolved metals field blank sample collection. The sampling team then installed a new capsule filter and purged the filter with sample for one minute. After purging the filter, the samplers collected the low-level hexavalent chromium, routine dissolved metals, the routine hexavalent chromium samples, and the QC sample for each analyte. Each of these samples was collected in a "cleanbox", as described in Section 3.1.

After collecting all the dissolved metals samples, the sampling team removed the capsule filter from the tubing configuration, and purged the tubing for one minute. The samplers then collected the low-level total metals, low-level total mercury, low-level dissolved mercury, routine total metals, as well as the QC sample for each analyte, and arsenic/selenium speciation samples in a "cleanbox," as described in Section 3.1. The sampling team then collected the BOD, Group I, and Group II samples, as well as the QC sample for each analyte, by pouring the samples directly from the tubing into the samples bottles without using a "cleanbox." The samplers collected the HEM/SGT-HEM and HEM/SGT-HEM QC samples by using a bottle dipper to collect the samples directly from the clear well to prevent any oil and grease adhering to the sides of the tubing. Therefore, EPA did not collect split samples with Homer City's representative for the HEM/SGT-HEM samples, but instead, collected duplicate samples with Homer City's representative. The samplers collected the HEM/SGT-HEM samples as close to the location where the tubing had been collecting the other samples as possible.

During the sample collection, the sampling team collected an aliquot of sample for field testing. Sample pH and temperature were measured immediately at the sampling point using a pH meter and four-color pH paper. The four-color pH paper was used as an independent check of the pH meter to ensure that similar results were measured. After returning to the staging area, the sampling team took measurements of free and total residual chlorine using a colorimeter. Table 3-3 presents the field measurement data for the effluent from the bottom ash pond.

### 3.2 List of Analytes and Sample Preservation

Analytes in EPA's Homer City sampling episode included those in the following classes of pollutants:

- Classicals:
  - Biochemical oxygen demand, 5-day (BOD5),
  - 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), and
  - Silica-gel treated hexane extractable material (SGT-HEM); and
- 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),
  - Routine hexavalent chromium,
  - 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 air pollution control wastewaters, including contributions from coal, scrubber sorbents, treatment chemicals, and other sources. Table 3-4 lists the analytical methods used to determine pollutant concentrations.

Table 3-5 lists the containers used for sample collection as well as the preservation requirements for each sample, and Table 3-6 summarizes the chemical preservation for each of the samples that were preserved on site. The sampling team preserved samples in accordance with procedures described in Section 3.4 of the Sampling Plan. All samples except routine total and dissolved metals, low-level total and dissolved metals, low-level total and dissolved mercury, and low-level hexavalent chromium samples were placed on ice and cooled to <6°C immediately following collection. All dissolved metals samples, except low-level dissolved mercury, were filtered in the field. The routine and low-level hexavalent chromium samples were preserved in the field, but all other metals samples were acid-preserved at the laboratory, prior to extraction. The routine hexavalent chromium samples were supposed to be preserved to a pH between 9.3 and 9.7 using an ammonium sulfate buffer solution; however, the sampling team discontinued preservation for some samples because 10 percent of the sample volume was added before the required pH was achieved (the pH of these preserved samples was approximately 9.0). The low-level hexavalent chromium sample bottles were prepreserved with 4 mL of 50-percent NaOH. The Group II and HEM/SGT-HEM samples were preserved with sulfur acid to a pH of <2 immediately after collection in the staging area, and the pH was confirmed with four-color pH strips.

## 3.3 Plant Operational Data

During the sampling episode at Homer City, plant personnel provided the sampling team with operational data for each of the generating units, the FGD scrubber system, and the bottom ash collection system, as well as operational and flow data for the FGD wastewater treatment system. Table 3-7 presents the unit operating characteristics, Table 3-8 presents the FGD scrubber system operating characteristics, Table 3-9 presents the FGD wastewater treatment system operating characteristics, and Table 3-10 presents the bottom ash system operating characteristics during the sampling episode.

## 3.4 Deviations from the Sampling and Analysis Plan

The sampling episode proceeded as specified in the Sampling Plan with the exceptions described below:

- **Collection Containers for Dissolved Metals at SP-1.** For the influent to the FGD wastewater treatment system, EPA planned to collect volume for the pump-off of routine and low-level dissolved metals and routine hexavalent chromium samples, as well as the QC samples, into two precleaned 10-liter containers. However, EPA collected the volume into three precleaned 10-liter container, to ensure that enough volume was collected.

- **Dissolved Metals Sample Filtration Time at SP-1.** For the influent to the FGD wastewater treatment system, EPA planned to filter the dissolved metals samples approximately one hour after filling the 10-liter containers with sample; however, the filtration did not occur until approximately 2.5 hours later.

- **Dissolved Metals Sample Collection at all Sampling Points.** EPA planned to collect the dissolved metals samples at all sampling points as "multipour" splits, by partially filling the EPA bottle, then filling the split bottle, and then repeating the partial filling of both bottles two more times until both bottles are completely full. Instead, EPA collected "true" split samples with Homer City's representative at all sampling points by placing a filter directly after the peristaltic pump and then having a splitter after the filter.

- **Low-Level Total Mercury Field Blank Sample Collection at all Sampling Points.** EPA planned to collect the low-level total mercury field blank samples after the low-level total metals field blank samples at all sampling points; however, EPA decided to collect the low-level total mercury field blank samples first. The low-level total metals field blank water was held in a plastic container, while the low-level mercury field blank water was held in a borosilicate glass container (because the glass is easier to clean for mercury contamination). The borosilicate glass has the potential to leach into the mercury field blank water, and therefore, could potentially contaminate the samples for the boron analysis. For this reason, EPA decided that the low-level total metals field blanks should be collected after the low-level mercury field blanks because then the field blank and the wastewater sample are both exposed to the same potential boron contamination from the low-level total mercury field blank water.

- **Sample Collection at the Second-Stage Clarifier (SP-2).** EPA planned to collect the samples of the second-stage clarifier overflow by setting up the sampling point on the clarifier bridge; however, EPA set up the sampling equipment on the ground, at the bottom of the clarifier. One sampler stood on the scaffolding set up by Homer City holding the tubing in the clarifier overflow weir.

- **Second-Stage Clarifier Flow Rate Estimation.** EPA planned to estimate the flow rate of the second-stage clarifier overflow by measuring the time required to fill a 1-L jar placed at the overflow weir, if possible. However, EPA decided that this flow value would likely not produce a reliable result and that the influent flow rate into the treatment system would be a more accurate representation of the flow rate.

- **HEM/SGT-HEM Sample Collection at Second-Stage Clarifier.** EPA planned to collect the HEM/SGT-HEM samples at the second-stage clarifier by using a bottle dipper to place the bottle near the overflow weir and filling the bottle with the water flowing over the weir. However, because Homer City built the scaffolding along the clarifier wall, EPA was able to dip the bottles directly into the overflow weir where the water was collected prior to being transported to the pH adjustment tank.

- **Sample Collection at the FGD Effluent (SP-3).** EPA planned to collect the samples of the effluent from the FGD wastewater treatment system by using Homer City's ISCO pump and tubing and attaching new tubing to the end of the preexisting tubing. However, EPA decided to use new Teflon® and silicone tubing cleaned according to EPA Method 1669 protocols and a rented ISCO pump to collect the samples.

- **HEM/SGT-HEM Sample Collection at FGD Effluent.** EPA planned to collect the HEM/SGT-HEM samples by dipping the bottles directly into the effluent tank using a bottle dipper; however, Homer City determined it would be inconvenient to remove the top of the effluent tank. Therefore, prior to the sampling episode, Homer City installed a stainless steel tap at the bottom of the effluent tank to allow EPA to collect samples without the use of tubing. EPA collected the

HEM/SGT-HEM samples at the effluent from the FGD wastewater treatment system by filling bottles directly from a stainless steel tap that Homer City had installed.

- **Sample Tubing Dropped During Sample Collection.** During the collection of the influent to the FGD wastewater treatment system (SP-1) and the second-stage clarifier overflow in the FGD wastewater treatment system (SP-2), EPA dropped the sample tubing on the ground. For the influent sample, EPA replaced the tubing with an identical piece of pre-cleaned tubing and resumed sample collection. For the second-stage clarifier overflow sample, EPA removed the connector on the end of the sample tubing and rinsed the tubing for 2 minutes with sample, prior to resuming sample collection.

- **Sample Tubing Detached During Sample Collection at SP-2.** While purging the sample tubing at the second-stage clarifier overflow in the FGD wastewater treatment system (SP-2), the tubing detached from the filter due to backpressure. The samplers were able to recover the filter and tubing without contaminating any equipment. The samplers reattached the tubing to the filter and continued purging for two minutes.

- **Chlorine Field Test Measurements.** EPA did not perform the chlorine field test measurement for the influent to the FGD wastewater treatment system (SP-1) immediately after sample collection because the color of the sample would have prevented an accurate measurement; therefore, EPA performed the analysis on a filtered sample collected during the pump-off. Because this test was performed on a filtered sample and because the chlorine may have dissipated during the time between initial sample collection and pump-off, the result may not represent the actual wastewater characteristics. In addition, EPA was unable to perform the chlorine field test measurement for the effluent from the bottom ash pond immediately after sample collection.

- **Preservation of Routine Hexavalent Chromium.** The routine hexavalent chromium samples were supposed to be preserved to a pH between 9.3 and 9.7 using an ammonium sulfate buffer solution; however, for some of the samples, preservation was discontinued because 10 percent of the sample volume was added before the required pH was achieved (the pH of these preserved samples was approximately 9.0).

## Table 3-1. Sample Collection Information, Homer City

| Sampling Point Number | Sampling Point Description | Type of Sample | Sample Collection Date and Time | SCC Number |
|---|---|---|---|---|
| SP-1 | Influent to FGD Wastewater Treatment System | Grab | 08/22/2007<br>1153 [a] and 1442 [b] | 70420 |
| SP-2 | Second-Stage Clarifier Overflow in FGD Wastewater Treatment System | Grab | 08/23/2007<br>0750 | 70421 |
| SP-3 | Effluent from FGD Wastewater Treatment System | Grab | 08/22/2007<br>0813 | 70422 |
| SP-4 | Effluent from Bottom Ash Pond | Grab | 08/23/2007<br>1130 | 70423 |
| SP-5 | Duplicate of Effluent from FGD Wastewater Treatment System | Grab | 08/22/2007<br>0813 | 70424 |
| SP-6 | Influent to FGD Wastewater Treatment System Field Blank | Grab | 08/22/2007<br>1127 [a] and 1430 [b] | 70425 |
| SP-7 | Second-Stage Clarifier Overflow in FGD Wastewater Treatment System Field Blank | Grab | 08/23/2007<br>0718 | 70426 |
| SP-8 | Effluent from FGD Wastewater Treatment System Field Blank | Grab | 08/22/2007<br>0731 | 70427 |
| SP-9 | Effluent from Bottom Ash Pond Field Blank | Grab | 08/23/2007<br>1102 | 70428 |

a – Collection of the total metals samples (low-level and routine), low-level dissolved mercury, and classicals.
b – Collection of the dissolved metals samples (except low-level dissolved mercury).

## Table 3-2. Number of Samples Collected by Sampling Point, Homer City

| Sampling Point Number | Sampling Point Description | 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+QC | 1+QC | 1+QC | 1+QC |  | 1+QC | 1+QC | 1 | 1 | 1 | 1 | 1 | 1+dup |
| SP-2 | Second-Stage Clarifier Overflow 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 | Bottom Ash Pond Effluent | 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-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 | Second-Stage Clarifier Overflow in FGD Wastewater Treatment System Field Blank | 1 | 1 | 1 |  | 1 | 1 | 1 |  |  |  |  | 1 |  |
| SP-8 | Effluent from FGD Wastewater Treatment System Field Blank | 1 | 1 | 1 |  | 1 | 1 | 1 |  |  |  |  | 1 |  |
| SP-9 | Bottom Ash Pond Effluent Field Blank | 1 | 1 | 1 |  | 1 | 1 | 1 |  |  |  |  | 1 |  |
| Total Number of Samples |  | 9+3QC | 9+3QC | 9+3QC | 5+3QC | 7+2QC | 8+3QC | 8+3QC | 5+2QC | 5+2QC | 5+2QC | 4+2QC | 8+2QC | 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 3-3. Field Measurements, Homer City

| Sampling Point Number | Sampling Point Description | Date and Time | Temp °C Meter | pH (S.U.) | | Free Chlorine (mg/L) | Total Chlorine (mg/L) | Manganese Interference Reading (mg/L) | Waste Stream Flow Rate (GPM) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Meter | Strips | | | | |
| SP-1 | Influent to FGD Wastewater Treatment | 08/22/07 1249 | 38.2 | 6.78 | NA | 0.00 [a] | 0.00 [a] | NA | 109 [d] |
| SP-2 | Second-Stage Clarifier Overflow in FGD Wastewater Treatment System | 08/23/07 0823 | 32.8 | 8.09 | 8.5 | 0.00 [b] | 0.00 [b] | NA | |
| SP-3 | Effluent from FGD Wastewater Treatment | 08/22/07 0921 | 29.4 | 7.37 | 7 | 0.33 | 0.33 | 0.00 | 107 [e] |
| SP-4 | Bottom Ash Pond Effluent | 08/23/07 1207 | 37.8 | 8.46 | NA | 0.00 [c] | 0.00 [c] | NA | |

a – EPA did not initially perform a free and total chlorine measurement because the color of the sample would prevent an accurate colorimetric reading. EPA later performed a reading of the filtered sample after settling, which resulted in 0.00 mg/L for both free and total chlorine.
b – The free and total chlorine measurements were 0.00 mg/L; however, the samplers observed that the sample looked cloudy after the N,N'-diethyl-p-phenylenediamine (DPD) reagent addition (as compared to the colorless sample prior to reagent addition).
c – EPA performed the free and total chlorine measurements at 5:00 pm; therefore, the chlorine in the sample may have dissipated.
d – Flow rate based on one measurement recorded from the influent flow meter during sample collection at 1:11 PM on August 22, 2007.
e – Flow rate based on the average of 12 measurements recorded from the effluent flow meter during sample collection on August 22, 2007.
NA – Not analyzed.

## Table 3-4. Analytical Methods and Procedures for Samples Collected at Homer City

| Method Number | Parameter | Method Type |
|---|---|---|
| **Classicals** | | |
| SM 5210 B | Biochemical Oxygen Demand (BOD5) | 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—$NH_3$ F (18th ed.) | Ammonia as Nitrogen | Distillation, potentiometric |
| SM 4500—$NO_3$ -H | Nitrate/Nitrate as Nitrogen | Autoanalyzer |
| SM 4500—N,C (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 |
| **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, 245.1 | Metals by Inductively Coupled Plasma Atomic Emission Spectrometry, and Atomic Absorption Spectroscopy | ICP and CVAA |
| ASTM D1687-92 | Hexavalent Chromium | Colorimetric |

CVAFS – Cold vapor atomic fluorescence spectrometry.
ICP/MS – Inductively coupled plasma with mass spectrometry.
ICP – Inductively coupled plasma.
CVAA – Cold vapor atomic adsorption.

## Table 3-5. 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 bottles | ≤6°C |
| Group II [b] | Two 1-L plastic bottles | $H_2SO_4$ to pH <2, ≤6°C |
| HEM/SGT-HEM | Two 1-L wide mouth glass jars | $H_2SO_4$ to pH <2, ≤6°C |
| **Metals** | | |
| Routine total metals, 27 element quantitation (Method 200.7, 200.8, 200.9, 245.1) | One 500-mL plastic bottle | None (acid preserve at laboratory) |
| Routine dissolved metals, 27 element quantitation (Method 200.7, 200.8, 200.9, 245.1) | One 500-mL plastic bottle | 0.45 µm filter (performed in field) (acid preserve at laboratory) |
| 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 |
| Low-level total mercury (Method 1631) | Two 250-mL glasses (ultraclean), fluoropolymer lined caps | None (acid preserve at laboratory) |
| Low-level dissolved mercury (Method 1631) | Two 250-mL glasses (ultraclean), fluoropolymer lined caps | None (acid preserve and filter at laboratory) |
| Low-level total elements by ICP/MS (11 elements, Method 1638) | One 1-L LDPE (ultraclean), fluoropolymer lined caps | None (acid preserve at laboratory) |
| Low-level dissolved elements by ICP/MS (11 elements, Method 1638) | One 1-L LDPE (ultraclean), fluoropolymer lined caps | 0.45 µm filter (performed in field) (acid preserve at laboratory) |
| Low-level hexavalent chromium (Method 1636) | One 500-mL LDPE (ultraclean), fluoropolymer lined caps | 0.45 µm filter (performed in field) 4 mL 50% NaOH per 500 mL sample (performed in field) |

