Modifications, Interfaces, and Tie-Ins to Existing Equipment and Systems

Common Modifications, Interfaces, and Tie-Ins

41.0804.1.MC01 - AQCS Reserve Power Supply
41.0804.1.MC02 - Grounding
41.0804.1.MC03 - Site Fire Protection
41.0804.1.MC04 - Site
41.0804.1.MC05 - Transmission

Unit 1 Modifications, Interfaces, and Tie-Ins

41.0804.1.M101 - AQCS Power Supply
41.0804.1.M102 - Communication
41.0804.1.M103 - Control and Monitoring
41.0804.1.M104 - Buildings and Enclosures
41.0804.1.M105 - Ductwork
41.0804.1.M106 - Fly Ash
41.0804.1.M107 - Induced Draft
41.0804.1.M108 - AQCS Compressed Air
41.0804.1.M109 - Service Water
41.0804.1.M110 - Ammonia Supply

Unit 2 Modifications, Interfaces, and Tie-Ins

41.0804.1.M201 - AQCS Power Supply
41.0804.1.M202 - Communication
41.0804.1.M203 - Control and Monitoring
41.0804.1.M204 - Buildings and Enclosures
41.0804.1.M205 - Ductwork
41.0804.1.M206 - Fly Ash
41.0804.1.M207 - Induced Draft 41.0804.1.M208 - AQCS Compressed Air
41.0804.1.M109 - Service Water
41.0804.1.M110 - Ammonia Supply

Unit 3 Modifications, Interfaces, and Tie-Ins

41.0804.1.M301 - AQCS Power Supply
41.0804.1.M302 - Communication
41.0804.1.M303 - Control and Monitoring
41.0804.1.M304 - Buildings and Enclosures
41.0804.1.M305 - Ductwork
41.0804.1.M306 - Fly Ash
41.0804.1.M307 - Induced Draft
41.0804.1.M308 - AQCS Compressed Air
41.0804.1.M309 - Service Water

41.0804.1.M310 - Continuous Emission Monitoring
41.0804.1.M311 - Wet Flue Gas Desulfurization

Unit 4 Modifications, Interfaces, and Tie-Ins

41.0804.1.M401 - AQCS Power Supply
41.0804.1.M402 - Communication
41.0804.1.M403 - Control and Monitoring
41.0804.1.M404 - Buildings and Enclosures
41.0804.1.M405 - Ductwork
41.0804.1.M406 - Fly Ash
41.0804.1.M407 - Induced Draft
41.0804.1.M408 - AQCS Compressed Air
41.0804.1.M409 - Service Water
41.0804.1.M410 - Continuous Emission Monitoring
41.0804.1.M411 - WFGD Reagent Preparation
41.0804.1.M412 - WFGD Makeup Water
41.0804.1.M413 - WFGD Byproduct Dewatering
41.0804.1.M414 - Wastewater

Modifications, Interfaces, and Tie-Ins Description
Common
AQCS Reserve Power Supply System

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Power Supply System and the new Air Quality Control System (AQCS) Power Supply System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing 13.8 kV AC power supply system consists of the following equipment:

- Two 13.8 kV Auto Supply Transformers with a 345/138 KV impedance grounded wye primary winding and a 13.8 kV delta, secondary winding
- Double ended 13.8 kV Metal-clad switchgear bus, having two mains, a tie, and four feeder circuit breakers;

2.2 Description of New Infrastructure

The new Common AQCS AC power supply system shall consist of the following equipment:

- Four 4.16 kV Common AQC Reserve Switchgear,
- Two 13.8-4.16kV Common AQC Reserve Auxiliary Transformers
- 5000A and 3000A cable bus to connect the Common Reserve Auxiliary Transformer secondary to the Common 4160V AQC Reserve Switchgear.
- Extension to existing 13.8kV switchgear described above.
- Ductbank running from the existing 13.8kV switchgear to the Common AQC Reserve Auxiliary Transformers.
- There will be a manhole on either end of the ductbank.
- 15kV cable to be run in the ductbank from the Extension of the existing 13.8kV switchgear to the Common AQC Reserve Auxiliary Transformers.