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 3-6. Sample Preservation Summary, Homer City

| Sampling Point Number | Analysis | Date and Time | Chemical | Initial pH | Final pH | Amount Added |
|---|---|---|---|---|---|---|
| 70420 | Group II V1 | 08/22/07 | $H_2SO_4$ | 7 | 2 | 50 drops |
| 70420 | Group II V2 | 08/22/07 | $H_2SO_4$ | 7 | 2 | 50 drops |
| 70420 | HEM/SGT-HEM V1 | 08/22/07 | $H_2SO_4$ | 7 | 2 | 65 drops |
| 70420 | HEM/SGT-HEM V2 | 08/22/07 | $H_2SO_4$ | 7 | 2 | 65 drops |
| 70420 | Routine Hexavalent Chromium | 08/22/07 | Ammonium Sulfate Buffer | 7 | 9 | 250 drops [a] |
| 70420 | Arsenic/Selenium Speciation (Duplicate) | 08/22/07 | HCl | 7 | 2 | 15 drops |
| 70421 | Group II V1 | 08/23/07 | $H_2SO_4$ | 8.5 | 2 | 50 drops |
| 70421 | Group II V2 | 08/23/07 | $H_2SO_4$ | 8.5 | 2 | 50 drops |
| 70421 | HEM/SGT-HEM V1 | 08/23/07 | $H_2SO_4$ | 8.5 | 2 | 70 drops |
| 70421 | HEM/SGT-HEM V2 | 08/23/07 | $H_2SO_4$ | 8.5 | 2 | 70 drops |
| 70421 | Routine Hexavalent Chromium | 08/23/07 | Ammonium Sulfate Buffer | 8.5 | 9.5 | 250 drops |
| 70421 | Arsenic/Selenium Speciation (Duplicate) | 08/23/07 | HCl | 8.5 | 2 | 30 drops |
| 70422 | Group II V1 | 08/22/07 | $H_2SO_4$ | 7 | 2 | 60 drops |
| 70422 | Group II V2 | 08/22/07 | $H_2SO_4$ | 7 | 2 | 60 drops |
| 70422 | Group II V1 MS/MSD | 08/22/07 | $H_2SO_4$ | 7 | 2 | 60 drops |
| 70422 | Group II V2 MS/MSD | 08/22/07 | $H_2SO_4$ | 7 | 2 | 60 drops |
| 70422 | HEM/SGT-HEM V1 | 08/22/07 | $H_2SO_4$ | 7 | 2 | 100 drops |
| 70422 | HEM/SGT-HEM V2 | 08/22/07 | $H_2SO_4$ | 7 | 2 | 100 drops |
| 70422 | HEM/SGT-HEM V1 MS/MSD | 08/22/07 | $H_2SO_4$ | 7 | 2 | 100 drops |
| 70422 | HEM/SGT-HEM V2 MS/MSD | 08/22/07 | $H_2SO_4$ | 7 | 2 | 100 drops |
| 70422 | Routine Hexavalent Chromium | 08/22/07 | Ammonium Sulfate Buffer | 7 | 9 | 250 drops [b] |
| 70422 | Routine Hexavalent Chromium MS/MSD | 08/22/07 | Ammonium Sulfate Buffer | 7 | 9 | 250 drops [b] |
| 70422 | Arsenic/Selenium Speciation (Duplicate) | 08/22/07 | HCl | 7 | 2 | 20 drops |
| 70423 | Group II V1 | 08/23/07 | $H_2SO_4$ | 6.5 | 2 | 50 drops |
| 70423 | Group II V2 | 08/23/07 | $H_2SO_4$ | 6.5 | 2 | 50 drops |
| 70423 | Group II V1 MS/MSD | 08/23/07 | $H_2SO_4$ | 6.5 | 2 | 50 drops |
| 70423 | Group II V2 MS/MSD | 08/23/07 | $H_2SO_4$ | 6.5 | 2 | 50 drops |
| 70423 | HEM/SGT-HEM V1 | 08/23/07 | $H_2SO_4$ | 6.5 | 2 | 80 drops |

a – Preservation of this sample was stopped due to excessive buffering of the sample. The pH of the sample was not changing with the addition of the ammonium sulfate buffer solution; therefore, the preservation was stopped to prevent the sample from being diluted by the preservative.
b – The sample bottle was filled too full to preserve initially; therefore, EPA removed some excess volume with a pipet prior to preserving the sample. The bottle was shaken well prior to removing the excess volume.

## Table 3-6. Sample Preservation Summary, Homer City

| Sampling Point Number | Analysis | Date and Time | Chemical | Initial pH | Final pH | Amount Added |
|---|---|---|---|---|---|---|
| 70423 | HEM/SGT-HEM V2 | 08/23/07 | $H_2SO_4$ | 6.5 | 2 | 80 drops |
| 70423 | HEM/SGT-HEM V1 | 08/23/07 | $H_2SO_4$ | 6.5 | 2 | 90 drops |
| 70423 | HEM/SGT-HEM V2 | 08/23/07 | $H_2SO_4$ | 6.5 | 2 | 90 drops |
| 70423 | Routine Hexavalent Chromium | 08/23/07 | Ammonium Sulfate Buffer | 6.5 | 9.5 | 250 drops |
| 70423 | Routine Hexavalent Chromium MS/MSD | 08/23/07 | Ammonium Sulfate Buffer | 6.5 | 9.5 | 250 drops |
| 70423 | Arsenic/Selenium Speciation (Duplicate) | 08/22/07 | HCl | 5.5 | 2 | 20 drops |
| 70424 | Group II V1 (Duplicate) | 08/22/07 | $H_2SO_4$ | 7 | 2 | 60 drops |
| 70424 | Group II V2 (Duplicate) | 08/22/07 | $H_2SO_4$ | 7 | 2 | 60 drops |
| 70424 | Routine Hexavalent Chromium (Duplicate) | 08/22/07 | Ammonium Sulfate Buffer | 7 | 9 | 250 drops [b] |
| 70426 | Routine Hexavalent Chromium (Field Blank) | 08/23/07 | Ammonium Sulfate Buffer | 7 | 9.5 | 80 drops |
| 70427 | Routine Hexavalent Chromium (Field Blank) | 08/22/07 | Ammonium Sulfate Buffer | 7 | 9.5 | 90 drops |
| 70428 | Routine Hexavalent Chromium (Field Blank) | 08/23/07 | Ammonium Sulfate Buffer | 7 | 9.5 | 140 drops |

a – Preservation of this sample was stopped due to excessive buffering of the sample. The pH of the sample was not changing with the addition of the ammonium sulfate buffer solution; therefore, the preservation was stopped to prevent the sample from being diluted by the preservative.
b – The sample bottle was filled too full to preserve initially; therefore, EPA removed some excess volume with a pipet prior to preserving the sample. The bottle was shaken well prior to removing the excess volume.

## Table 3-7. Generating Unit Operating Characteristics During Sample Collection, Homer City

| Unit ID | Boiler Type | Coal type | Coal Usage (tons) [a] | Source of Coal (coal region and/or state) | Capacity (MW) | Electricity Production (or percent capacity) | SCR (No, On, Off) | Particulate Control System (HS/CS ESP, or BH) | Wet FGD System (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Supercritical wall fired boiler | Eastern Bituminous blend | 11,429 | See note below. | 650 | 646 (99%) | SCR on. | ESP | No |
| 2 | Supercritical wall fired boiler | Eastern Bituminous blend | 10,939 | See note below. | 650 | 618 (95%) | SCR on. | ESP | No |
| 3 | Babcock & Wilson drum boiler | Eastern Bituminous blend | 12,097 | See note below. | 700 | 675 (96%) | SCR on. | ESP | Yes |

Note: Homer City was burning an Eastern Bituminous blend of mostly coal from the upper and lower Freeport seam and the upper, middle, and lower Kittanning seam. In addition a lesser amount of coal from the Pittsburgh seam is also used.
a – Total amount of coal burned in the units from 12 AM 8/22/07 through 11 PM 8/23/07 (48 hours average).



## Table 3-8. FGD Scrubber System Operating Characteristics, Homer City

| Unit ID | Type of Scrubber | Sorbent | Additives (DBA, Formic Acid, etc.) | FGD Make-up Water Source | $SO_2$ Removal Percentage (%) | Forced Oxidation (Yes/No) | Percent Solids in Slurry (%) | Type of Solids Separation |
|---|---|---|---|---|---|---|---|---|
| 3 | Spray tray | Limestone | Formic Acid | Open cycle using clarified river water and cooling water blowdown from unit 3 only. | Typically 95-98% 95.4% Average for 8/22-23 | Yes | Typically 13-15% | Primary and Secondary Hydroclones |

[QUESTION FOR HOMER CITY: Please provide an estimate for the percent solids in the FGD purge stream after the primary and secondary hydroclones. If possible, provide the estimate based on the days of sample collection, August 22-23, 2007.]

**Table 3-9. FGD Wastewater Treatment System Operating Characteristics, Homer City**

| **FGD Solids Dewatering (for last cycle prior to sampling or while sampling)** | |
|---|---|
| Scrubber slurry blowdown flow rate | |
| Scrubber slurry blowdown duration | |
| Scrubber slurry blowdown percent solids | |
| **FGD Wastewater Treatment System Operation During Sample Collection** | |
| Scrubber purge flow rate | |
| Scrubber purge duration | |
| Lime addition | |
| Ferric chloride addition | 63 ppm (set-point in first-stage neutralization tank)<br>60 ppm (set-point in second-stage neutralization tank) |
| Anionic Polymer (Nalco Pol-E-Z 2706) addition | 14 ppm (set-point in first-stage clarifier)<br>6.5 ppm (set-point in second-stage clarifier) |
| Cationic Polymer (Nalcolyte 8100) addition | 20 ppm (set-point in first stage neutralization tank) |
| Hydrochloric acid addition | |
| Effluent flow rate (average) | |
| Frequency of effluent discharge | Continuous |
| Retention time of equalization tank | |
| Retention time of primary clarifier | |
| Retention time of chemical reaction tanks | |
| Retention time of secondary clarifier | |

Note: Data regarding the FGD solids dewatering frequency were not provided by Homer City.

[QUESTION FOR HOMER CITY: Please fill in the above table based on the operating characteristics at the time of the sampling episode, August 22-23, 2007.]

**Table 3-10. Bottom Ash System Operating Characteristics, Homer City**

| Unit ID | 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) |
|---|---|---|---|---|---|
| 1 | | | | | No |
| 2 | | | | | No |
| 3 | | | | | No |

[QUESTION FOR HOMER CITY: Please fill in the above table based on the operating characteristics at the time of the sampling episode, August 22-23, 2007. If specific data from the time of the sampling episode are not available, please provide estimates.]

# 4. LABORATORY ANALYTICAL RESULTS AND DISCUSSION

This section summarizes and discusses the analytical data collected during this sampling episode. Section 4.1 discusses the methods used by the laboratories for the biphasic analysis of SP-1 and presents the results of the analyses. Section 4.2 presents the laboratory analytical data for the influent to and effluent from the FGD wastewater treatment system, as well as the second-stage clarifier overflow within the system. Section 4.3 presents the laboratory analytical data for the effluent from the bottom ash pond.

Appendix A provides all analytical results for all samples collected at Homer City, including all qualified results and all results that were measured above the method detection limit, but below the reporting limit (i.e., J-values). Appendix B presents the analytical results in a format similar to that used in Sections 4.2 and 4.3, but with the J-values shown (J-values are not included in the tables presented in Sections 4.2 and 4.3).

## 4.1 Measured and Calculated Results for FGD Influent Samples

The samples of the influent to the FGD wastewater treatment system were expected to contain significant amounts of readily settleable solids, to a large degree consisting of gypsum, unreacted limestone, and fly ash. Because of this, EPA was concerned that there could be analytical interferences for the metals analyses, since the acid digestion procedures used may not be sufficiently rigorous for samples with high solids loads. Therefore, EPA directed its contract laboratories to separate the aqueous and solid phases of the sample prior to conducting certain analyses, where allowed by the analytical method and if necessary to obtain acceptable analytical results. This biphasic approach provides EPA with both measured and calculated pollutant concentrations for the following phases of the sample:

- Aqueous phase;
- Solid phase; and
- Total sample.

The routine metals laboratory, ProChem Analytical (ProChem), and the low-level laboratory, Battelle Marine Sciences Laboratory (Battelle), used two different approaches for the biphasic analysis because of the different methods used for routine versus low-level metals analyses. This section describes the approaches used by each laboratory and presents the results of the analyses.

*Routine Metals and Selected Classicals Analyses*

ProChem used EPA Method 200.7 to analyze the wastewater samples for routine metals, and EPA Method 245.1 to analyze for routine mercury. EPA Method 200.7 states, “Aqueous samples containing total suspended solids ≥1% (w/v) should be extracted as a solid type sample.” [4] Because EPA expected the solids content to be greater than one percent, ProChem developed an approach for the analysis of the FGD influent samples that consisted of filtering the solids from the sample and analyzing the solid and aqueous phases separately. To calculate the total sample concentration from the solid and aqueous phase results, the laboratory also needed to measure the original sample volume, solid phase weight, and filtrate volume. EPA developed the following equation to calculate the individual metal total concentrations for the sample.

$$\text{Total Sample Concentration} = \frac{(C_{Filtrate} \times V_{Filtrate}) + (C_{Solid} \times Wt_{Solid})}{V_{Sample}} \quad (4\text{-}1)$$

where:

| | | |
|---|---|---|
| $C_{Filtrate}$ | = | concentration of the analyte in the aqueous phase of the sample; |
| $V_{Filtrate}$ | = | volume of the filtrate; |
| $C_{Solid}$ | = | concentration of the analyte in the solid phase of the sample; |
| $Wt_{Solid}$ | = | weight of the solids in the sample; and |
| $V_{Sample}$ | = | volume of the original sample. |

ProChem used the same approach for the six classical pollutants that were analyzed as biphasic samples: ammonia as nitrogen, chloride, nitrate/nitrite, sulfate, total Kjeldahl nitrogen (TKN), and total phosphorus.

*Low-Level Metals Analyses*

Battelle used EPA Method 1638 to analyze the wastewater samples for low-level metals, and EPA Method 1631E to analyze for low-level mercury. EPA Method 1638 does not contain any language stating how wastewater samples with high solid concentrations should be analyzed; therefore, Battelle developed an approach for the analysis of the FGD influent samples that minimized potential contamination to the samples. Battelle's approach consisted of analyzing the total metals concentration and dissolved metals concentration for each analyte directly from the sample bottles, and calculating the solid phase concentration. By using this approach, the laboratory did not have to perform an extra filtration step to determine the individual metals concentrations for the various phases in the sample. Battelle did not have any problems with the digestion of the solids during the total sample analyses for the Homer City FGD influent samples.

To calculate the solid phase concentration from the total and dissolved phase results, Battelle also measured the TSS level in the total metals sample bottle. EPA used the following equation to calculate the individual metal solid phase concentrations for the sample:

$$C_{Solid} = \frac{C_{Total} - C_{Diss}}{C_{TSS}} \quad (4\text{-}2)$$

where:

| | | |
|---|---|---|
| $C_{Solid}$ | = | concentration of the metal in the solid phase of the sample; |
| $C_{Total}$ | = | total concentration of the metal in the sample; |
| $C_{Diss}$ | = | concentration of the metal in the dissolved phase of the sample; and |
| $C_{TSS}$ | = | TSS concentration of the sample. |

*Analytical Deviations*

During the analysis of the Homer City FGD influent samples, ProChem did not measure the original sample volume and filtrate volume for the routine total metals samples, which were needed for the calculation of the total sample concentration. Because ProChem did not have extra sample volume to reanalyze the samples, extra sample volume from the low-level total metals sample bottles at Battelle were shipped to ProChem for the reanalysis of routine total metals. When performing the reanalysis using Battelle's extra sample volume, ProChem used the same approach as Battelle (i.e., analyzing the total sample directly), because the laboratory determined that the suspended solids present in the sample were at a concentration less than one percent; therefore, the phase separation was not required by EPA Method 200.7. The laboratory analyzed the total metals directly from the sample bottle. The laboratory had already analyzed the dissolved metals concentration; therefore, a solid concentration was calculated using Equation 4-2.

Table 4-1 presents the results of the biphasic analysis for low-level total metals and routine total metals (except routine total mercury, which is discussed below) in the FGD influent samples. Only those analytes that were detected at the influent to the FGD wastewater treatment system (SP-1) are included in the table. Results are rounded to three significant figures. Appendix Table A-1 presents all the analytical results from the influent to the FGD wastewater treatment system (SP-1) sample analysis, including J-values.

For the biphasic classical analyses, ProChem did not measure the original sample volume and filtrate volume, which were needed for the calculation of the total sample concentration, and they did not have extra sample volume to reanalyze the classicals. Although additional sample volume was available for the reanalysis of mercury, by the time the error was recognized, the holding time for the mercury analysis had expired.

To determine the total sample results for the classical analytes, EPA calculated the sample volume using the sample weight and sample density. EPA was also able to calculate the filtrate volume using data that had already been collected by the laboratory. Therefore, the classical analytes total concentrations were calculated using Equation 4-1 without making any assumptions. For the routine total mercury concentration, EPA had to estimate the sample volume to calculate the filtrate volume needed for the calculation. As a best available estimate, EPA assumed that the sample volume was 500 mL, based on the sample bottle size, knowing that the actual volume of sample collected may have been less than or greater than 500 mL.

Table 4-2 presents the results of the biphasic analysis for routine total mercury and Table 4-3 presents the results of the biphasic analysis for ammonia as nitrogen, chloride, sulfate, nitrate/nitrite, TKN, and total phosphorus in the FGD influent samples. Only those analytes that were detected at the influent to the FGD wastewater treatment system (SP-1) are included in the tables. Results are rounded to three significant figures. Appendix Table A-1 presents all the analytical results from the influent to the FGD wastewater treatment system (SP-1) sample analysis, including J-values.

## 4.2 FGD Wastewater Treatment System

Table 4-4 presents the analytical results of the classical pollutants at the influent to the FGD wastewater treatment system (SP-1), the second-stage clarifier overflow from the FGD wastewater treatment system (SP-2), and the effluent from the FGD wastewater treatment system (average of SP-3 and SP-5 results). Table 4-5 presents the analytical results of the routine and low-level metals for these same sampling points. Only those analytes that were detected in one or more samples (at levels above the reporting limit) for the sampling episode are included in the table. Results are rounded to three significant digits. If an analyte was not detected in a sample above the report limit, “ND” is reported followed by the sample-specific report limit in parentheses. Note that the results presented in Tables 4-4 and 4-5 are not paired results, meaning that sample collection across the treatment system was not timed to reflect the amount of time it takes the wastewater to pass through the treatment system (approximately 3.5 days).

Appendix Tables A-1, A-2, A-3, and A-5 present all the analytical results from the influent to the FGD wastewater treatment system (SP-1), the second-stage clarifier overflow from the FGD wastewater treatment system (SP-2), the effluent from the FGD wastewater treatment system (SP-3), and the duplicate of the effluent from the FGD wastewater treatment system (SP-5) sample analyses, including J-values. Appendix Table B-1 presents the analytical results for the metal analytes in a format similar to Table 4-5; however, Table B-1 also include results where analytes were measured above the method detection level, but below the reporting limit (i.e., J-values).