3.0 Interface

15kV cable will be run in the ductbank from the extension of the existing 13.8kV switchgear to the Common AQC Reserve Auxiliary Transformers. The ductbank will be run from the 14kV Substation (Existing 13.8kV Switchgear extension), beneath the railroad track, to the Common Reserve Transformers located just East of the Unit 1&2 SDRS Building and RF Tanks. Cable bus will run from the secondary of the Common AQC Reserve Aux Transformers to the Common AQC Reserve Switchgear. The

Common Reserve 4160V Switchgear will be located in a Power Distribution Center in proximity to the Common Reserve Transformers.

4.0 Terminal Point List

The AQCS Reserve Power Supply System will have the following terminal points:

- Modification/Connection to the Existing 13.8kV Switchgear

Modifications, Interfaces, and Tie-Ins Description
Common
Grounding

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Grounding System and the new Air Quality Control System (AQCS) Grounding System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

Existing infrastructure consists of a grounding grid for the plant.

2.2 Description of New Infrastructure

The Grounding System for AQCS facilities shall provide adequate paths to permit the dissipation of ground fault currents and lightning and switching surges.

3.0 Interface

The ground grid for AQCS facilities shall be connected to the existing plant ground grid through multiple parallel paths.

4.0 Terminal Point List

The Grounding System will have the following terminal points:

- Grounding of the modification of the existing 13.8kV switchgear to existing grounding system.
- The manholes shall be grounded and tied into the existing system.
- The Common Reserve Auxiliary Transformers shall have a ground ring and ground rods that shall be tied into the existing ground grid.
- The Common Reserve Switchgear shall have a ground ring and ground rods that shall be tied into the existing ground grid.

Modifications, Interfaces, and Tie-Ins Description
Common
Fire Protection

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Fire Protection System and the new Air Quality Control System (AQCS) Fire Protection System. Actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Site Fire Protection System is supplied by two water sources: directly from the city water supply and from a 40,000 gallon city water storage tank. The city water supply supplies fire protection to the fire hydrants, valve pits, and valve houses. The city water storage tank is filled from the city water supply and provides the suction for the booster fire pumps and the booster jockey pumps that provide fire protection for the suppression systems around the plant. Service water is the backup water supply for the system.

2.2 Description of New Infrastructure

The AQCS Fire Protection System will be tied to the existing Fire Protection System. The underground piping system shall be extended to encompass new fire hydrants near the new AQCS infrastructure. A new loop will be extended from the fire pump discharge header around the new AQCS infrastructure. Two 300,000 gallon firewater tanks will be added east of Unit 1 for increased fire fighting capacity. Sprinkler systems will be supplied for all four pulse jet fabric filters and the Unit 3 and Unit 4 fly ash equipment buildings. Additionally for Unit 4 Arrangement B, the new Sample Lab, Annex Building, and new Multifunctional Warehouse and Loading Dock will contain sprinkler systems. For additional details on the new equipment, refer to the Site Fire Protection System Description (168908.41.0804.3.MC03).

3.0 Interface

New fire hydrants will be tied in to the existing underground main to the east of the units. The new loop will be tied-in to the existing fire pump discharge header located in the boiler buildings in two places. Each new firewater tanks will have individual lines that tie-in to the existing fire pump suction header. The tanks will also be tied to the existing city water supply. This tie-in will only be used for initial fill and makeup for the firewater tanks.

4.0 Terminal Point List

The Fire Protection System will have the following terminal points:

Underground Piping System:

- New hydrants will be tied in to the existing underground main east of the plant near the pipe rack that runs north-south.
- Each new firewater tank will be tied-in to the underground city water main running east-west.

Aboveground Piping System:

- Each line from the firewater tanks will be tied-in separately to the existing fire pump suction header in the boiler buildings.
- The new firewater loop will be tied-in to the existing fire pump discharge header in two places, on the south and north ends of the boiler buildings near Unit 4 and Unit 2, respectively.

Modifications, Interfaces, and Tie-Ins Description
Common
Site

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek roads, grading, and drainage and the new Air Quality Control System (AQCS) additions; actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing plant roads to be impacted are primarily to the east of the power block. The existing roads are in general asphalt paved, with the general surrounding grade gravel surfaced.

The existing plant grading will be impacted to any significant extent only in the area northeast of Unit 2 at the corner of the existing plant loop road. A significant elevation change occurs between the main plant powerblock level and the admin and parking area to the northeast. Modifications to the east loop road in this area will result in extension of the upper terrace level to the northeast to accommodate the repositioned road. All other impacts to existing grade resulting from the new AQCS additions are expected to be immediately local to new structures and minor in nature.

The existing plant drainage will not be impacted to any significant degree except locally in the immediate areas of new structures. Overall storm management and runoff flow directions and characteristics are expected to be changed only minimally.

2.2 Description of New Infrastructure

The existing plant loop road will remain the primary means of accessing new AQCS installations. The east loop road will be re-established in its current location to pass beneath the Unit 3 PJFF support structure. The corner of the loop road northeast of Unit 2 will be relocated slightly to the northeast to pass around new AQCS installations at Unit 2. Relocation of the corner will require rework of the existing main access road to the powerblock terrace to match. New access roads and driveways from the existing loop road will be established to new AQCS installations at Unit 4. AQCS additions at Unit 2 will eliminate the road to the loading dock at the existing warehouse. The loading dock and access road will be re-established either to the north side of the existing warehouse or to a new warehouse to be located in the lower terrace parking lot, depending on which arrangement is selected at Unit 4. Any parking lost due to the installation of a new warehouse will be replaced beside the new warehouse or on the powerblock terrace level north of Unit 2. Existing driveways and turnoffs from the loop road to access new AQCS

structures and buildings will be re-established upon completion of construction. Turnouts and truck unloading lanes will be added to the existing loop road adjacent to new bulk material storage silos to minimize impact on road traffic during deliveries and unloading.

In general new roads will be asphalt paved to match existing roads, although gravel surfacing may be allowed in low or infrequent traffic areas. Access to existing equipment, such as the Unit 4 ID fan maintenance area and the Reagent Prep Building, will be maintained and reflected in the new road construction. The west loop road passes through the extended turbine hall encompassing all four units, with entrances at the Unit 2 and Unit 4 ends. During construction, any modifications impacting the west loop road will be made such that at least one entrance to the extended turbine hall remains in operation at all times.

Relocation of the corner of the loop road northeast of Unit 2 will require extension of the powerblock terrace level to the northeast. The terrace will be extended using compacted structural fill, but the final dimensions of the extension cannot be determined until all equipment is sized and procured during detailed design. The existing slope from powerblock to lower terrace levels will be retained, with the toe of the slope shifted to the northeast as required to maintain the slope. The existing personnel access stair between powerblock and lower terrace level will be relocated or rebuilt as required by the relocated slope.

Existing storm drain inlets and piping may be relocated due to new installations, but their function and service areas are intended to remain generally unaffected. New culverts will be installed under new roads and driveways to maintain existing surface flow paths. The addition of new impervious surfaces such as roofs will impact runoff quantities in the immediate area of new construction but are not expected to be of a magnitude to impact the overall existing site drainage system. Local additions to existing storm drainage piping may be required as determined during detailed design, but drainage in the areas impacted by new construction are expected for the most part to be negligibly changed.

3.0 Interface

The interface will take place primarily between the loop road as modified or augmented to match new construction and existing intersecting roads. Grading and drainage interfaces will in general be in those same locations along the loop road.

4.0 Terminal Point List

The Site System will have the following terminal points:

- Existing storm drainage inlets (locations to be determined during detailed design)
- Existing and new road intersections (locations to be determined during detailed design)

Modifications, Interfaces, and Tie-Ins Description
Common
Transmission

1.0 Introduction

The purpose of this description is to describe the conceptual modification and tie-in to the Mill Creek Transmission System for the new Air Quality Control System (AQCS); actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

There are two 345 kV transmission lines that transverse the plant from west to east to the substation on the east side of the plant. The Unit 1/2 345 kV transmission line runs north of Unit 2, and the Unit 3/4 345 kV transmission line runs south of the reagent preparation building near Unit 4.

2.2 Description of New Infrastructure

The new Unit 1/2 345kV transmission line will be added to reroute the transmission line around the area to be modified for the new Unit 2 AQC equipment. The new Unit 3/4 345kV transmission line will be added to reroute the transmission line around the area to be modified for the new Unit 4 AQC equipment, if Unit 4 Arrangement A is selected.

3.0 Interface

The new 345kV transmission lines will interface to the existing 345kV transmission lines.