## 4.3 Bottom Ash Pond Treatment System

Table 4-6 presents the analytical results of the classical pollutants at the effluent from the bottom ash treatment system (SP-4). Table 4-7 presents the analytical results of the routine and low-level metals at the effluent from the bottom ash treatment system (SP-4). Only those analytes that were detected in one or more samples (at levels above the reporting limit) for the sampling episode are included in the table. Results are rounded to three significant digits. If an analyte was not detected in a sample above the report limit, "ND" is reported followed by the sample-specific report limit in parentheses. Appendix Table A-4 presents all the analytical results from the effluent from the bottom ash treatment system (SP-4) sample analysis, including J-values. Appendix Table B-2 presents the analytical results for the metal analytes in a format similar to Table 4-7; however, Table B-2 also include results where analytes were measured above the method detection level, but below the reporting limit (i.e., J-values).

**Table 4-1. Biphasic Sample Results for Low-Level Total Metals and Routine Total Metals Measured Above the Report Limit, FGD Influent, Homer City**

| Analyte | Aqueous Phase Result (ug/L) | Calculated Solid Phase Result (mg/kg) | Total Sample Result (ug/L) |
|---|---|---|---|
| **Low-level Total Metals** | | | |
| Antimony | ND (0.400) | 2.67 | 31.1 |
| Arsenic | 24.2 R | 103 | 1,220 |
| Cadmium | 24.5 | 2.43 | 52.8 R |
| Chromium | ND (16.0) | 109 | 1,270 |
| Copper | 11.3 | 63.2 | 747 |
| Lead | ND (1.00) | 30.2 | 351 |
| Mercury | 0.0809 | 50.8 | 533 |
| Nickel | 1,450 | 119 | 2,840 |
| Selenium | 584 | 253 | 3,530 |
| Thallium | 23.2 | 1.21 | 37.3 |
| Zinc | 34.7 | 180 | 2,130 |
| **Routine Total Metals** | | | |
| Aluminum | ND (50.0) | 21,700 | 289,000 |
| Antimony | ND (20.0) | 5.11 | 86.4 |
| Arsenic | ND (10.0) | 119 | 1,590 |
| Barium | 149 R | 884 | 11,900 R |
| Beryllium | 10.5 | 1.38 | 28.8 |
| Boron | 254,000 | ND (1,500) | 224,000 |
| Cadmium | 26.2 | 9.31 | 150 |
| Calcium | 1,990,000 | 92,500 | 3,220,000 |
| Chromium | ND (10.0) | 105 | 1,400 |
| Cobalt | 201 | 12.6 | 369 |
| Copper | 14.5 | 59.9 | 811 |
| Iron | ND (100) | 62,000 | 824,000 |
| Lead | ND (50.0) | 24.7 | 340 |
| Magnesium | 3,100,000 | ND (1,500) | 2,760,000 |
| Manganese | 173,000 | 3,910 | 225,000 |
| Molybdenum | 30.6 | 25.9 | 375 |
| Nickel | 1,350 | 91.0 | 2,560 |
| Selenium | 656 | 251 | 4,000 |
| Sodium | 1,440,000 | ND (3,760) | 1,430,000 |
| Thallium | 61.2 | Exclude | Exclude |
| Titanium | ND (10.0) | 97.7 | 1,300 |
| Vanadium | ND (20.0) | 57.6 | 766 |
| Yttrium | 6.28 | 43.6 | 586 |
| Zinc | ND (10.0) | 143 | 1,900 |

ND – Not detected (number in parenthesis is the report limit).
R – MS/MSD % Recovery outside method acceptance criteria.
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.

## Table 4-2. Biphasic Sample Results for Routine Total Mercury, FGD Influent, Homer City

| Analyte | Aqueous Phase Result (mg/L) | Solid Phase Result (mg/kg) | Calculated Total Sample Result (mg/L) |
|---|---|---|---|
| **Routine Total Metals** | | | |
| Mercury | ND (10.0) | 14.5 | 243 |

ND – Not detected (number in parenthesis is the report limit).

## Table 4-3. Biphasic Sample Results for Classical Analytes Measured Above the Report Limit, FGD Influent, Homer City

| Analyte | Aqueous Phase Result (mg/L) | Solid Phase Result (mg/kg) | Calculated Total Sample Result (mg/L) |
|---|---|---|---|
| **Classical Pollutants** | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 3.62 | 23.8 | 4.12 |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 44.0 | 467 | 54.5 |
| Total Kjeldahl Nitrogen (TKN) | 9.52 | 199 | 14.2 |
| Chloride | 12,000 | 4,000 | 11,800 |
| Sulfate | 5,900 | 46,900 | 6,920 |
| Total Phosphorus | 0.680 | 79.6 | 2.64 |

## Table 4-4. Classical Pollutants Measured Above the Report Limit for the FGD Wastewater Treatment System, Homer City

| Analyte | Method | Unit | FGD Influent (SP-1) | FGD Second-stage Clarifier Overflow Effluent (SP-2) | FGD Effluent (SP-3/SP-5) [a] |
|---|---|---|---|---|---|
| **Classical Pollutants** | | | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 4500-$NH_3$F | MG/L | 4.12 | 3.80 | 0.295 |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 353.2 | MG/L | 54.5 | 6.00 | 36.5 R |
| Total Kjeldahl Nitrogen (TKN) | 4500-N,C | MG/L | 14.2 | 13.1 | 3.04 |
| Chloride | 4500-CL-C | MG/L | 11,800 | 11,500 | 11,800 |
| Sulfate | D516-90 | MG/L | 6,920 | 2,920 | 2,790 |
| Total Dissolved Solids (TDS) | 2540 C | MG/L | 23,200 | 20,500 | 22,600 |
| Total Phosphorus | 365.3 | MG/L | 2.64 | 0.350 | 0.520 |
| Total Suspended Solids (TSS) | 2540 D | MG/L | 13,300 | 8.00 | <5.50 |

a – The FGD effluent results represent the average of the FGD effluent and the duplicate of the FGD effluent analytical measurements.
R – MS/MSD % Recovery outside method acceptance criteria.
< – Average result includes at least one non-detect value. (Calculation uses detection limit for non-detected results).
Note: Results shown are not paired samples. See Section 4.2.

## Table 4-5. Metals Measured Above the Report Limit for the FGD Wastewater Treatment System, Homer City

| Analyte | Method | Unit | FGD Influent (SP-1) | | FGD Second-stage Clarifier Overflow Effluent (SP-2) | | FGD Effluent (SP-3/SP-5) [a] | |
|---|---|---|---|---|---|---|---|---|
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| **Routine Metals** | | | | | | | | |
| Aluminum | 200.7 | UG/L | 289,000 | ND (50.0) | ND (50.0) | ND (50.0) | ND (50.0) | ND (50.0) |
| Antimony | 200.7 | UG/L | 86.4 | ND (20.0) | 20.1 | ND (20.0) | <20.8 | ND (20.0) |
| Arsenic | 200.7 | UG/L | 1,590 | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) |
| Barium | 200.7 | UG/L | 11,900 R | 149 R | 112 | 116 | 71.3 R | 70.6 R,T |
| Beryllium | 200.7 | UG/L | 28.8 | 10.5 | 7.69 | 7.90 | 7.68 | 7.71 |
| Boron | 200.7 | UG/L | 224,000 | 254,000 | 191,000 | 187,000 | 191,000 | 184,000 |
| Cadmium | 200.7 | UG/L | 150 | 26.2 | ND (5.00) | ND (5.00) | ND (5.00) | ND (5.00) |
| Calcium | 200.7 | UG/L | 3,220,000 | 1,990,000 | 1,740,000 | 1,520,000 | 2,000,000 | 1,930,000 |
| Chromium | 200.7 | UG/L | 1,400 | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) |
| Hexavalent Chromium | D1687-92 | UG/L | NA | ND (2.00) | NA | ND (2.00) | NA | ND (2.00) |
| Cobalt | 200.7 | UG/L | 369 | 201 | ND (50.0) | ND (50.0) | ND (50.0) | ND (50.0) |
| Copper | 200.7 | UG/L | 811 | 14.5 | 12.3 | 12.0 | 12.5 | 11.8 |
| Iron | 200.7 | UG/L | 824,000 | ND (100) | ND (100) | ND (100) | <117 | 166 R |
| Lead | 200.7 | UG/L | 340 | ND (50.0) | ND (50.0) | ND (50.0) | ND (50.0) | ND (50.0) |
| Magnesium | 200.7 | UG/L | 2,760,000 | 3,100,000 | 2,640,000 | 2,630,000 | 2,610,000 | 2,510,000 |
| Manganese | 200.7 | UG/L | 225,000 | 173,000 | 47,700 | 47,000 | 30,100 | 29,100 |
| Mercury | 245.1 | UG/L | 243 | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) |
| Molybdenum | 200.7 | UG/L | 375 | 30.6 | 36.7 | 35.9 | 37.6 | 35.8 |
| Nickel | 200.7 | UG/L | 2,560 R | 1,350 | 56.9 | 56.9 | ND (50.0) | ND (50.0) |

a – The FGD effluent results represent the average of the FGD effluent and the duplicate of the FGD effluent analytical measurements.
NA – Not analyzed.
ND – Not detected (number in parenthesis is the report limit).
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.
< – Average result includes at least one non-detect value. (Calculation uses detection limit for non-detected results).
Note: Results shown are not paired samples. See Section 4.2.

## Table 4-5. Metals Measured Above the Report Limit for the FGD Wastewater Treatment System, Homer City

| Analyte | Method | Unit | FGD Influent (SP-1) | | FGD Second-stage Clarifier Overflow Effluent (SP-2) | | FGD Effluent (SP-3/SP-5) [a] | |
|---|---|---|---|---|---|---|---|---|
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Selenium | 200.7 | UG/L | 4,000 R | 656 R | 187 | 179 | 771 | 741 R |
| Sodium | 200.7 | UG/L | 1,430,000 | 1,440,000 | 1,140,000 | 1,130,000 | 1,280,000 | 1,230,000 |
| Thallium | 200.7 | UG/L | Exclude | 61.2 | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) |
| Titanium | 200.7 | UG/L | 1,300 R | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) |
| Vanadium | 200.7 | UG/L | 766 | ND (20.0) | ND (20.0) | ND (20.0) | ND (20.0) | ND (20.0) |
| Yttrium | 200.7 | UG/L | 586 | 6.28 | ND (5.00) | ND (5.00) | ND (5.00) | ND (5.00) |
| Zinc | 200.7 | UG/L | 1,900 | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) | ND (10.0) |
| **Low-Level Metals** | | | | | | | | |
| Antimony | 1638 | UG/L | 31.1 | ND (0.400) | ND (0.400) | ND (0.400) | ND (0.400) | ND (0.400) |
| Arsenic | 1638 | UG/L | 1,220 | 24.2 R | 20.6 | 21.8 | 23.0 | 22.5 |
| Cadmium | 1638 | UG/L | 52.8 R | 24.5 | ND (2.00) | ND (2.00) | ND (2.00) | ND (2.00) |
| Chromium | 1638 | UG/L | 1,270 | ND (16.0) | ND (16.0) | ND (16.0) | ND (16.0) | ND (16.0) |
| Hexavalent Chromium | 1636 | UG/L | NA | NA | NA | ND (2.50) | NA | ND (2.50) |
| Copper | 1638 | UG/L | 747 | 11.3 | 10.9 | 9.22 | 9.67 | 9.39 |
| Lead | 1638 | UG/L | 351 | ND (1.00) | ND (1.00) | ND (1.00) | ND (1.00) | ND (1.00) |
| Mercury | 1631E | UG/L | 533 | 0.0809 | 0.125 | 0.0245 | 0.117 | 0.0542 |
| Nickel | 1638 | UG/L | 2,840 | 1,450 | 111 | 116 | 92.1 | 93.5 |
| Selenium | 1638 | UG/L | 3,530 | 584 | 238 | 241 | 613 | 620 |
| Thallium | 1638 | UG/L | 37.3 | 23.2 | 16.8 | 16.6 | 16.0 | 15.8 |
| Zinc | 1638 | UG/L | 2,130 | 34.7 | 15.0 | 14.4 | 15.2 | 15.7 |

a – The FGD effluent results represent the average of the FGD effluent and the duplicate of the FGD effluent analytical measurements.
NA – Not analyzed.
ND – Not detected (number in parenthesis is the report limit).
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.
< – Average result includes at least one non-detect value. (Calculation uses detection limit for non-detected results).
Note: Results shown are not paired samples. See Section 4.2.

## Table 4-6. Classical Pollutants Measured Above the Report Limit for the Bottom Ash Pond Effluent, Homer City

| Analyte | Method | Unit | Bottom Ash Pond Effluent (SP-4) |
|---|---|---|---|
| **Classical Pollutants** | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 4500-$NH_3$F | MG/L | 0.340 |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 353.2 | MG/L | 37.0 |
| Total Kjeldahl Nitrogen (TKN) | 4500-N,C | MG/L | 1.36 |
| Chloride | 4500-CL-C | MG/L | 90.0 |
| Sulfate | D516-90 | MG/L | 1,290 |
| Total Dissolved Solids (TDS) | 2540 C | MG/L | 1,250 |
| Total Phosphorus | 365.3 | MG/L | 1.09 |
| Total Suspended Solids (TSS) | 2540 D | MG/L | 5.00 |

## Table 4-7. Metals Measured Above the Report Limit for the Bottom Ash Pond Effluent, Homer City

| Analyte | Method | Unit | Bottom Ash Pond Effluent (SP-4) | |
|---|---|---|---|---|
| | | | Total | Dissolved |
| **Routine Total Metals** | | | | |
| Aluminum | 200.7 | UG/L | 323 | 231 |
| Antimony | 200.7 | UG/L | ND (20.0) | ND (20.0) |
| Arsenic | 200.7 | UG/L | ND (10.0) | ND (10.0) |
| Barium | 200.7 | UG/L | 101 | 106 |
| Beryllium | 200.7 | UG/L | ND (5.00) | ND (5.00) |
| Boron | 200.7 | UG/L | 396 | 397 |
| Cadmium | 200.7 | UG/L | ND (5.00) | ND (5.00) |
| Calcium | 200.7 | UG/L | 186,000 | 192,000 |
| Chromium | 200.7 | UG/L | ND (10.0) | ND (10.0) |
| Hexavalent Chromium | D1687-92 | UG/L | NA | ND (2.00) |
| Cobalt | 200.7 | UG/L | ND (50.0) | ND (50.0) |
| Copper | 200.7 | UG/L | ND (10.0) | ND (10.0) |
| Iron | 200.7 | UG/L | 355 | 106 |
| Lead | 200.7 | UG/L | ND (50.0) | ND (50.0) |
| Magnesium | 200.7 | UG/L | 31,800 | 32,600 |
| Manganese | 200.7 | UG/L | 128 | 129 |
| Mercury | 245.1 | UG/L | ND (0.200) | ND (0.200) |
| Molybdenum | 200.7 | UG/L | 19.7 | 20.2 |
| Nickel | 200.7 | UG/L | ND (50.0) | ND (50.0) |
| Selenium | 200.7 | UG/L | 6.02 | 6.10 L |
| Sodium | 200.7 | UG/L | 106,000 | 106,000 |
| Thallium | 200.7 | UG/L | ND (10.0) | ND (10.0) |
| Titanium | 200.7 | UG/L | ND (10.0) | ND (10.0) |
| Vanadium | 200.7 | UG/L | ND (20.0) | ND (20.0) |
| Yttrium | 200.7 | UG/L | ND (5.00) | ND (5.00) |
| Zinc | 200.7 | UG/L | 21.6 | 35.2 |
| **Low-Level Metals** | | | | |
| Antimony | 1638 | UG/L | 1.09 | 0.990 |
| Arsenic | 1638 | UG/L | 6.52 | 5.00 |
| Cadmium | 1638 | UG/L | ND (0.500) | ND (0.500) |
| Chromium | 1638 | UG/L | ND (4.00) | ND (4.00) |
| Hexavalent Chromium | 1636 | UG/L | NA | 3.01 |
| Copper | 1638 | UG/L | 2.37 | 2.08 |
| Lead | 1638 | UG/L | ND (0.250) | ND (0.250) |
| Mercury | 1631E | UG/L | 0.00511 | 0.00141 |
| Nickel | 1638 | UG/L | 10.7 | 10.4 |

L – Sample result between 5x and 10x blank result.
NA – Not analyzed.
ND – Not detected (number in parenthesis is the report limit).

**Table 4-7. Metals Measured Above the Report Limit for the Bottom Ash Pond Effluent, Homer City**

| Analyte | Method | Unit | Bottom Ash Pond Effluent (SP-4) | |
|---|---|---|---|---|
| | | | Total | Dissolved |
| Selenium | 1638 | UG/L | 5.74 | 5.16 |
| Thallium | 1638 | UG/L | 1.32 | 1.31 |
| Zinc | 1638 | UG/L | 24.2 | 15.0 |

L – Sample result between 5x and 10x blank result.
NA – Not analyzed.
ND – Not detected (number in parenthesis is the report limit).

# 5. DATA QUALITY

QA/QC procedures applicable to the Homer City sampling episode are outlined in the *Quality Assurance Project Plan for the Steam Electric Detailed Study* (QAPP) [3]. This section describes the QC procedures used to assess the precision and accuracy of the analytical data presented in Section 4 and Appendices A and B. QC practices used for this sampling episode include the analysis of matrix spikes, blanks, duplicate samples, and QC standard checks.

## 5.1 Analytical Quality Control

EPA contracted directly with analytical laboratories for the analysis of samples collected during this episode. EPA's Sample Control Center (SCC) verified that the performances of the laboratories selected by EPA was acceptable by conducting QC checks of the analytical data as specified by SCC's *Quality Assurance Project Plan* dated 15 February 2008. SCC data review chemists prepared written data review narratives describing any qualifications of the analytical data from this episode. The data review narratives are included in Appendix C.

## 5.2 Field Quality Control

This section discusses the bottle blanks, equipment blanks, field blanks, and field duplicate sample results. Section 3.8 of the Sampling Plan discusses field QC specifications. Tables presented in this section include results for only certain analytes (e.g., only those detected in the respective field QC sample or those detected during the sampling episode). Appendix A contains the results for all analytes, both detected and nondetected.

### *5.2.1 Bottle Blanks*

EPA collects bottle blanks to evaluate possible contamination from the sample collection bottles. Bottle blanks were collected and analyzed for low-level metals by the supplier of the pre-cleaned bottles, Albion Environmental.

Albion Environmental collected the bottle blanks for the low-level metals sample bottles (1000 mL LDPE), the low-level hexavalent chromium samples bottles (500 mL LDPE), the speciation sample bottles (125 mL amber glass bottles), and the 2-L blank water bottles by filling the pre-cleaned bottle to the neck with ASTM Type 1 water, preserving the sample with nitric acid to a pH <2, and allowing the sample to sit for at least 24 hours. Albion Environmental then analyzed the samples using EPA Method 1638.

Albion Environmental collected the bottle blanks for the 4-liter blank water bottles by filling the pre-cleaned bottle with ASTM Type 1 water and allowing it to soak for approximately 24 hours. Albion Environmental then poured a representative aliquot into a pre-cleaned LDPE sample bottle, preserved the sample with nitric acid to a pH <2, and allowed the sample to sit for at least 24 hours. Albion Environmental then analyzed the samples using EPA Method 1638.

Albion Environmental collected the bottle blanks for the low-level mercury sample bottles (250 flint glass bottles and 1-L borosilicate glass bottles) by filling the pre-cleaned bottle to the neck with ASTM Type 1 water, preserving the sample with bromine monochloride, and allowing the sample to sit for at least 24 hours. Albion Environmental then analyzed the samples using EPA Method 1631E.

Albion Environmental collected the bottle blank for the 10-liter composite containers by filling the container with approximately two liters of ASTM Type 1 water and allowing it to soak for approximately 24 hours. During this period, Albion Environmental shook the container periodically and changed its orientation to expose all surfaces of the container to the ASTM Type 1 water. Albion Environmental then shook the 10-liter container and poured a representative sample into a pre-cleaned sample bottle (a LDPE bottle for low-level metals and a glass bottle for low-level mercury). The blank samples were then preserved and analyzed according to the analytical methods (i.e., EPA Method 1638 or 1631E), as described above for the other bottle blank samples.

No metals were detected in the bottle blank, indicating that there was no contamination from the sample containers. Appendix Table A-6 presents all of the analytical results from the bottle blank and equipment blank analyses for all of the equipment used for the collection of low-level samples.

### *5.2.2 Equipment Blanks*

EPA collects equipment blanks to evaluate possible contamination from the equipment used for sample collection. EPA did not collect specific equipment blanks for this sampling program; however, the field blanks as collected (as described in Section 5.2.3) include the sampling equipment. In addition, Albion Environmental collected and analyzed equipment blanks for low-level metals for each type of pre-cleaned equipment supplied for the episode.

Albion Environmental collected the equipment blanks for the capsule filters and fabricated tubing sets by pumping approximately 500 mL of ASTM Type 1 water through the pre-cleaned filter or tubing set and discarding the water. Albion Environmental then pumped additional water through the pre-cleaned filter or tubing set into a pre-cleaned bottle (a LDPE bottle for low-level metals and a glass bottle for low-level mercury). The blank samples were then preserved and analyzed according to the analytical methods (EPA Method 1638 or 1631E), as described in Section 5.2.1 for the bottle blank samples. For the fabricated tubing sets, Albion Environmental collected and analyzed equipment blanks for the individual components of the tubing sets, the assembled tubing sets, or both.

No metals were detected in the equipment blanks, indicating that there was no contamination from the sampling equipment. Appendix Table A-6 presents all of the analytical results from the bottle blank and equipment blank analyses for all of the equipment used for the collection of low-level samples.

### *5.2.3 Field Blanks*

The sampling team collected field blanks (SP-6, SP-7, SP-8, and SP-9) to evaluate possible contamination caused by sampling equipment, sampling equipment decontamination procedures, sample collection procedures, or atmospheric contamination. EPA analyzed the field blank samples for the low-level and routine metals analyses, including both total and dissolved metals[1].

The low-level total metals field blank samples for the influent to the FGD Wastewater Treatment System (SP-6) were collected by pouring ASTM Type 1 water through a precleaned funnel attached to the silicone tubing used for sample collection. The sampling team shrouded the blank water and funnel with a plastic bag while pouring the blank water into the funnel to prevent potential atmospheric deposition. In addition, the sample bottles were placed in a "cleanbox" to prevent potential atmospheric deposition. The ASTM Type 1 water flowed through the funnel and tubing, and was poured into the sample bottles. EPA collected the field blank samples separately from the Homer City representative's field blank samples. Split samples were not collected for the field blank samples because the sample split was performed at the tap outlet, not within the sample tubing.

The low-level and routine total metals field blank samples for the second-stage clarifier overflow in the FGD wastewater treatment system (SP-7), the effluent from the FGD Wastewater Treatment System (SP-8), and the effluent from the bottom ash pond (SP-9) were collected by pumping ASTM Type 1 water through the tubing used for the sample collection. The container holding the ASTM Type 1 water was placed in a large plastic bag and the tubing was placed directly into the container. The large plastic bag was closed off as quickly as possible to minimize potential atmospheric deposition. The sample bottles were placed in a "cleanbox" and the ASTM Type 1 water was pumped through the tubing and "Y" splitter, and poured into the sample bottles. EPA collected the field blank samples as "true" split samples with Homer City's representative, using the same procedure discussed in the sample collection description (Section 3.1).

The low-level and routine dissolved metals field blank samples for the influent to the FGD Wastewater Treatment System (SP-6), the second-stage clarifier overflow in the FGD wastewater treatment system (SP-7), the effluent from the FGD Wastewater Treatment System (SP-8), and the effluent from the bottom ash pond (SP-9) were collected by pumping ASTM Type 1 water through the tubing used for the dissolved metals sample collection and a capsule filter. The container holding the ASTM Type 1 water was placed in a large plastic bag and the tubing was placed directly into the container. The large plastic bag was closed off as quickly as possible to minimize potential atmospheric deposition. The sample bottles were placed in a "cleanbox" and the ASTM Type 1 water was pumped through the tubing, capsule filter, and "Y" splitter, and poured into the sample bottles. EPA collected the field blank samples as "true" split samples with Homer City's representative, using the same procedure discussed in the sample collection description (Section 3.1).

Table 5-1 presents the field blank analytical results for SP-6 through SP-9. Only those analytes that were detected in the field blank samples at levels above the reporting limit are included in the table. Results are rounded to three significant digits. Appendix Tables A-7 through A-10 present all the analytical results for the field blanks from the influent to the FGD wastewater treatment system (SP-6), second-stage clarifier overflow in the FGD wastewater

[1] EPA did not collect a low-level dissolved mercury field blank sample in the field because the sample filtration was performed at the laboratory to minimize potential mercury contamination. The laboratory performed a filtration blank prior to filtering the sample, which is assessed as the field blank for the low-level dissolved mercury sample.

treatment system (SP-7), effluent from the FGD wastewater treatment system (SP-8), and effluent from the bottom ash pond (SP-9) sample analyses, including all qualified results and all results that were measured above the method detection limit, but below the reporting limit (i.e., J-values).

### *5.2.4 Field Duplicates*

The sampling team collected field duplicate samples (SP-5) to assess the sampling measurement precision for the episode. Field duplicate samples are separate samples collected from the same location as the original sample. The duplicate is filled immediately after the original sample, and is stored and analyzed independently. The relative percent difference (RPD) between the two sample results is examined to determine the precision of the data. EPA used the following equation to calculate the RPD for the duplicate sample results.

$$\text{RPD}\ (\%) = \frac{|S - D|}{\left(\frac{S + D}{2}\right)} \times 100 \qquad (5\text{-}1)$$

where:

| | | |
|---|---|---|
| S | = | concentration of the analyte from original sample analysis; |
| D | = | concentration of the analyte from the duplicate sample analysis; and |
| RPD | = | relative percent difference between the original and duplicate sample result. |

During this sampling episode, duplicate samples (SP-5) for all analytes (except HEM/SGT-HEM) were collected from the effluent from the FGD wastewater treatment system (SP-3). Table 5-1 presents analytical results and the RPD for SP-3 and SP-5 and includes analytical results for only those analytes that were detected in one or more samples for the sampling episode. Results are rounded to three significant figures. Appendix Tables A-3 and A-5 present all the analytical results for the effluent from the FGD wastewater treatment system (SP-3) and the duplicate of the effluent from the FGD wastewater treatment system (SP-5) sample analyses, including all qualified results and all results that were measured above the method detection limit, but below the reporting limit (i.e., J-values).

## Table 5-1. Field Blank Results Measured Above the Report Limit, Homer City

| Analyte | Sample Point | Method | Unit | Concentration (ug/L) |
|---|---|---|---|---|
| **Routine Total Metals** | | | | |
| Calcium | FGD Effluent | 200.7 | UG/L | 141 |
| Calcium | Bottom Ash Effluent | 200.7 | UG/L | 86.3 |
| Magnesium | Bottom Ash Effluent | 200.7 | UG/L | 220 |
| **Routine Dissolved Metals** | | | | |
| Barium | FGD Effluent | 200.7 | UG/L | 4.70 |
| Calcium | FGD Effluent | 200.7 | UG/L | 193 |
| Magnesium | FGD Effluent | 200.7 | UG/L | 221 |
| Molybdenum | FGD Effluent | 200.7 | UG/L | 55.8 |
| Selenium | FGD Effluent | 200.7 | UG/L | 15.1 |
| **Low-Level Dissolved Metals** | | | | |
| Hexavalent Chromium | FGD Second-stage Clarifier Overflow | 1636 | UG/L | 3.17 |
| Hexavalent Chromium | FGD Effluent | 1636 | UG/L | 2.56 |
| Copper | Bottom Ash Effluent | 1638 | UG/L | 0.240 |
| Hexavalent Chromium | Bottom Ash Effluent | 1636 | UG/L | 4.36 |

## Table 5-2. Field Duplicate Results, Homer City

| Analyte | Original FGD Effluent Concentration (SP-3) | Duplicate FGD Effluent Concentration (SP-5) | Average Result | Relative Percent Difference (%) | Units |
|---|---|---|---|---|---|
| **Classical Pollutants** | | | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 0.360 | 0.230 | 0.295 | 44 | MG/L |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 37.0 | 36.0 R | 36.5 | 2.7 | MG/L |
| Total Kjeldahl Nitrogen (TKN) | 2.96 | 3.11 | 3.04 | 4.9 | MG/L |
| Chloride | 12,000 | 11,500 | 11,800 | 4.3 | MG/L |
| Sulfate | 2,520 | 3,050 | 2,790 | 19 | MG/L |
| Total Dissolved Solids (TDS) | 23,800 | 21,300 | 22,600 | 11 | MG/L |
| Total Phosphorus | 0.720 | 0.320 | 0.520 | 77 | MG/L |
| Total Suspended Solids (TSS) | ND (5.00) | 6.00 | < 5.50 | NC | MG/L |
| **Routine Total Metals** | | | | | |
| Aluminum | ND (50.0) | ND (50.0) | ND (50.0) | NC | UG/L |
| Antimony | ND (20.0) | 21.5 | < 20.8 | NC | UG/L |
| Arsenic | ND (10.0) | ND (10.0) | ND (10.0) | NC | UG/L |
| Barium | 71.1 R | 71.4 | 71.3 | 0.42 | UG/L |
| Beryllium | 7.61 | 7.74 | 7.68 | 1.7 | UG/L |
| Boron | 188,000 | 193,000 | 191,000 | 2.6 | UG/L |
| Cadmium | ND (5.00) | ND (5.00) | ND (5.00) | NC | UG/L |
| Calcium | 1,920,000 | 2,070,000 | 2,000,000 | 7.5 | UG/L |
| Chromium | ND (10.0) | ND (10.0) | ND (10.0) | NC | UG/L |
| Cobalt | ND (50.0) | ND (50.0) | ND (50.0) | NC | UG/L |
| Copper | 13.0 | 12.0 | 12.5 | 8.0 | UG/L |
| Iron | 134 | ND (100) | < 117 | NC | UG/L |
| Lead | ND (50.0) | ND (50.0) | ND (50.0) | NC | UG/L |
| Magnesium | 2,560,000 | 2,650,000 | 2,610,000 | 3.5 | UG/L |

< – Average result includes at least one non-detect value. (Calculation uses detection limit for non-detected results).
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
NC – Not calculated.
ND – Not detected (number in parenthesis is the report limit).

## Table 5-2. Field Duplicate Results, Homer City

| Analyte | Original FGD Effluent Concentration (SP-3) | Duplicate FGD Effluent Concentration (SP-5) | Average Result | Relative Percent Difference (%) | Units |
|---|---|---|---|---|---|
| Manganese | 29,800 | 30,300 | 30,100 | 1.7 | UG/L |
| Mercury | ND (10.0) | ND (10.0) | ND (10.0) | NC | UG/L |
| Molybdenum | 37.9 | 37.2 | 37.6 | 1.9 | UG/L |
| Nickel | ND (50.0) | ND (50.0) | ND (50.0) | NC | UG/L |
| Selenium | 773 | 768 | 771 | 0.65 | UG/L |
| Sodium | 1,280,000 | 1,270,000 | 1,280,000 | 0.78 | UG/L |
| Thallium | ND (10.0) | ND (10.0) | ND (10.0) | NC | UG/L |
| Titanium | ND (10.0) | ND (10.0) | ND (10.0) | NC | UG/L |
| Vanadium | ND (20.0) | ND (20.0) | ND (20.0) | NC | UG/L |
| Yttrium | ND (5.00) | ND (5.00) | ND (5.00) | NC | UG/L |
| Zinc | ND (10.0) | ND (10.0) | ND (10.0) | NC | UG/L |
| **Routine Dissolved Metals** | | | | | |
| Aluminum | ND (50.0) | ND (50.0) | ND (50.0) | NC | UG/L |
| Antimony | ND (20.0) | ND (20.0) | ND (20.0) | NC | UG/L |
| Arsenic | ND (10.0) | ND (10.0) | ND (10.0) | NC | UG/L |
| Barium | 71.9 R,T | 69.2 | 70.6 | 3.8 | UG/L |
| Beryllium | 7.74 | 7.68 | 7.71 | 0.78 | UG/L |
| Boron | 182,000 | 185,000 | 184,000 | 1.6 | UG/L |
| Cadmium | ND (5.00) | ND (5.00) | ND (5.00) | NC | UG/L |
| Calcium | 1,970,000 | 1,880,000 | 1,930,000 | 4.7 | UG/L |
| Chromium | ND (10.0) | ND (10.0) | ND (10.0) | NC | UG/L |
| Hexavalent Chromium | ND (2.00) | ND (2.00) | ND (2.00) | NC | UG/L |
| Cobalt | ND (50.0) | ND (50.0) | ND (50.0) | NC | UG/L |
| Copper | 11.6 | 11.9 | 11.8 | 2.6 | UG/L |

< – Average result includes at least one non-detect value. (Calculation uses detection limit for non-detected results).
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
NC – Not calculated.
ND – Not detected (number in parenthesis is the report limit).

## Table 5-2. Field Duplicate Results, Homer City

| Analyte | Original FGD Effluent Concentration (SP-3) | | Duplicate FGD Effluent Concentration (SP-5) | Average Result | Relative Percent Difference (%) | Units |
|---|---|---|---|---|---|---|
| Iron | 134 | R | 197 | 166 | 38 | UG/L |
| Lead | ND (50.0) | | ND (50.0) | ND (50.0) | NC | UG/L |
| Magnesium | 2,520,000 | | 2,500,000 | 2,510,000 | 0.80 | UG/L |
| Manganese | 29,200 | | 29,000 | 29,100 | 0.69 | UG/L |
| Mercury | ND (10.0) | | ND (10.0) | ND (10.0) | NC | UG/L |
| Molybdenum | 36.3 | | 35.2 | 35.8 | 3.1 | UG/L |
| Nickel | ND (50.0) | | ND (50.0) | ND (50.0) | NC | UG/L |
| Selenium | 766 | R | 715 | 741 | 6.9 | UG/L |
| Sodium | 1,250,000 | | 1,210,000 | 1,230,000 | 3.3 | UG/L |
| Thallium | ND (10.0) | | ND (10.0) | ND (10.0) | NC | UG/L |
| Titanium | ND (10.0) | | ND (10.0) | ND (10.0) | NC | UG/L |
| Vanadium | ND (20.0) | | ND (20.0) | ND (20.0) | NC | UG/L |
| Yttrium | ND (5.00) | | ND (5.00) | ND (5.00) | NC | UG/L |
| Zinc | ND (10.0) | | ND (10.0) | ND (10.0) | NC | UG/L |
| **Low-Level Total Metals** | | | | | | |
| Antimony | ND (0.400) | | ND (0.400) | ND (0.400) | NC | UG/L |
| Arsenic | 23.5 | | 22.4 | 23.0 | 4.8 | UG/L |
| Cadmium | ND (2.00) | | ND (2.00) | ND (2.00) | NC | UG/L |
| Chromium | ND (16.0) | | ND (16.0) | ND (16.0) | NC | UG/L |
| Copper | 9.44 | | 9.90 | 9.67 | 4.8 | UG/L |
| Lead | ND (1.00) | | ND (1.00) | ND (1.00) | NC | UG/L |
| Mercury | 0.117 | | 0.117 | 0.117 | 0.0 | UG/L |
| Nickel | 92.0 | | 92.2 | 92.1 | 0.22 | UG/L |
| Selenium | 621 | | 605 | 613 | 2.6 | UG/L |

< – Average result includes at least one non-detect value. (Calculation uses detection limit for non-detected results).
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
NC – Not calculated.
ND – Not detected (number in parenthesis is the report limit).