4.0 Terminal Point List

The Transmission System will have the following terminal points:

- The Unit 1/2 345kV transmission line relocation will require that a mid section of the transmission line is demolished, and that section replaced by a transmission line and pole that take the transmission line north, and then back south to be terminated within the existing transmission line.
- The Unit 3/4 345kV transmission line relocation will require that a mid section of the transmission line is demolished, and that section replaced by a transmission lines and poles that take the transmission line south, then run west to east, then run north and terminate within the existing transmission line near the substation.

Modifications, Interfaces, and Tie-Ins Description
Unit 1
AQCS Power Supply System

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Power Supply System and the new Air Quality Control System (AQCS) Power Supply System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing 4.16 kV Medium Voltage System does not connect to the Unit 1 AQC Auxiliary Power. The Common AQC Reserve Auxiliary System does tie-in and is discussed in 41.0804.1.MC01.

There will be a 22kV feed to the primary of the Unit 1 AQC Main Auxiliary transformer. The existing Unit 1 Isolated Phase Bus Duct (IPB) will be tapped to provide the interface from the generator to the auxiliary transformer.

2.2 Description of New Infrastructure

The new AQCS AC power supply system shall consist of the following equipment:

- 4.16 kV Switchgear,
- Main Auxiliary Transformer,
- 4.16 kV ID Fan motor soft motor starters,
- 480 volt transformers, switchgear, and motor control centers; and
- DC and Uninterruptible Power Supply (UPS) systems to provide DC power to switchgear and UPS power to the Distributed Control System (DCS).

Cable bus will provide the connections from the main auxiliary transformer to the switchgear. Cable connections will connect all other electrical loads.

3.0 Interface

A new IPB tap will have to be installed. This IPB tap will terminate at the Main Auxiliary Transformer.

4.0 Terminal Point List

The AQCS Power Supply System will have the following terminal points:

- 22kV IPB tap at the existing IPB to furnish power to the primary side of the Main Auxiliary Transformer.

Modifications, Interfaces, and Tie-Ins Description
Unit 1
Communication

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Communication systems and the new Air Quality Control System (AQCS) Communication Systems; detailed interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing public address system is a multi-channel Gai-Tronics system.

2.2 Description of New Infrastructure

The Communication System shall include a page/party public address system compatible with Gai-Tronics equipment.

3.0 Interface

The AQCS page party system shall connect to the existing Gai-Tronics system equipment.

4.0 Terminal Point List

The Communication System will have the following terminal points:

- Interface of new system to existing.
- 120VAC power.

Modifications, Interfaces, and Tie-Ins Description
Unit 1
Control and Monitoring

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Control and Monitoring System and the new Air Quality Control System (AQCS) Control and Monitoring; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing DCS is a Honeywell Experion system.

2.2 Description of New Infrastructure

The AQCS DCS shall provide a means to manually and automatically control AQCS plant components individually and as a coordinated plant system. The system will be an extension of the existing system.

3.0 Interface

The new high performance manager (HPM) processors and associated I/O modules will be connected to the existing redundant universal control network (UCN) 01.

4.0 Terminal Point List

The AQCS Power Supply System will have the following terminal points:

- Main 120 VAC UPS panel board
- General 208/120 VAC panel board

Modifications, Interfaces, and Tie-Ins Description
Unit 1
Buildings and Enclosures

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Buildings and the new Air Quality Control System (AQCS) Buildings and Enclosures; actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

Numerous miscellaneous buildings used for various purposes exist as part of the Unit 1 facility. These buildings, in general, are composed of both "stick-built" (individually-designed-and-constructed specialty structures) such as the Unit 1 Boiler Building and pre-engineered metal buildings such as the SDRS Building. These buildings consist of a metal panel exterior on a steel frame supported by a concrete foundation. Details, arrangement, and degree of finish depend on the building's intended function, but all structures protect and provide the necessary environmental control for the functions they enclose. Unit 1 and Unit 2 structures are closely related and from both internal and exterior appearances Unit 2 is a natural continuation of Unit 1.