## Table 5-2. Field Duplicate Results, Homer City

| Analyte | Original FGD Effluent Concentration (SP-3) | Duplicate FGD Effluent Concentration (SP-5) | Average Result | Relative Percent Difference (%) | Units |
|---|---|---|---|---|---|
| Thallium | 15.9 | 16.0 | 16.0 | 0.63 | UG/L |
| Zinc | 15.2 | 15.2 | 15.2 | 0.0 | UG/L |
| **Low-Level Dissolved Metals** | | | | | |
| Antimony | ND (0.400) | ND (0.400) | ND (0.400) | NC | UG/L |
| Arsenic | 22.5 | 22.4 | 22.5 | 0.45 | UG/L |
| Cadmium | ND (2.00) | ND (2.00) | ND (2.00) | NC | UG/L |
| Chromium | ND (16.0) | ND (16.0) | ND (16.0) | NC | UG/L |
| Hexavalent Chromium | ND (2.50) | ND (2.50) | ND (2.50) | NC | UG/L |
| Copper | 9.26 | 9.52 | 9.39 | 2.8 | UG/L |
| Lead | ND (1.00) | ND (1.00) | ND (1.00) | NC | UG/L |
| Mercury | 0.0556 | 0.0528 | 0.0542 | 5.2 | UG/L |
| Nickel | 93.7 | 93.3 | 93.5 | 0.43 | UG/L |
| Selenium | 606 | 634 | 620 | 4.5 | UG/L |
| Thallium | 15.8 | 15.8 | 15.8 | 0.0 | UG/L |
| Zinc | 15.2 | 16.2 | 15.7 | 6.4 | UG/L |

< – Average result includes at least one non-detect value. (Calculation uses detection limit for non-detected results).
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
NC – Not calculated.
ND – Not detected (number in parenthesis is the report limit).

# 6. REFERENCES

1. Eastern Research Group, Inc., 2007. Final Engineering Site Visit Report for EME Homer City Generation L.P.'s, Homer City Power Plant. August 9. DCN 04718. EPA-HQ-OW-2006-0071-0695.

2. Eastern Research Group, Inc., 2007. Sampling Plan, EME Homer City Generation L.P.'s Homer City Power Plant. August 17. DCN 04860A1. EPA-HQ-OW-2006-0071-0649.1.

3. Eastern Research Group, Inc., 2007. Quality Assurance Project Plan for the Steam Electric Detailed Study. September 25. DCN 05079. EPA-HQ-OW-2006-0071-0724.

4. U.S. EPA. 2001. Method 200.7: Trace Elements in Water, Solids, and Biosolids, by Inductively Coupled Plasma-Atomic Emission Spectrometry. Revision 5.0. EPA-821-R-01-010. January.

# Appendix A

# ANALYTICAL RESULTS

## Table A-1. FGD Influent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Classical Pollutants – Total** | | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 4500-NH3F | MG/L | 4.12 | |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 353.2 | MG/L | 54.5 | |
| Total Kjeldahl Nitrogen (TKN) | 4500-N,C | MG/L | 14.2 | |
| Biochemical Oxygen Demand (BOD) | 5210B | MG/L | ND (120) | U |
| Chloride | 4500-CL-C | MG/L | 11,800 | |
| Hexane Extractable Material (HEM) | 1664A | MG/L | ND (5.00) | U |
| Sulfate | D516-90 | MG/L | 6,920 | |
| Total Dissolved Solids (TDS) | 2540 C | MG/L | 23,200 | |
| Total Phosphorus | 365.3 | MG/L | 2.64 | |
| Total Suspended Solids (TSS) | 2540 D | MG/L | 13,300 | |
| **Classical Pollutants – Solid (wet weight)** | | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 4500-NH3F | MG/KG | 23.8 | |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 1685 | MG/KG | 467 | |
| Total Kjeldahl Nitrogen (TKN) | 4500-N,C | MG/KG | 199 | |
| Chloride | 4500-CL-C | MG/KG | 4,000 | |
| Sulfate | D516-90 | MG/KG | 46,900 | |
| Total Phosphorus | 365.3 | MG/KG | 79.6 | |
| **Classical Pollutants – Filtered Aqueous** | | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 4500-NH3F | MG/L | 3.62 | |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 353.2 | MG/L | 44.0 | |
| Total Kjeldahl Nitrogen (TKN) | 4500-N,C | MG/L | 9.52 | |
| Chloride | 4500-CL-C | MG/L | 12,000 | |
| Sulfate | D516-90 | MG/L | 5,900 | |
| Total Phosphorus | 365.3 | MG/L | 0.680 | |
| **Routine Metals – Total** | | | | |
| Aluminum | 200.7 | UG/L | 289,000 | |
| Antimony | 200.7 | UG/L | 86.4 | |
| Arsenic | 200.7 | UG/L | 1,590 | |
| Barium | 200.7 | UG/L | 11,900 | R |
| Beryllium | 200.7 | UG/L | 28.8 | |
| Boron | 200.7 | UG/L | 224,000 | |
| Cadmium | 200.7 | UG/L | 150 | |
| Calcium | 200.7 | UG/L | 3,220,000 | |
| Chromium | 200.7 | UG/L | 1,400 | |
| Cobalt | 200.7 | UG/L | 369 | |
| Copper | 200.7 | UG/L | 811 | |

ND – Not detected (number in parenthesis is the report limit).
J – Result measured above the MDL, but less than the reporting limit.
R – MS/MSD % Recovery outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.

## Table A-1. FGD Influent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Iron | 200.7 | UG/L | 824,000 | |
| Lead | 200.7 | UG/L | 340 | |
| Magnesium | 200.7 | UG/L | 2,760,000 | |
| Manganese | 200.7 | UG/L | 225,000 | |
| Mercury | 245.1 | UG/L | 243 | |
| Molybdenum | 200.7 | UG/L | 375 | |
| Nickel | 200.7 | UG/L | 2,560 | R |
| Selenium | 200.7 | UG/L | 4,000 | R |
| Silver | 200.7 | UG/L | ND (40.0) | U |
| Sodium | 200.7 | UG/L | 1,430,000 | |
| Thallium | 200.7 | UG/L | Exclude | |
| Tin | 200.7 | UG/L | ND (60.0) | U |
| Titanium | 200.7 | UG/L | 1,300 | R |
| Vanadium | 200.7 | UG/L | 766 | |
| Yttrium | 200.7 | UG/L | 586 | |
| Zinc | 200.7 | UG/L | 1,900 | |
| **Routine Metals – Dissolved** | | | | |
| Aluminum | 200.7 | UG/L | ND (50.0) | U |
| Antimony | 200.7 | UG/L | 18.4 | J |
| Arsenic | 200.7 | UG/L | 7.51 | J |
| Barium | 200.7 | UG/L | 149 | R |
| Beryllium | 200.7 | UG/L | 10.5 | |
| Boron | 200.7 | UG/L | 254,000 | |
| Cadmium | 200.7 | UG/L | 26.2 | |
| Calcium | 200.7 | UG/L | 1,990,000 | |
| Chromium | 200.7 | UG/L | ND (10.0) | U |
| Hexavalent Chromium | D1687-92 | UG/L | ND (2.00) | U |
| Cobalt | 200.7 | UG/L | 201 | |
| Copper | 200.7 | UG/L | 14.5 | |
| Iron | 200.7 | UG/L | ND (100) | U |
| Lead | 200.7 | UG/L | 11.5 | J |
| Magnesium | 200.7 | UG/L | 3,100,000 | |
| Manganese | 200.7 | UG/L | 173,000 | |
| Mercury | 245.1 | UG/L | ND (10.0) | U |
| Molybdenum | 200.7 | UG/L | 30.6 | |
| Nickel | 200.7 | UG/L | 1,350 | |
| Selenium | 200.7 | UG/L | 656 | R |

ND – Not detected (number in parenthesis is the report limit).
J – Result measured above the MDL, but less than the reporting limit.
R – MS/MSD % Recovery outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.

## Table A-1. FGD Influent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Silver | 200.7 | UG/L | 7.93 | J |
| Sodium | 200.7 | UG/L | 1,440,000 | |
| Thallium | 200.7 | UG/L | 61.2 | |
| Tin | 200.7 | UG/L | ND (30.0) | U |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | ND (20.0) | U |
| Yttrium | 200.7 | UG/L | 6.28 | |
| Zinc | 200.7 | UG/L | ND (10.0) | U |
| **Routine Metals – Filtered Aqueous** | | | | |
| Mercury | 245.1 | UG/L | ND (10.0) | U |
| **Routine Metals – Solid (wet weight)** | | | | |
| Mercury | 245.1 | MG/KG | 14.5 | |
| **Routine Metals – Solid (dry weight)** | | | | |
| Aluminum | 200.7 | MG/KG | 21,700 | |
| Antimony | 200.7 | MG/KG | 5.11 | |
| Arsenic | 200.7 | MG/KG | 119 | |
| Barium | 200.7 | MG/KG | 884 | |
| Beryllium | 200.7 | MG/KG | 1.38 | |
| Boron | 200.7 | MG/KG | ND (1,500) | U |
| Cadmium | 200.7 | MG/KG | 9.31 | |
| Calcium | 200.7 | MG/KG | 92,500 | |
| Chromium | 200.7 | MG/KG | 105 | |
| Cobalt | 200.7 | MG/KG | 12.6 | |
| Copper | 200.7 | MG/KG | 59.9 | |
| Iron | 200.7 | MG/KG | 62,000 | |
| Lead | 200.7 | MG/KG | 24.7 | |
| Magnesium | 200.7 | MG/KG | ND (1,500) | U |
| Manganese | 200.7 | MG/KG | 3,910 | |
| Molybdenum | 200.7 | MG/KG | 25.9 | |
| Nickel | 200.7 | MG/KG | 91.0 | |
| Selenium | 200.7 | MG/KG | 251 | |
| Silver | 200.7 | MG/KG | ND (3.01) | U |
| Sodium | 200.7 | MG/KG | ND (3,760) | U |
| Thallium | 200.7 | MG/KG | Exclude | |
| Tin | 200.7 | MG/KG | ND (4.51) | U |
| Titanium | 200.7 | MG/KG | 97.7 | |
| Vanadium | 200.7 | MG/KG | 57.6 | |

ND – Not detected (number in parenthesis is the report limit).
J – Result measured above the MDL, but less than the reporting limit.
R – MS/MSD % Recovery outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.

## Table A-1. FGD Influent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Yttrium | 200.7 | MG/KG | 43.6 | |
| Zinc | 200.7 | MG/KG | 143 | |
| **Low-Level Metals – Total** | | | | |
| Antimony | 1638 | UG/L | 31.1 | |
| Arsenic | 1638 | UG/L | 1,220 | |
| Cadmium | 1638 | UG/L | 52.8 | R |
| Chromium | 1638 | UG/L | 1,270 | |
| Copper | 1638 | UG/L | 747 | |
| Lead | 1638 | UG/L | 351 | |
| Mercury | 1631E | UG/L | 533 | |
| Nickel | 1638 | UG/L | 2,840 | |
| Selenium | 1638 | UG/L | 3,530 | |
| Silver | 1638 | UG/L | ND (20.0) | U |
| Thallium | 1638 | UG/L | 37.3 | |
| Zinc | 1638 | UG/L | 2,130 | |
| **Low-Level Metals - Dissolved** | | | | |
| Antimony | 1638 | UG/L | ND (0.400) | U |
| Arsenic | 1638 | UG/L | 24.2 | R |
| Cadmium | 1638 | UG/L | 24.5 | |
| Chromium | 1638 | UG/L | ND (16.0) | U |
| Copper | 1638 | UG/L | 11.3 | |
| Lead | 1638 | UG/L | ND (1.00) | U |
| Mercury | 1631E | UG/L | 0.0809 | |
| Nickel | 1638 | UG/L | 1,450 | |
| Selenium | 1638 | UG/L | 584 | |
| Silver | 1638 | UG/L | ND (2.00) | U |
| Thallium | 1638 | UG/L | 23.2 | |
| Zinc | 1638 | UG/L | 34.7 | |
| **Low-Level Metals – Solid (dry weight)** | | | | |
| Antimony | 1638 | MG/KG | 2.67 | |
| Arsenic | 1638 | MG/KG | 103 | |
| Cadmium | 1638 | MG/KG | 2.43 | |
| Chromium | 1638 | MG/KG | 109 | |
| Copper | 1638 | MG/KG | 63.2 | |
| Lead | 1638 | MG/KG | 30.2 | |
| Mercury | 1631E | MG/KG | 50.8 | |
| Nickel | 1638 | MG/KG | 119 | |

ND – Not detected (number in parenthesis is the report limit).
J – Result measured above the MDL, but less than the reporting limit.
R – MS/MSD % Recovery outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.

## Table A-1. FGD Influent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Selenium | 1638 | MG/KG | 253 | |
| Silver | 1638 | MG/KG | ND (1.72) | U |
| Thallium | 1638 | MG/KG | 1.21 | |
| Zinc | 1638 | MG/KG | 180 | |

ND – Not detected (number in parenthesis is the report limit).
J – Result measured above the MDL, but less than the reporting limit.
R – MS/MSD % Recovery outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.

## Table A-2. FGD Second-Stage Clarifier Overflow Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Classical Pollutants** | | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 4500-NH3F | MG/L | 3.80 | |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 353.2 | MG/L | 6.00 | |
| Total Kjeldahl Nitrogen (TKN) | 4500-N,C | MG/L | 13.1 | |
| Biochemical Oxygen Demand (BOD) | 5210B | MG/L | ND (73.0) | U |
| Chloride | 4500-CL-C | MG/L | 11,500 | |
| Hexane Extractable Material (HEM) | 1664A | MG/L | ND (5.00) | U |
| Sulfate | D516-90 | MG/L | 2,920 | |
| Total Dissolved Solids (TDS) | 2540 C | MG/L | 20,500 | |
| Total Phosphorus | 365.3 | MG/L | 0.350 | |
| Total Suspended Solids (TSS) | 2540 D | MG/L | 8.00 | |
| **Routine Metals – Total** | | | | |
| Aluminum | 200.7 | UG/L | ND (50.0) | U |
| Antimony | 200.7 | UG/L | 20.1 | |
| Arsenic | 200.7 | UG/L | 3.81 | J |
| Barium | 200.7 | UG/L | 112 | |
| Beryllium | 200.7 | UG/L | 7.69 | |
| Boron | 200.7 | UG/L | 191,000 | |
| Cadmium | 200.7 | UG/L | 3.93 | J |
| Calcium | 200.7 | UG/L | 1,740,000 | |
| Chromium | 200.7 | UG/L | ND (10.0) | U |
| Cobalt | 200.7 | UG/L | 10.8 | J |
| Copper | 200.7 | UG/L | 12.3 | |
| Iron | 200.7 | UG/L | 85.9 | J |
| Lead | 200.7 | UG/L | 3.17 | J |
| Magnesium | 200.7 | UG/L | 2,640,000 | |
| Manganese | 200.7 | UG/L | 47,700 | |
| Mercury | 245.1 | UG/L | ND (10.0) | U |
| Molybdenum | 200.7 | UG/L | 36.7 | |
| Nickel | 200.7 | UG/L | 56.9 | |
| Selenium | 200.7 | UG/L | 187 | |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 1,140,000 | |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 0.938 | J |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | 0.365 | J |
| Yttrium | 200.7 | UG/L | 1.52 | J |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-2. FGD Second-Stage Clarifier Overflow Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Zinc | 200.7 | UG/L | ND (10.0) | U |
| **Routine Metals – Dissolved** | | | | |
| Aluminum | 200.7 | UG/L | ND (50.0) | U |
| Antimony | 200.7 | UG/L | 14.0 | J |
| Arsenic | 200.7 | UG/L | 3.05 | J |
| Barium | 200.7 | UG/L | 116 | |
| Beryllium | 200.7 | UG/L | 7.90 | |
| Boron | 200.7 | UG/L | 187,000 | |
| Cadmium | 200.7 | UG/L | 3.58 | J |
| Calcium | 200.7 | UG/L | 1,520,000 | |
| Chromium | 200.7 | UG/L | 2.46 | J |
| Hexavalent Chromium | D1687-92 | UG/L | ND (2.00) | U |
| Cobalt | 200.7 | UG/L | 10.7 | J |
| Copper | 200.7 | UG/L | 12.0 | |
| Iron | 200.7 | UG/L | 85.4 | J |
| Lead | 200.7 | UG/L | ND (50.0) | U |
| Magnesium | 200.7 | UG/L | 2,630,000 | |
| Manganese | 200.7 | UG/L | 47,000 | |
| Mercury | 245.1 | UG/L | ND (10.0) | U |
| Molybdenum | 200.7 | UG/L | 35.9 | |
| Nickel | 200.7 | UG/L | 56.9 | |
| Selenium | 200.7 | UG/L | 179 | |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 1,130,000 | |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 1.88 | J |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | 0.585 | J |
| Yttrium | 200.7 | UG/L | 1.62 | J |
| Zinc | 200.7 | UG/L | ND (10.0) | U |
| **Low-Level Metals – Total** | | | | |
| Antimony | 1638 | UG/L | ND (0.400) | U |
| Arsenic | 1638 | UG/L | 20.6 | |
| Cadmium | 1638 | UG/L | 1.74 | J |
| Chromium | 1638 | UG/L | 8.76 | J |
| Copper | 1638 | UG/L | 10.9 | |
| Lead | 1638 | UG/L | 0.0512 | J |
| Mercury | 1631E | UG/L | 0.125 | |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-2. FGD Second-Stage Clarifier Overflow Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Nickel | 1638 | UG/L | 111 | |
| Selenium | 1638 | UG/L | 238 | |
| Silver | 1638 | UG/L | 0.0413 | J |
| Thallium | 1638 | UG/L | 16.8 | |
| Zinc | 1638 | UG/L | 15.0 | |
| **Low-Level Metals - Dissolved** | | | | |
| Antimony | 1638 | UG/L | ND (0.400) | U |
| Arsenic | 1638 | UG/L | 21.8 | |
| Cadmium | 1638 | UG/L | 1.69 | J |
| Chromium | 1638 | UG/L | 9.27 | J |
| Hexavalent Chromium | 1636 | UG/L | ND (2.50) | U |
| Copper | 1638 | UG/L | 9.22 | |
| Lead | 1638 | UG/L | 0.0485 | J |
| Mercury | 1631E | UG/L | 0.0245 | |
| Nickel | 1638 | UG/L | 116 | |
| Selenium | 1638 | UG/L | 241 | |
| Silver | 1638 | UG/L | 0.0891 | J |
| Thallium | 1638 | UG/L | 16.6 | |
| Zinc | 1638 | UG/L | 14.4 | |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-3. FGD Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Classical Pollutants** | | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 4500-NH3F | MG/L | 0.360 | |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 353.2 | MG/L | 37.0 | |
| Total Kjeldahl Nitrogen (TKN) | 4500-N,C | MG/L | 2.96 | |
| Biochemical Oxygen Demand (BOD) | 5210B | MG/L | ND (120) | U |
| Chloride | 4500-CL-C | MG/L | 12,000 | |
| Hexane Extractable Material (HEM) | 1664A | MG/L | ND (5.00) | U |
| Sulfate | D516-90 | MG/L | 2,520 | |
| Total Dissolved Solids (TDS) | 2540 C | MG/L | 23,800 | |
| Total Phosphorus | 365.3 | MG/L | 0.720 | |
| Total Suspended Solids (TSS) | 2540 D | MG/L | ND (5.00) | U |
| **Routine Metals – Total** | | | | |
| Aluminum | 200.7 | UG/L | ND (50.0) | U |
| Antimony | 200.7 | UG/L | 13.6 | J |
| Arsenic | 200.7 | UG/L | 3.60 | J |
| Barium | 200.7 | UG/L | 71.1 | R |
| Beryllium | 200.7 | UG/L | 7.61 | |
| Boron | 200.7 | UG/L | 188,000 | |
| Cadmium | 200.7 | UG/L | 3.24 | J |
| Calcium | 200.7 | UG/L | 1,920,000 | |
| Chromium | 200.7 | UG/L | ND (10.0) | U |
| Cobalt | 200.7 | UG/L | 6.36 | J |
| Copper | 200.7 | UG/L | 13.0 | |
| Iron | 200.7 | UG/L | 134 | |
| Lead | 200.7 | UG/L | 0.987 | J |
| Magnesium | 200.7 | UG/L | 2,560,000 | |
| Manganese | 200.7 | UG/L | 29,800 | |
| Mercury | 245.1 | UG/L | ND (10.0) | U |
| Molybdenum | 200.7 | UG/L | 37.9 | |
| Nickel | 200.7 | UG/L | 34.0 | J |
| Selenium | 200.7 | UG/L | 773 | |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 1,280,000 | |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 3.41 | J |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | 0.563 | J |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-3. FGD Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Yttrium | 200.7 | UG/L | 1.46 | J |
| Zinc | 200.7 | UG/L | ND (10.0) | U |
| **Routine Metals – Dissolved** | | | | |
| Aluminum | 200.7 | UG/L | ND (50.0) | U |
| Antimony | 200.7 | UG/L | 14.0 | J |
| Arsenic | 200.7 | UG/L | 3.56 | J |
| Barium | 200.7 | UG/L | 71.9 | R, T |
| Beryllium | 200.7 | UG/L | 7.74 | |
| Boron | 200.7 | UG/L | 182,000 | |
| Cadmium | 200.7 | UG/L | 3.30 | J |
| Calcium | 200.7 | UG/L | 1,970,000 | |
| Chromium | 200.7 | UG/L | ND (10.0) | U |
| Hexavalent Chromium | D1687-92 | UG/L | ND (2.00) | U |
| Cobalt | 200.7 | UG/L | 6.27 | J |
| Copper | 200.7 | UG/L | 11.6 | |
| Iron | 200.7 | UG/L | 134 | R |
| Lead | 200.7 | UG/L | 2.58 | J |
| Magnesium | 200.7 | UG/L | 2,520,000 | |
| Manganese | 200.7 | UG/L | 29,200 | |
| Mercury | 245.1 | UG/L | ND (10.0) | U |
| Molybdenum | 200.7 | UG/L | 36.3 | |
| Nickel | 200.7 | UG/L | 31.7 | J |
| Selenium | 200.7 | UG/L | 766 | R |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 1,250,000 | |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 4.41 | J |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | 0.0756 | J |
| Yttrium | 200.7 | UG/L | 1.53 | J |
| Zinc | 200.7 | UG/L | 9.62 | J |
| **Low-Level Metals – Total** | | | | |
| Antimony | 1638 | UG/L | ND (0.400) | U |
| Arsenic | 1638 | UG/L | 23.5 | |
| Cadmium | 1638 | UG/L | 1.77 | J |
| Chromium | 1638 | UG/L | 10.4 | J |
| Copper | 1638 | UG/L | 9.44 | |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-3. FGD Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Lead | 1638 | UG/L | 0.0362 | J |
| Mercury | 1631E | UG/L | 0.117 | |
| Nickel | 1638 | UG/L | 92.0 | |
| Selenium | 1638 | UG/L | 621 | |
| Silver | 1638 | UG/L | 0.0672 | J |
| Thallium | 1638 | UG/L | 15.9 | |
| Zinc | 1638 | UG/L | 15.2 | |
| **Low-Level Metals - Dissolved** | | | | |
| Antimony | 1638 | UG/L | ND (0.400) | U |
| Arsenic | 1638 | UG/L | 22.5 | |
| Cadmium | 1638 | UG/L | 1.61 | J |
| Chromium | 1638 | UG/L | 10.2 | J |
| Hexavalent Chromium | 1636 | UG/L | ND (2.50) | U |
| Copper | 1638 | UG/L | 9.26 | |
| Lead | 1638 | UG/L | ND (1.00) | U |
| Mercury | 1631E | UG/L | 0.0556 | |
| Nickel | 1638 | UG/L | 93.7 | |
| Selenium | 1638 | UG/L | 606 | |
| Silver | 1638 | UG/L | 0.0695 | J |
| Thallium | 1638 | UG/L | 15.8 | |
| Zinc | 1638 | UG/L | 15.2 | |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-4. Bottom Ash Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Classical Pollutants** | | | | |
| Ammonia As Nitrogen ($NH_3$-N) | 4500-NH3F | MG/L | 0.340 | |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 353.2 | MG/L | 37.0 | |
| Total Kjeldahl Nitrogen (TKN) | 4500-N,C | MG/L | 1.36 | |
| Biochemical Oxygen Demand (BOD) | 5210B | MG/L | ND (2.00) | U |
| Chloride | 4500-CL-C | MG/L | 90.0 | |
| Hexane Extractable Material (HEM) | 1664A | MG/L | ND (5.00) | U |
| Sulfate | D516-90 | MG/L | 1,290 | |
| Total Dissolved Solids (TDS) | 2540 C | MG/L | 1,250 | |
| Total Phosphorus | 365.3 | MG/L | 1.09 | |
| Total Suspended Solids (TSS) | 2540 D | MG/L | 5.00 | |
| **Routine Metals – Total** | | | | |
| Aluminum | 200.7 | UG/L | 323 | |
| Antimony | 200.7 | UG/L | 2.68 | J |
| Arsenic | 200.7 | UG/L | 6.50 | J |
| Barium | 200.7 | UG/L | 101 | |
| Beryllium | 200.7 | UG/L | 0.569 | J |
| Boron | 200.7 | UG/L | 396 | |
| Cadmium | 200.7 | UG/L | 0.117 | J |
| Calcium | 200.7 | UG/L | 186,000 | |
| Chromium | 200.7 | UG/L | 0.549 | J |
| Cobalt | 200.7 | UG/L | 2.07 | J |
| Copper | 200.7 | UG/L | 2.93 | J |
| Iron | 200.7 | UG/L | 355 | |
| Lead | 200.7 | UG/L | 0.687 | J |
| Magnesium | 200.7 | UG/L | 31,800 | |
| Manganese | 200.7 | UG/L | 128 | |
| Mercury | 245.1 | UG/L | ND (0.200) | U |
| Molybdenum | 200.7 | UG/L | 19.7 | |
| Nickel | 200.7 | UG/L | 7.36 | J |
| Selenium | 200.7 | UG/L | 6.02 | |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 106,000 | |
| Thallium | 200.7 | UG/L | 1.10 | J |
| Tin | 200.7 | UG/L | ND (30.0) | U |
| Titanium | 200.7 | UG/L | 6.78 | J |
| Vanadium | 200.7 | UG/L | 7.85 | J |
| Yttrium | 200.7 | UG/L | 0.314 | J |

J – Result measured above the MDL, but less than the reporting limit.
L – Sample result between 5x and 10x blank result.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-4. Bottom Ash Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Zinc | 200.7 | UG/L | 21.6 | |
| **Routine Metals – Dissolved** | | | | |
| Aluminum | 200.7 | UG/L | 231 | |
| Antimony | 200.7 | UG/L | 1.62 | J |
| Arsenic | 200.7 | UG/L | 4.88 | J |
| Barium | 200.7 | UG/L | 106 | |
| Beryllium | 200.7 | UG/L | 0.576 | J |
| Boron | 200.7 | UG/L | 397 | |
| Cadmium | 200.7 | UG/L | 0.174 | J |
| Calcium | 200.7 | UG/L | 192,000 | |
| Chromium | 200.7 | UG/L | 0.268 | J |
| Hexavalent Chromium | D1687-92 | UG/L | ND (2.00) | U |
| Cobalt | 200.7 | UG/L | 1.74 | J |
| Copper | 200.7 | UG/L | 2.82 | J |
| Iron | 200.7 | UG/L | 106 | |
| Lead | 200.7 | UG/L | 0.410 | J |
| Magnesium | 200.7 | UG/L | 32,600 | |
| Manganese | 200.7 | UG/L | 129 | |
| Mercury | 245.1 | UG/L | ND (0.200) | U |
| Molybdenum | 200.7 | UG/L | 20.2 | |
| Nickel | 200.7 | UG/L | 7.06 | J |
| Selenium | 200.7 | UG/L | 6.10 | L |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 106,000 | |
| Thallium | 200.7 | UG/L | 0.634 | J |
| Tin | 200.7 | UG/L | 1.22 | J |
| Titanium | 200.7 | UG/L | 0.745 | J |
| Vanadium | 200.7 | UG/L | 6.98 | J |
| Yttrium | 200.7 | UG/L | 0.146 | J |
| Zinc | 200.7 | UG/L | 35.2 | |
| **Low-Level Metals – Total** | | | | |
| Antimony | 1638 | UG/L | 1.09 | |
| Arsenic | 1638 | UG/L | 6.52 | |
| Cadmium | 1638 | UG/L | 0.0973 | J |
| Chromium | 1638 | UG/L | 2.67 | J |
| Copper | 1638 | UG/L | 2.37 | |
| Lead | 1638 | UG/L | 0.231 | J |
| Mercury | 1631E | UG/L | 0.00511 | |

J – Result measured above the MDL, but less than the reporting limit.
L – Sample result between 5x and 10x blank result.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-4. Bottom Ash Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Nickel | 1638 | UG/L | 10.7 | |
| Selenium | 1638 | UG/L | 5.74 | |
| Silver | 1638 | UG/L | 0.0313 | J |
| Thallium | 1638 | UG/L | 1.32 | |
| Zinc | 1638 | UG/L | 24.2 | |
| **Low-Level Metals - Dissolved** | | | | |
| Antimony | 1638 | UG/L | 0.990 | |
| Arsenic | 1638 | UG/L | 5.00 | |
| Cadmium | 1638 | UG/L | 0.117 | J |
| Chromium | 1638 | UG/L | 2.28 | J |
| Hexavalent Chromium | 1636 | UG/L | 3.01 | |
| Copper | 1638 | UG/L | 2.08 | |
| Lead | 1638 | UG/L | 0.00830 | J |
| Mercury | 1631E | UG/L | 0.00141 | |
| Nickel | 1638 | UG/L | 10.4 | |
| Selenium | 1638 | UG/L | 5.16 | |
| Silver | 1638 | UG/L | ND (0.500) | U |
| Thallium | 1638 | UG/L | 1.31 | |
| Zinc | 1638 | UG/L | 15.0 | |

J – Result measured above the MDL, but less than the reporting limit.
L – Sample result between 5x and 10x blank result.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-5. Duplicate of FGD Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Classical Pollutants** | | | | |
| Ammonia As Nitrogen ($NH_3$-N)) | 4500-NH3F | MG/L | 0.230 | |
| Nitrate/Nitrite ($NO_3$-N + $NO_2$-N) | 353.2 | MG/L | 36.0 | R |
| Total Kjeldahl Nitrogen (TKN) | 4500-N,C | MG/L | 3.11 | |
| Biochemical Oxygen Demand (BOD) | 5210B | MG/L | ND (120) | U |
| Chloride | 4500-CL-C | MG/L | 11,500 | |
| Sulfate | D516-90 | MG/L | 3,050 | |
| Total Dissolved Solids (TDS) | 2540 C | MG/L | 21,300 | |
| Total Phosphorus | 365.3 | MG/L | 0.320 | |
| Total Suspended Solids (TSS) | 2540 D | MG/L | 6.00 | |
| **Routine Metals – Total** | | | | |
| Aluminum | 200.7 | UG/L | ND (50.0) | U |
| Antimony | 200.7 | UG/L | 21.5 | |
| Arsenic | 200.7 | UG/L | 3.05 | J |
| Barium | 200.7 | UG/L | 71.4 | |
| Beryllium | 200.7 | UG/L | 7.74 | |
| Boron | 200.7 | UG/L | 193,000 | |
| Cadmium | 200.7 | UG/L | 3.14 | J |
| Calcium | 200.7 | UG/L | 2,070,000 | |
| Chromium | 200.7 | UG/L | ND (10.0) | U |
| Cobalt | 200.7 | UG/L | 6.25 | J |
| Copper | 200.7 | UG/L | 12.0 | |
| Iron | 200.7 | UG/L | 86.6 | J |
| Lead | 200.7 | UG/L | 1.79 | J |
| Magnesium | 200.7 | UG/L | 2,650,000 | |
| Manganese | 200.7 | UG/L | 30,300 | |
| Mercury | 245.1 | UG/L | ND (10.0) | U |
| Molybdenum | 200.7 | UG/L | 37.2 | |
| Nickel | 200.7 | UG/L | 33.5 | J |
| Selenium | 200.7 | UG/L | 768 | |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 1,270,000 | |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 0.555 | J |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | 0.530 | J |
| Yttrium | 200.7 | UG/L | 1.51 | J |
| Zinc | 200.7 | UG/L | ND (10.0) | U |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
R – MS/MSD % Recovery outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-5. Duplicate of FGD Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Routine Metals – Dissolved** | | | | |
| Aluminum | 200.7 | UG/L | ND (50.0) | U |
| Antimony | 200.7 | UG/L | 14.2 | J |
| Arsenic | 200.7 | UG/L | 3.59 | J |
| Barium | 200.7 | UG/L | 69.2 | |
| Beryllium | 200.7 | UG/L | 7.68 | |
| Boron | 200.7 | UG/L | 185,000 | |
| Cadmium | 200.7 | UG/L | 3.12 | J |
| Calcium | 200.7 | UG/L | 1,880,000 | |
| Chromium | 200.7 | UG/L | ND (10.0) | U |
| Hexavalent Chromium | D1687-92 | UG/L | ND (2.00) | U |
| Cobalt | 200.7 | UG/L | 6.00 | J |
| Copper | 200.7 | UG/L | 11.9 | |
| Iron | 200.7 | UG/L | 197 | |
| Lead | 200.7 | UG/L | 1.38 | J |
| Magnesium | 200.7 | UG/L | 2,500,000 | |
| Manganese | 200.7 | UG/L | 29,000 | |
| Mercury | 245.1 | UG/L | ND (10.0) | U |
| Molybdenum | 200.7 | UG/L | 35.2 | |
| Nickel | 200.7 | UG/L | 31.8 | J |
| Selenium | 200.7 | UG/L | 715 | |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 1,210,000 | |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 0.611 | J |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | 0.726 | J |
| Yttrium | 200.7 | UG/L | 1.22 | J |
| Zinc | 200.7 | UG/L | ND (10.0) | U |
| **Low-Level Metals – Total** | | | | |
| Antimony | 1638 | UG/L | ND (0.400) | U |
| Arsenic | 1638 | UG/L | 22.4 | |
| Cadmium | 1638 | UG/L | 1.71 | J |
| Chromium | 1638 | UG/L | 11.7 | J |
| Copper | 1638 | UG/L | 9.90 | |
| Lead | 1638 | UG/L | 0.0355 | J |
| Mercury | 1631E | UG/L | 0.117 | |
| Nickel | 1638 | UG/L | 92.2 | |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
R – MS/MSD % Recovery outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-5. Duplicate of FGD Effluent Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Selenium | 1638 | UG/L | 605 | |
| Silver | 1638 | UG/L | 0.0745 | J |
| Thallium | 1638 | UG/L | 16.0 | |
| Zinc | 1638 | UG/L | 15.2 | |
| **Low-Level Metals - Dissolved** | | | | |
| Antimony | 1638 | UG/L | ND (0.400) | U |
| Arsenic | 1638 | UG/L | 22.4 | |
| Cadmium | 1638 | UG/L | 1.68 | J |
| Chromium | 1638 | UG/L | 8.79 | J |
| Hexavalent Chromium | 1636 | UG/L | ND (2.50) | U |
| Copper | 1638 | UG/L | 9.52 | |
| Lead | 1638 | UG/L | 0.0274 | J |
| Mercury | 1631E | UG/L | 0.0528 | |
| Nickel | 1638 | UG/L | 93.3 | |
| Selenium | 1638 | UG/L | 634 | |
| Silver | 1638 | UG/L | 0.0891 | J |
| Thallium | 1638 | UG/L | 15.8 | |
| Zinc | 1638 | UG/L | 16.2 | |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
R – MS/MSD % Recovery outside method acceptance criteria.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-6. Bottle Blank and Equipment Blank Analytical Data, Homer City

| Analyte | Method | Process | Units | Concentration |
|---|---|---|---|---|
| **LDPE 1000 ml Plastic Bottles – Bottle Blank (for low-level metals samples)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| **LDPE 500 ml Plastic Bottles – Bottle Blank (for low-level hexavalent chromium samples)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |

ND – Not detected (number in parenthesis is the report limit).