2.2 Description of New Infrastructure

The miscellaneous buildings and structures for the Unit 1 AQCS modifications will be designed similarly to those existing and will reflect the function and arrangement of the systems they enclose or support. The new buildings and structures proposed for Unit 1 are identified as follows:

- Unit 1 Pulse Jet Fabric Filter (PJFF) Support Structure
- Unit 1 AQCS Electrical Building
- Unit 1 ID Fans Variable Frequency Drive (VFD) Enclosure
- Unit 1 Selective Catalytic Reduction (SCR) Module Support Structure
- Unit 1/Unit 2 SCR Power Distribution Center (PDC)
- Ductwork support structure

Pre-engineered metal buildings, because of their lower capital cost and versatility, will be used where practical and are proposed for the Unit 1 AQCS Electrical Building. This building will consist of a fabricated steel frame of a "standard" size and arrangement enclosed by metal panel wall and roof systems. The buildings will be insulated, include utilities but no plumbing, have an unfinished interior, and include only heating and ventilation, except where required otherwise by the system(s) enclosed.

Where practical and cost effective, small buildings housing one or two related functions provided by a single equipment vendor will be prefabricated with the equipment already installed. This type of structure is proposed for the Unit 1 ID Fan VFD Enclosure and the Unit 1/Unit 2 SCR PDC. Prefabricated enclosures usually result in a higher capital cost but a significant savings in onsite installation labor. These relatively small structures will be delivered complete for installation on a constructed foundation with any outside utilities or services required to be connected to a prefabricated terminal point on the structure. These enclosures are expected to consist of a steel frame with metal panel enclosure. Where prefabricated construction turns out to be impractical or not cost effective, the structures usually revert to pre-engineered buildings.

The PJFF Support Structure is not an enclosure per se and is required primarily as a support for the Unit 1 PJFF assembly. As such it is a very specialized structure and must be designed and constructed as a stick-built installation. The PJFF Support Structure will allow the new PJFF to be erected above the existing SDRS Building between Unit 1 and 2 scrubbers. The unenclosed structure will consist of a structural steel superstructure mounted on concrete footings.

The Unit 1 SCR module will be installed in the location currently occupied by the Unit 1 electrostatic precipitator on top of the low roof above the existing ID fans in the Unit 1 Boiler Building. Removal of the ESP will result in significant excess capacity in the existing Unit 1 structure being available for supporting the SCR. During detailed design the load removed will be evaluated versus the load to be added in this location and modifications, if required, to the existing superstructure will be determined. The resulting combination of existing building superstructure and new superstructure will provide support and access to the SCR module. This “SCR Module Support Structure” will be an integral part of the existing Unit 1 Boiler Building superstructure and will continue support of the adjacent ductwork and building enclosure as well as the SCR module. The additional superstructure will also be designed to further distribute any new loads in excess of those removed to the foundations to avoid or at least minimize modifications to the existing foundations. Final design of the modifications making up the SCR Module Support Structure must await final determination of the loads to be imposed at time of detailed design.

All new Unit 1 buildings, of whatever type, will be supported on cast-in-place concrete foundations. To minimize the foundation footprint, and thus the potential impact to existing underground utilities in the area, all foundations are expected to be supported on drilled piers rather than larger-footprint shallow footings. Further, in areas of extreme congestion where large drill rigs are unable to access, the foundations will be supported on micropiles which can be installed used in areas of limited access.

None of the new structures at Unit 1 are expected to be continuously manned. That, together with the close proximity of existing facilities, allows plumbing and sanitary utilities, interior finishes, and interior space conditioning for personnel comfort to be eliminated. However, the structures will be provided with appropriate personnel, vehicle,

and equipment maintenance access, and a Life Safety review of egress will be completed for each structure.

3.0 Interface

The AQCS Electrical Building and ID Fan VFD Enclosure will be physically and functionally separate from with little or no intended interface to existing structures. The PJFF Support Structure is specifically intended to avoid any interface, to the extent practical, with any existing structure, including the SDRS Building it straddles. Methods of construction for these buildings, especially installation of the new foundations, will be evaluated to minimize any impact of the new structure on those existing. By definition, the SCR Module Support Structure will be an integral extension of the existing Unit 1 Boiler Building, as will the support steel carrying the SCR PDC. The interface between existing and new structure will be complex and will be defined during detailed design. Depending on the service required, the new structures may receive drainage, power, or other services from existing site systems and will interface with those systems accordingly.

4.0 Terminal Point List

Specific terminal points for each of the new Unit 1 buildings and structures will be identified during detailed design.