## Table A-6. Bottle Blank and Equipment Blank Analytical Data, Homer City

| Analyte | Method | Process | Units | Concentration |
|---|---|---|---|---|
| **Flint 125 ml Amber Glass Bottles – Bottle Blank (for speciation samples)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| **Flint 250 ml Glass Bottles – Bottle Blank (for low-level mercury samples)** | | | | |
| Mercury | EPA 1631E | Total Recoverable | UG/L | ND (0.00020) |
| **Capsule Filter – Equipment Blank (for dissolved low-level metals sample collection)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Mercury | EPA 1631E | Dissolved | UG/L | ND (0.00020) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |

ND – Not detected (number in parenthesis is the report limit).

## Table A-6. Bottle Blank and Equipment Blank Analytical Data, Homer City

| Analyte | Method | Process | Units | Concentration |
|---|---|---|---|---|
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| **LDPE 4000 ml Plastic Bottles – Bottle Blank (for low-level metals field blank water)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| **LDPE 2000 ml Plastic Bottles – Bottle Blank (for low-level metals field blank water)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |

ND – Not detected (number in parenthesis is the report limit).

## Table A-6. Bottle Blank and Equipment Blank Analytical Data, Homer City

| Analyte | Method | Process | Units | Concentration |
|---|---|---|---|---|
| **Borosilicate 1000 ml Glass Bottles – Bottle Blank (for low-level mercury field blank water)** | | | | |
| Mercury | EPA 1631E | Total Recoverable | UG/L | ND (0.00020) |
| **LDPE 10 L Composite Bottles – Bottle Blank (sample composite bottle for dissolved/filtration pump-off)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Mercury | EPA 1631E | Total Recoverable | UG/L | ND (0.00020) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| **Pump-Off Tubing Set – Equipment Blank (Teflon® and silicone tubing for dissolved sample collection for low-level metals)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Mercury | EPA 1631E | Total Recoverable | UG/L | ND (0.00020) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |

ND – Not detected (number in parenthesis is the report limit).

## Table A-6. Bottle Blank and Equipment Blank Analytical Data, Homer City

| Analyte | Method | Process | Units | Concentration |
|---|---|---|---|---|
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| **C-Flex Tubing Set – Equipment Blank (#73 silicone tubing attached to #24 silicone tubing for sample collection for low-level mercury and metals from FGD influent sample tap)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Mercury | EPA 1631E | Total Recoverable | UG/L | ND (0.00020) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| **Tubing Set – Equipment Blank (25 feet of Teflon® tubing, 5 feet #24 silicone tubing, Y-splitter, two pieces of 5 feet #24 silicone tubing for sample collection for low-level mercury and metals from FGD primary clarifier effluent, effluent from FGD wastewater treatment system, and bottom ash pond effluent)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Mercury | EPA 1631E | Total Recoverable | UG/L | ND (0.00020) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |

ND – Not detected (number in parenthesis is the report limit).

## Table A-6. Bottle Blank and Equipment Blank Analytical Data, Homer City

| Analyte | Method | Process | Units | Concentration |
|---|---|---|---|---|
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| **Funnel Assembly Set – Equipment Blank (Plastic funnel attached to #73 silicone tubing for field blank sample collection for low-level total metals at the FGD influent)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Mercury | EPA 1631E | Total Recoverable | UG/L | ND (0.00020) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| **C-Flex Tubing Set – Equipment Blank (10 feet #73 silicone tubing, Y-splitter, two pieces of 5 feet #24 silicone tubing for alternative sample collection approach for low-level mercury and metals from FGD influent sample tap)** | | | | |
| Aluminum | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Antimony | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Arsenic | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Barium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Beryllium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Cadmium | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Chromium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Cobalt | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Copper | EPA 1638 | Dissolved | UG/L | ND (0.30) |
| Lead | EPA 1638 | Dissolved | UG/L | ND (0.050) |

ND – Not detected (number in parenthesis is the report limit).

## Table A-6. Bottle Blank and Equipment Blank Analytical Data, Homer City

| Analyte | Method | Process | Units | Concentration |
|---|---|---|---|---|
| Manganese | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Mercury | EPA 1631E | Total Recoverable | UG/L | ND (0.00020) |
| Molybdenum | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Nickel | EPA 1638 | Dissolved | UG/L | ND (0.50) |
| Selenium | EPA 1638 | Dissolved | UG/L | ND (2.0) |
| Silver | EPA 1638 | Dissolved | UG/L | ND (0.10) |
| Thallium | EPA 1638 | Dissolved | UG/L | ND (0.050) |
| Vanadium | EPA 1638 | Dissolved | UG/L | ND (1.0) |
| Zinc | EPA 1638 | Dissolved | UG/L | ND (0.50) |

ND – Not detected (number in parenthesis is the report limit).

## Table A-7. FGD Influent Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Low-Level Metals – Total** | | | | |
| Antimony | 1638 | UG/L | ND (0.0200) | U |
| Arsenic | 1638 | UG/L | ND (0.150) | U |
| Cadmium | 1638 | UG/L | ND (0.100) | U |
| Chromium | 1638 | UG/L | 0.129 | J |
| Copper | 1638 | UG/L | ND (0.200) | U |
| Lead | 1638 | UG/L | ND (0.0500) | U |
| Mercury | 1631E | UG/L | ND (0.000500) | U |
| Nickel | 1638 | UG/L | ND (1.00) | U |
| Selenium | 1638 | UG/L | ND (1.00) | U |
| Silver | 1638 | UG/L | ND (0.100) | U |
| Thallium | 1638 | UG/L | ND (0.0200) | U |
| Zinc | 1638 | UG/L | ND (0.500) | U |
| **Low-Level Metals - Dissolved** | | | | |
| Antimony | 1638 | UG/L | ND (0.0200) | U |
| Arsenic | 1638 | UG/L | ND (0.150) | U |
| Cadmium | 1638 | UG/L | ND (0.100) | U |
| Chromium | 1638 | UG/L | 0.154 | J |
| Copper | 1638 | UG/L | 0.116 | J |
| Lead | 1638 | UG/L | ND (0.0500) | U |
| Nickel | 1638 | UG/L | ND (1.00) | U |
| Selenium | 1638 | UG/L | ND (1.00) | U |
| Silver | 1638 | UG/L | 0.00260 | J |
| Thallium | 1638 | UG/L | ND (0.0200) | U |
| Zinc | 1638 | UG/L | ND (0.500) | U |

ND – Not detected (number in parenthesis is the report limit).
J – Result measured above the MDL, but less than the reporting limit.
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-8. FGD Second-Stage Clarifier Overflow Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Routine Metals – Total** | | | | |
| Aluminum | 200.7 | UG/L | 6.29 | J |
| Antimony | 200.7 | UG/L | 0.0483 | J |
| Arsenic | 200.7 | UG/L | ND (10.0) | U |
| Barium | 200.7 | UG/L | 0.0858 | J |
| Beryllium | 200.7 | UG/L | ND (5.00) | U |
| Boron | 200.7 | UG/L | 3.93 | J |
| Cadmium | 200.7 | UG/L | 0.0172 | J |
| Calcium | 200.7 | UG/L | 17.4 | J |
| Chromium | 200.7 | UG/L | ND (10.0) | U |
| Cobalt | 200.7 | UG/L | ND (50.0) | U |
| Copper | 200.7 | UG/L | 0.0440 | J |
| Iron | 200.7 | UG/L | 0.281 | J |
| Lead | 200.7 | UG/L | 0.0131 | J |
| Magnesium | 200.7 | UG/L | 14.6 | J |
| Manganese | 200.7 | UG/L | 0.347 | J |
| Mercury | 245.1 | UG/L | ND (0.200) | U |
| Molybdenum | 200.7 | UG/L | ND (10.0) | U |
| Nickel | 200.7 | UG/L | 0.0289 | J |
| Selenium | 200.7 | UG/L | ND (5.00) | U |
| Silver | 200.7 | UG/L | 0.131 | J |
| Sodium | 200.7 | UG/L | 27.9 | J |
| Thallium | 200.7 | UG/L | 0.556 | J |
| Tin | 200.7 | UG/L | ND (30.0) | U |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | 0.185 | J |
| Yttrium | 200.7 | UG/L | 0.00100 | J |
| Zinc | 200.7 | UG/L | 0.634 | J |
| **Routine Metals – Dissolved** | | | | |
| Aluminum | 200.7 | UG/L | 1.93 | J |
| Antimony | 200.7 | UG/L | ND (20.0) | U |
| Arsenic | 200.7 | UG/L | ND (10.0) | U |
| Barium | 200.7 | UG/L | 0.425 | J |
| Beryllium | 200.7 | UG/L | ND (5.00) | U |
| Boron | 200.7 | UG/L | 4.13 | J |
| Cadmium | 200.7 | UG/L | 0.0577 | J |
| Calcium | 200.7 | UG/L | 41.3 | J |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-8. FGD Second-Stage Clarifier Overflow Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Chromium | 200.7 | UG/L | ND (10.0) | U |
| Hexavalent Chromium | D1687-92 | UG/L | ND (2.00) | U |
| Cobalt | 200.7 | UG/L | 0.0181 | J |
| Copper | 200.7 | UG/L | 0.340 | J |
| Iron | 200.7 | UG/L | 3.46 | J |
| Lead | 200.7 | UG/L | 0.543 | J |
| Magnesium | 200.7 | UG/L | 20.4 | J |
| Manganese | 200.7 | UG/L | 0.485 | J |
| Mercury | 245.1 | UG/L | ND (0.200) | U |
| Molybdenum | 200.7 | UG/L | ND (10.0) | U |
| Nickel | 200.7 | UG/L | ND (50.0) | U |
| Selenium | 200.7 | UG/L | 0.457 | J |
| Silver | 200.7 | UG/L | 0.325 | J |
| Sodium | 200.7 | UG/L | 41.6 | J |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 0.533 | J |
| Titanium | 200.7 | UG/L | 0.0427 | J |
| Vanadium | 200.7 | UG/L | 0.314 | J |
| Yttrium | 200.7 | UG/L | ND (5.00) | U |
| Zinc | 200.7 | UG/L | 1.78 | J |
| **Low-Level Metals – Total** | | | | |
| Antimony | 1638 | UG/L | ND (0.0200) | U |
| Arsenic | 1638 | UG/L | ND (0.150) | U |
| Cadmium | 1638 | UG/L | ND (0.100) | U |
| Chromium | 1638 | UG/L | 0.140 | J |
| Copper | 1638 | UG/L | ND (0.200) | U |
| Lead | 1638 | UG/L | ND (0.0500) | U |
| Mercury | 1631E | UG/L | ND (0.000500) | U |
| Nickel | 1638 | UG/L | ND (1.00) | U |
| Selenium | 1638 | UG/L | ND (1.00) | U |
| Silver | 1638 | UG/L | ND (0.100) | U |
| Thallium | 1638 | UG/L | ND (0.0200) | U |
| Zinc | 1638 | UG/L | ND (0.500) | U |
| **Low-Level Metals - Dissolved** | | | | |
| Antimony | 1638 | UG/L | ND (0.0200) | U |
| Arsenic | 1638 | UG/L | ND (0.150) | U |
| Cadmium | 1638 | UG/L | ND (0.100) | U |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-8. FGD Second-Stage Clarifier Overflow Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Chromium | 1638 | UG/L | 0.115 | J |
| Hexavalent Chromium | 1636 | UG/L | 3.17 | |
| Copper | 1638 | UG/L | 0.0770 | J |
| Lead | 1638 | UG/L | ND (0.0500) | U |
| Nickel | 1638 | UG/L | ND (1.00) | U |
| Selenium | 1638 | UG/L | ND (1.00) | U |
| Silver | 1638 | UG/L | 0.00240 | J |
| Thallium | 1638 | UG/L | 0.000500 | J |
| Zinc | 1638 | UG/L | ND (0.500) | U |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-9. FGD Effluent Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Routine Metals – Total** | | | | |
| Aluminum | 200.7 | UG/L | 1.20 | J |
| Antimony | 200.7 | UG/L | 0.111 | J |
| Arsenic | 200.7 | UG/L | ND (10.0) | U |
| Barium | 200.7 | UG/L | 0.0905 | J |
| Beryllium | 200.7 | UG/L | ND (5.00) | U |
| Boron | 200.7 | UG/L | 51.0 | J |
| Cadmium | 200.7 | UG/L | ND (5.00) | U |
| Calcium | 200.7 | UG/L | 141 | |
| Chromium | 200.7 | UG/L | 0.0145 | J |
| Cobalt | 200.7 | UG/L | ND (50.0) | U |
| Copper | 200.7 | UG/L | ND (10.0) | U |
| Iron | 200.7 | UG/L | 3.07 | J |
| Lead | 200.7 | UG/L | 0.0217 | J |
| Magnesium | 200.7 | UG/L | 157 | J |
| Manganese | 200.7 | UG/L | 1.91 | J |
| Mercury | 245.1 | UG/L | ND (0.200) | U |
| Molybdenum | 200.7 | UG/L | ND (10.0) | U |
| Nickel | 200.7 | UG/L | 0.110 | J |
| Selenium | 200.7 | UG/L | ND (5.00) | U |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | ND (500) | U |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 0.140 | J |
| Titanium | 200.7 | UG/L | 0.0476 | J |
| Vanadium | 200.7 | UG/L | ND (20.0) | U |
| Yttrium | 200.7 | UG/L | 0.0312 | J |
| Zinc | 200.7 | UG/L | 0.517 | J |
| **Routine Metals – Dissolved** | | | | |
| Aluminum | 200.7 | UG/L | 3.37 | J |
| Antimony | 200.7 | UG/L | 8.04 | J |
| Arsenic | 200.7 | UG/L | ND (10.0) | U |
| Barium | 200.7 | UG/L | 4.70 | |
| Beryllium | 200.7 | UG/L | ND (5.00) | U |
| Boron | 200.7 | UG/L | 36.2 | J |
| Cadmium | 200.7 | UG/L | ND (5.00) | U |
| Calcium | 200.7 | UG/L | 193 | |
| Chromium | 200.7 | UG/L | 0.105 | J |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-9. FGD Effluent Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Hexavalent Chromium | D1687-92 | UG/L | ND (2.00) | U |
| Cobalt | 200.7 | UG/L | ND (50.0) | U |
| Copper | 200.7 | UG/L | 0.214 | J |
| Iron | 200.7 | UG/L | 6.21 | J |
| Lead | 200.7 | UG/L | 0.0410 | J |
| Magnesium | 200.7 | UG/L | 221 | |
| Manganese | 200.7 | UG/L | 2.83 | J |
| Mercury | 245.1 | UG/L | ND (0.200) | U |
| Molybdenum | 200.7 | UG/L | 55.8 | |
| Nickel | 200.7 | UG/L | 0.0789 | J |
| Selenium | 200.7 | UG/L | 15.1 | |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 8.79 | J |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 0.971 | J |
| Titanium | 200.7 | UG/L | 0.177 | J |
| Vanadium | 200.7 | UG/L | ND (20.0) | U |
| Yttrium | 200.7 | UG/L | ND (5.00) | U |
| Zinc | 200.7 | UG/L | 0.427 | J |
| **Low-Level Metals – Total** | | | | |
| Antimony | 1638 | UG/L | ND (0.0200) | U |
| Arsenic | 1638 | UG/L | ND (0.150) | U |
| Cadmium | 1638 | UG/L | ND (0.100) | U |
| Chromium | 1638 | UG/L | 0.132 | J |
| Copper | 1638 | UG/L | ND (0.200) | U |
| Lead | 1638 | UG/L | ND (0.0500) | U |
| Mercury | 1631E | UG/L | ND (0.000500) | U |
| Nickel | 1638 | UG/L | ND (1.00) | U |
| Selenium | 1638 | UG/L | ND (1.00) | U |
| Silver | 1638 | UG/L | ND (0.100) | U |
| Thallium | 1638 | UG/L | ND (0.0200) | U |
| Zinc | 1638 | UG/L | ND (0.500) | U |
| **Low-Level Metals - Dissolved** | | | | |
| Antimony | 1638 | UG/L | ND (0.0200) | U |
| Arsenic | 1638 | UG/L | ND (0.150) | U |
| Cadmium | 1638 | UG/L | 0.00190 | J |
| Chromium | 1638 | UG/L | 0.115 | J |
| Hexavalent Chromium | 1636 | UG/L | 2.56 | |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-9. FGD Effluent Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Copper | 1638 | UG/L | ND (0.200) | U |
| Lead | 1638 | UG/L | ND (0.0500) | U |
| Nickel | 1638 | UG/L | ND (1.00) | U |
| Selenium | 1638 | UG/L | ND (1.00) | U |
| Silver | 1638 | UG/L | ND (0.100) | U |
| Thallium | 1638 | UG/L | 0.000600 | J |
| Zinc | 1638 | UG/L | ND (0.500) | U |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-10. Bottom Ash Effluent Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| **Routine Metals – Total** | | | | |
| Aluminum | 200.7 | UG/L | 1.50 | J |
| Antimony | 200.7 | UG/L | ND (20.0) | U |
| Arsenic | 200.7 | UG/L | ND (10.0) | U |
| Barium | 200.7 | UG/L | 0.0289 | J |
| Beryllium | 200.7 | UG/L | ND (5.00) | U |
| Boron | 200.7 | UG/L | 20.2 | J |
| Cadmium | 200.7 | UG/L | 0.00200 | J |
| Calcium | 200.7 | UG/L | 86.3 | |
| Chromium | 200.7 | UG/L | 0.0452 | J |
| Cobalt | 200.7 | UG/L | ND (50.0) | U |
| Copper | 200.7 | UG/L | 0.659 | J |
| Iron | 200.7 | UG/L | 1.41 | J |
| Lead | 200.7 | UG/L | ND (50.0) | U |
| Magnesium | 200.7 | UG/L | 220 | |
| Manganese | 200.7 | UG/L | 3.98 | J |
| Mercury | 245.1 | UG/L | ND (0.200) | U |
| Molybdenum | 200.7 | UG/L | ND (10.0) | U |
| Nickel | 200.7 | UG/L | ND (50.0) | U |
| Selenium | 200.7 | UG/L | ND (5.00) | U |
| Silver | 200.7 | UG/L | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 128 | J |
| Thallium | 200.7 | UG/L | ND (10.0) | U |
| Tin | 200.7 | UG/L | 0.00890 | J |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | 0.227 | J |
| Yttrium | 200.7 | UG/L | ND (5.00) | U |
| Zinc | 200.7 | UG/L | 1.08 | J |
| **Routine Metals – Dissolved** | | | | |
| Aluminum | 200.7 | UG/L | 3.20 | J |
| Antimony | 200.7 | UG/L | ND (20.0) | U |
| Arsenic | 200.7 | UG/L | 0.0708 | J |
| Barium | 200.7 | UG/L | 0.504 | J |
| Beryllium | 200.7 | UG/L | ND (5.00) | U |
| Boron | 200.7 | UG/L | 19.7 | J |
| Cadmium | 200.7 | UG/L | 0.0144 | J |
| Calcium | 200.7 | UG/L | 18.5 | J |
| Chromium | 200.7 | UG/L | 0.0673 | J |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-10. Bottom Ash Effluent Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Hexavalent Chromium | D1687-92 | UG/L | ND (2.00) | U |
| Cobalt | 200.7 | UG/L | ND (50.0) | U |
| Copper | 200.7 | UG/L | 1.01 | J |
| Iron | 200.7 | UG/L | 24.9 | J |
| Lead | 200.7 | UG/L | 1.57 | J |
| Magnesium | 200.7 | UG/L | 7.37 | J |
| Manganese | 200.7 | UG/L | 0.227 | J |
| Mercury | 245.1 | UG/L | ND (0.200) | U |
| Molybdenum | 200.7 | UG/L | ND (10.0) | U |
| Nickel | 200.7 | UG/L | ND (50.0) | U |
| Selenium | 200.7 | UG/L | ND (5.00) | U |
| Silver | 200.7 | UG/L | 0.403 | J |
| Sodium | 200.7 | UG/L | 45.7 | J |
| Thallium | 200.7 | UG/L | 0.0366 | J |
| Tin | 200.7 | UG/L | 0.160 | J |
| Titanium | 200.7 | UG/L | ND (10.0) | U |
| Vanadium | 200.7 | UG/L | 0.179 | J |
| Yttrium | 200.7 | UG/L | ND (5.00) | U |
| Zinc | 200.7 | UG/L | 0.636 | J |
| **Low-Level Metals – Total** | | | | |
| Antimony | 1638 | UG/L | ND (0.0200) | U |
| Arsenic | 1638 | UG/L | ND (0.150) | U |
| Cadmium | 1638 | UG/L | 0.00260 | J |
| Chromium | 1638 | UG/L | 0.0868 | J |
| Copper | 1638 | UG/L | ND (0.200) | U |
| Lead | 1638 | UG/L | ND (0.0500) | U |
| Mercury | 1631E | UG/L | ND (0.000500) | U |
| Nickel | 1638 | UG/L | ND (1.00) | U |
| Selenium | 1638 | UG/L | ND (1.00) | U |
| Silver | 1638 | UG/L | ND (0.100) | U |
| Thallium | 1638 | UG/L | ND (0.0200) | U |
| Zinc | 1638 | UG/L | ND (0.500) | U |
| **Low-Level Metals - Dissolved** | | | | |
| Antimony | 1638 | UG/L | ND (0.0200) | U |
| Arsenic | 1638 | UG/L | ND (0.150) | U |
| Cadmium | 1638 | UG/L | 0.00130 | J |
| Chromium | 1638 | UG/L | ND (0.800) | U |
| Hexavalent Chromium | 1636 | UG/L | 4.36 | |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table A-10. Bottom Ash Effluent Field Blank Analytical Data, Homer City

| Analyte | Method | Unit | Concentration | |
|---|---|---|---|---|
| Copper | 1638 | UG/L | 0.240 | |
| Lead | 1638 | UG/L | ND (0.0500) | U |
| Nickel | 1638 | UG/L | ND (1.00) | U |
| Selenium | 1638 | UG/L | ND (1.00) | U |
| Silver | 1638 | UG/L | ND (0.100) | U |
| Thallium | 1638 | UG/L | 0.000400 | J |
| Zinc | 1638 | UG/L | ND (0.500) | U |

J – Result measured above the MDL, but less than the reporting limit.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Appendix B

## ANALYTICAL DATA FOR METALS, FGD WASTEWATER AND BOTTOM ASH POND

## Table B-1. Analytical Results for Metals in the FGD Wastewater Treatment System, Homer City

| Analyte | Method | Unit | FGD Influent (SP-1) | | Second-Stage Clarifier Overflow Effluent (SP-2) | | Original FGD Effluent (SP-3) | | Duplicate FGD Effluent (SP-5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| **Routine Metals** | | | | | | | | | | |
| Aluminum | 200.7 | UG/L | 289,000 | ND (50.0) U | ND (50.0) U | ND (50.0) U | ND (50.0) U | ND (50.0) U | ND (50.0) U | ND (50.0) U |
| Antimony | 200.7 | UG/L | 86.4 | 18.4 J | 20.1 | 14.0 J | 13.6 J | 14.0 J | 21.5 | 14.2 J |
| Arsenic | 200.7 | UG/L | 1,590 | 7.51 J | 3.81 J | 3.05 J | 3.60 J | 3.56 J | 3.05 J | 3.59 J |
| Barium | 200.7 | UG/L | 11,900 R | 149 R | 112 | 116 | 71.1 R | 71.9 R,T | 71.4 | 69.2 |
| Beryllium | 200.7 | UG/L | 28.8 | 10.5 | 7.69 | 7.90 | 7.61 | 7.74 | 7.74 | 7.68 |
| Boron | 200.7 | UG/L | 224,000 | 254,000 | 191,000 | 187,000 | 188,000 | 182,000 | 193,000 | 185,000 |
| Cadmium | 200.7 | UG/L | 150 | 26.2 | 3.93 J | 3.58 J | 3.24 J | 3.30 J | 3.14 J | 3.12 J |
| Calcium | 200.7 | UG/L | 3,220,000 | 1,990,000 | 1,740,000 | 1,520,000 | 1,920,000 | 1,970,000 | 2,070,000 | 1,880,000 |
| Chromium | 200.7 | UG/L | 1,400 | ND (10.0) U | ND (10.0) U | 2.46 J | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U |
| Hexavalent Chromium | D1687-92 | UG/L | NA | ND (2.00) U | NA | ND (2.00) U | NA | ND (2.00) U | NA | ND (2.00) U |
| Cobalt | 200.7 | UG/L | 369 | 201 | 10.8 J | 10.7 J | 6.36 J | 6.27 J | 6.25 J | 6.00 J |
| Copper | 200.7 | UG/L | 811 | 14.5 | 12.3 | 12.0 | 13.0 | 11.6 | 12.0 | 11.9 |
| Iron | 200.7 | UG/L | 824,000 | ND (100) U | 85.9 J | 85.4 J | 134 | 134 R | 86.6 J | 197 |
| Lead | 200.7 | UG/L | 340 | 11.5 J | 3.17 J | ND (50.0) U | 0.987 J | 2.58 J | 1.79 J | 1.38 J |
| Magnesium | 200.7 | UG/L | 2,760,000 | 3,100,000 | 2,640,000 | 2,630,000 | 2,560,000 | 2,520,000 | 2,650,000 | 2,500,000 |
| Manganese | 200.7 | UG/L | 225,000 | 173,000 | 47,700 | 47,000 | 29,800 | 29,200 | 30,300 | 29,000 |
| Mercury | 245.1 | UG/L | 243 | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U |
| Molybdenum | 200.7 | UG/L | 375 | 30.6 | 36.7 | 35.9 | 37.9 | 36.3 | 37.2 | 35.2 |
| Nickel | 200.7 | UG/L | 2,560 R | 1,350 | 56.9 | 56.9 | 34.0 J | 31.7 J | 33.5 J | 31.8 J |
| Selenium | 200.7 | UG/L | 4,000 R | 656 R | 187 | 179 | 773 | 766 R | 768 | 715 |
| Silver | 200.7 | UG/L | ND (40.0) U | 7.93 J | ND (20.0) U | ND (20.0) U | ND (20.0) U | ND (20.0) U | ND (20.0) U | ND (20.0) U |

J – Result measured above the MDL, but less than the reporting limit.
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
U – Result below the MDL. Number shown in parentheses is the reporting limit).
NA – Not analyzed.
ND – Not detected (number in parenthesis is the report limit).
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.
Note: Results shown are not paired samples. See Section 4.2.

# Table B-1. Analytical Results for Metals in the FGD Wastewater Treatment System, Homer City

| Analyte | Method | Unit | FGD Influent (SP-1) | | Second-Stage Clarifier Overflow Effluent (SP-2) | | Original FGD Effluent (SP-3) | | Duplicate FGD Effluent (SP-5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Dissolved | Total | Dissolved | Total | Dissolved | Total | Dissolved |
| Sodium | 200.7 | UG/L | 1,430,000 | 1,440,000 | 1,140,000 | 1,130,000 | 1,280,000 | 1,250,000 | 1,270,000 | 1,210,000 |
| Thallium | 200.7 | UG/L | Exclude | 61.2 | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U |
| Tin | 200.7 | UG/L | ND (60.0) U | ND (30.0) U | 0.938 J | 1.88 J | 3.41 J | 4.41 J | 0.555 J | 0.611 J |
| Titanium | 200.7 | UG/L | 1,300 R | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U |
| Vanadium | 200.7 | UG/L | 766 | ND (20.0) U | 0.365 J | 0.585 J | 0.563 J | 0.0756 J | 0.530 J | 0.726 J |
| Yttrium | 200.7 | UG/L | 586 | 6.28 | 1.52 J | 1.62 J | 1.46 J | 1.53 J | 1.51 J | 1.22 J |
| Zinc | 200.7 | UG/L | 1,900 | ND (10.0) U | ND (10.0) U | ND (10.0) U | ND (10.0) U | 9.62 J | ND (10.0) U | ND (10.0) U |
| **Low-Level Metals** | | | | | | | | | | |
| Antimony | 1638 | UG/L | 31.1 | ND (0.400) U | ND (0.400) U | ND (0.400) U | ND (0.400) U | ND (0.400) U | ND (0.400) U | ND (0.400) U |
| Arsenic | 1638 | UG/L | 1,220 | 24.2 R | 20.6 | 21.8 | 23.5 | 22.5 | 22.4 | 22.4 |
| Cadmium | 1638 | UG/L | 52.8 R | 24.5 | 1.74 J | 1.69 J | 1.77 J | 1.61 J | 1.71 J | 1.68 J |
| Chromium | 1638 | UG/L | 1,270 | ND (16.0) U | 8.76 J | 9.27 J | 10.4 J | 10.2 J | 11.7 J | 8.79 J |
| Hexavalent Chromium | 1636 | UG/L | NA | NA | NA | ND (2.50) U | NA | ND (2.50) U | NA | ND (2.50) U |
| Copper | 1638 | UG/L | 747 | 11.3 | 10.9 | 9.22 | 9.44 | 9.26 | 9.90 | 9.52 |
| Lead | 1638 | UG/L | 351 | ND (1.00) U | 0.0512 J | 0.0485 J | 0.0362 J | ND (1.00) U | 0.0355 J | 0.0274 J |
| Mercury | 1631E | UG/L | 533 | 0.0809 | 0.125 | 0.0245 | 0.117 | 0.0556 | 0.117 | 0.0528 |
| Nickel | 1638 | UG/L | 2,840 | 1,450 | 111 | 116 | 92.0 | 93.7 | 92.2 | 93.3 |
| Selenium | 1638 | UG/L | 3,530 | 584 | 238 | 241 | 621 | 606 | 605 | 634 |
| Silver | 1638 | UG/L | ND (20.0) U | ND (2.00) U | 0.0413 J | 0.0891 J | 0.0672 J | 0.0695 J | 0.0745 J | 0.0891 J |
| Thallium | 1638 | UG/L | 37.3 | 23.2 | 16.8 | 16.6 | 15.9 | 15.8 | 16.0 | 15.8 |
| Zinc | 1638 | UG/L | 2,130 | 34.7 | 15.0 | 14.4 | 15.2 | 15.2 | 15.2 | 16.2 |

J – Result measured above the MDL, but less than the reporting limit.
R – MS/MSD % Recovery outside method acceptance criteria.
T – MS/MSD RPD outside method acceptance criteria.
U – Result below the MDL. Number shown in parentheses is the reporting limit).
NA – Not analyzed.
ND – Not detected (number in parenthesis is the report limit).
Exclude – Results were excluded because the MS/MSD samples had a zero percent recovery for total thallium.
Note: Results shown are not paired samples. See Section 4.2.

## Table B-2. Analytical Results for Metals in the Bottom Ash Pond Effluent, Homer City

| Analyte | Method | Unit | Bottom Ash Pond Effluent (SP-4) | | | |
|---|---|---|---|---|---|---|
| | | | Total | | Dissolved | |
| **Routine Metals** | | | | | | |
| Aluminum | 200.7 | UG/L | 323 | | 231 | |
| Antimony | 200.7 | UG/L | 2.68 | J | 1.62 | J |
| Arsenic | 200.7 | UG/L | 6.50 | J | 4.88 | J |
| Barium | 200.7 | UG/L | 101 | | 106 | |
| Beryllium | 200.7 | UG/L | 0.569 | J | 0.576 | J |
| Boron | 200.7 | UG/L | 396 | | 397 | |
| Cadmium | 200.7 | UG/L | 0.117 | J | 0.174 | J |
| Calcium | 200.7 | UG/L | 186,000 | | 192,000 | |
| Chromium | 200.7 | UG/L | 0.549 | J | 0.268 | J |
| Hexavalent Chromium | D1687-92 | UG/L | NA | | ND (2.00) | U |
| Cobalt | 200.7 | UG/L | 2.07 | J | 1.74 | J |
| Copper | 200.7 | UG/L | 2.93 | J | 2.82 | J |
| Iron | 200.7 | UG/L | 355 | | 106 | |
| Lead | 200.7 | UG/L | 0.687 | J | 0.410 | J |
| Magnesium | 200.7 | UG/L | 31,800 | | 32,600 | |
| Manganese | 200.7 | UG/L | 128 | | 129 | |
| Mercury | 245.1 | UG/L | ND (0.200) | U | ND (0.200) | U |
| Molybdenum | 200.7 | UG/L | 19.7 | | 20.2 | |
| Nickel | 200.7 | UG/L | 7.36 | J | 7.06 | J |
| Selenium | 200.7 | UG/L | 6.02 | | 6.10 | L |
| Silver | 200.7 | UG/L | ND (20.0) | U | ND (20.0) | U |
| Sodium | 200.7 | UG/L | 106,000 | | 106,000 | |
| Thallium | 200.7 | UG/L | 1.10 | J | 0.634 | J |
| Tin | 200.7 | UG/L | ND (30.0) | U | 1.22 | J |
| Titanium | 200.7 | UG/L | 6.78 | J | 0.745 | J |
| Vanadium | 200.7 | UG/L | 7.85 | J | 6.98 | J |
| Yttrium | 200.7 | UG/L | 0.314 | J | 0.146 | J |
| Zinc | 200.7 | UG/L | 21.6 | | 35.2 | |
| **Low-Level Metals – Total** | | | | | | |
| Antimony | 1638 | UG/L | 1.09 | | 0.990 | |
| Arsenic | 1638 | UG/L | 6.52 | | 5.00 | |
| Cadmium | 1638 | UG/L | 0.0973 | J | 0.117 | J |
| Chromium | 1638 | UG/L | 2.67 | J | 2.28 | J |
| Hexavalent Chromium | 1636 | UG/L | NA | | 3.01 | |
| Copper | 1638 | UG/L | 2.37 | | 2.08 | |

J – Result measured above the MDL, but less than the reporting limit.
L – Sample result between 5x and 10x blank result.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

## Table B-2. Analytical Results for Metals in the Bottom Ash Pond Effluent, Homer City

| Analyte | Method | Unit | Bottom Ash Pond Effluent (SP-4) | | | |
|---|---|---|---|---|---|---|
| | | | Total | | Dissolved | |
| Lead | 1638 | UG/L | 0.231 | J | 0.00830 | J |
| Mercury | 1631E | UG/L | 0.00511 | | 0.00141 | |
| Nickel | 1638 | UG/L | 10.7 | | 10.4 | |
| Selenium | 1638 | UG/L | 5.74 | | 5.16 | |
| Silver | 1638 | UG/L | 0.0313 | J | ND (0.500) | U |
| Thallium | 1638 | UG/L | 1.32 | | 1.31 | |
| Zinc | 1638 | UG/L | 24.2 | | 15.0 | |

J – Result measured above the MDL, but less than the reporting limit.
L – Sample result between 5x and 10x blank result.
ND – Not detected (number in parenthesis is the report limit).
U – Result below the MDL. (Number shown in parentheses is the reporting limit).

# Appendix C

# DATA REVIEW NARRATIVES

## Appendix D

## PICTURES FROM THE SAMPLING EPISODE

**Figure D-1. Sampler Working Inside a "Cleanbox"**

**Figure D-2. Sample Tap Splitter at the Influent to FGD Wastewater Treatment System**

**Figure D-3. Sampling Set Up at the Influent to FGD Wastewater Treatment System (SP-1)**

**Figure D-4. Sample Collection Point for the 2nd Stage Clarifier Overflow**

**Figure D-5. Sampling Set Up for the 2nd Stage Clarifier Overflow (SP-2)**

**Figure D-6. Sample Collection Point for the Effluent from the FGD Wastewater Treatment System**

**Figure D-7. Sampling Set Up at Effluent from FGD Wastewater Treatment System (SP-3)**

**Figure D-8. Sampling Set Up at Effluent from the Bottom Ash Pond (SP-4)**