Modifications, Interfaces, and Tie-Ins Description
Unit 1
Ductwork

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Plant Flue Gas Exhaust System and the new Air Quality Control System (AQCS) Ductwork System; actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing flue gas exhaust system downstream of the Unit 1 economizer outlet consists of a single electrostatic precipitator (ESP), two parallel vertical axis air heaters, two parallel ID fans, two parallel booster fans, and a single wet scrubber with dual inlet and discharge, plus interconnecting ductwork. Treated flue gas from the wet scrubber is discharged to a dedicated exhaust flue in a chimney shell common with Unit 2 via lined ductwork. The ductwork interior to the Boiler Building and the ESP equipment are supported from structural steel and foundation systems within the building. Exterior ductwork and downstream equipment are supported by exposed above-grade steel framing and individual concrete foundations. Ductwork is provided with expansion joints to maintain gas tight structural support throughout the equipment operating system flow and temperature range.

2.2 Description of New Infrastructure

The major equipment proposed in the Phase II AQC modifications include the physical replacement of the ESP with an SCR module, addition of sorbent and powdered activated carbon (PAC) injection systems, addition of a pulse jet fabric filter (PJFF), and replacement of the existing fans with two new parallel ID fans. The scope of Phase II work ends at the inlet flange to the existing scrubber unit. The new SCR will be located in the gas path downstream of the economizer and upstream of the air heaters. All other new equipment will be located in the gas path between the outlet of the air heater and the inlet to the scrubber module. New ductwork will be installed to interconnect all new components, plus the air heaters, and will terminate at the inlet flanges to the scrubber.

3.0 Interface

Several new interfaces will be established between existing and new equipment and several existing pieces of equipment will be eliminated from the gas path. The individual interfaces are described as follows.

- The ductwork between the economizer outlets and the air heaters will be cut and two elbows installed in each train of duct. The first elbow will connect the economizer outlet to the inlet of the new SCR, making the first interface in the exhaust path.
- The outlet from the SCR will be ducted to the second elbow installed above the air heater, resulting in separate interfaces between common SCR and the two air heaters.
- The outlet from each air heater will be ducted via new ductwork to a point outside the existing Boiler Building. In the process the two existing ID fans will be bypassed and the ESP removed to make way for the SCR module, eliminating both of those existing interfaces.
- The two trains of exhaust duct will intersect and become a single common duct in the area east of the Boiler Building. In this area sorbent injection and PAC injection will be introduced to the common duct. The common duct will then be routed to the inlet of the new PJFF, resulting in the next interface. The common duct will bypass the existing booster fans, eliminating those existing interfaces.
- A single common duct will exit the PJFF outlet and bifurcate into two parallel duct runs, one to each new ID fan.
- The outlet from each new ID fan will be routed to the existing scrubber inlet ducts, one on the north and one on the south side of the existing scrubber.

All ductwork described above will be new, and supported independently where existing ductwork supports cannot be incorporated. Ductwork will be of carbon steel construction and unlined, since temperatures and conditions upstream of the wet scrubber will not require corrosion-resistant liners. Expansion joints, slide plates, and anchor points will be provided where required to ensure gastight operation under all operating temperatures without inducing unacceptable stresses into the interfacing equipment.

4.0 Terminal Point List

The Unit 1 Ductwork terminal points list is summarized as follows, pending final confirmation at time of detailed design:

- Economizer outlet (two required)
- SCR inlet (two required)
- SCR outlet (two required)
- Air heater inlet (two required)
- Air heater outlet (two required, combine to one common duct)
- PJFF inlet (one common required). Interface with sorbent and PAC injection systems occurs upstream of this location.
- PJFF outlet (one common, split into two duct)
- ID fan inlets (two required)
- ID fan outlets (two required)
- Wet scrubber module inlets (two required).

Modifications, Interfaces, and Tie-Ins Description
Unit 1
Fly Ash

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Ash Systems and the new Air Quality Control System (AQCS) Fly Ash System. Actual interfaces will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Fly Ash System consists of pneumatic conveying lines that sequentially remove ash from the economizer breeching, air preheater gas duct, and precipitator hoppers. The ash is vacuum conveyed to an existing Fly Ash Transfer Tank which also services Unit 2. From the transfer tank, the ash is pressure conveyed to the existing east or west fly ash storage silos.

2.2 Description of New Infrastructure

The new Fly Ash System will tie into the existing Fly Ash System. The new Fly Ash System will consist of new vacuum lines that will pneumatically remove fly ash from the pulse jet fabric filter (PJFF) hoppers, SCR hoppers, the existing economizer breeching hoppers, and the air preheater gas duct hoppers. A revised sequence will be established to remove ash from the new and existing hoppers. The ash will be vacuum conveyed to the existing Unit 1 and 2 Fly Ash Transfer Tank which will be used for Unit 1 only. From the transfer tank, ash will be pressure conveyed using the existing pressure conveying system to the west silo or to a new fly ash waste silo using existing pressure conveying lines. A new branch line from the existing pressure conveying line to the new silo will be provided. The existing Unit 1 vacuum exhausters, pressure blowers, and ash pick-up valves may be used in the new system depending on the condition and capacity of the existing equipment. This will be identified during detailed design.

3.0 Interface

To construct the new SCR, the existing precipitator will be demolished. The duct to the precipitator hoppers will be disconnected and extended to the PJFF hoppers as well as any intermediate duct hoppers. The ash lines from the SCR hoppers will tie into the lines from the economizer breeching hoppers. A preliminary review indicates that the existing fly ash system transfer tank and pneumatic conveying system can accommodate the AQCS additions without modification. This will be confirmed during detailed design.

4.0 Terminal Point List

The new Fly Ash System will have the following terminal points:

- PJFF hopper flanges
- Existing Unit 1 economizer breeching ash vacuum line.
- Existing Unit 1 and 2 Fly Ash Transfer Tank.

Modifications, Interfaces, and Tie-Ins Description
Unit 1
Induced Draft

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Induced Draft Systems and the new Induced Draft System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Induced Draft System consists of two induced draft (ID) fans and two booster fans to maintain furnace draft pressure and to overcome the draft system resistance. The ID fans are driven by 2,500 hp, 720 rpm motors and hydrokinetic fluid drives that allow variable speed operation. The booster fans are driven by 3,000 hp, 900 rpm motors with hydrokinetic fluid drives as well. The existing draft system consists of the boiler, air heaters, an electrostatic precipitator (ESP) system, ID fans, booster fans, wet flue gas desulfurization (WFGD) system, and associated ductwork, dampers, and other supporting equipment.

2.2 Description of New Infrastructure

The new Induced Draft System shall consist of two new ID fans designed to maintain furnace draft pressure and to overcome the resistance of the new draft system. The new ID fans would be driven by approximately 9,400 hp motors with variable frequency drives for variable speed control. The new draft system would consist of the existing boiler, a new selective catalytic reduction (SCR) system with an economizer bypass, the existing air heaters, a new pulse jet fabric filter (PJFF) system, new ID fans, refurbished WFGD system, and associated new and existing ductwork, dampers, and other supporting equipment.

3.0 Interface

The new ID fans shall be connected to the new ductwork at the outlet of the new PJFF system and the new ductwork entering the refurbished WFGD system. The new variable frequency drives shall be supplied with new power feeds and connections to the existing DCS to allow control of furnace pressure. The new variable frequency drives and new lube oil skids may be cooled by ambient air or by plant cooling water. For the basis of the cost estimate, the drives and skids will be ambient air cooled.

4.0 Terminal Point List

The Induced Draft System will have the following terminal points:

- Ductwork outlet of the new PJFF system
- Ductwork inlet of the refurbished WFGD system
- Existing ID fan DCS controls
- New ID fan medium voltage power feeds to variable frequency drives
- New ID fan low voltage power feeds to variable frequency drives, lube oil skids, and other accessories

Modifications, Interfaces, and Tie-Ins Description
Unit 1
AQCS Compressed Air

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Air Systems and the new Air Quality Control System (AQCS) Compressed Air System. Actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing air systems provide station air and instrument air to the existing plant infrastructure.

2.2 Description of New Infrastructure

The AQCS Compressed Air Systems will provide the clean, dry, oil free compressed air at an adequate pressure and adequate capacity for the pulse jet fabric filter, sonic horns, actuators, controls, instrumentation, and other air users in the AQCS addition.

3.0 Interface

A cross tie will be provided between the existing air systems and the new AQCS Compressed Air Systems. A cross-tie with the existing Station Air System will be provided by tying in before the new air filter/dryer skid. In addition, a cross tie with the existing Instrument Air System will be provided by tying in after the AQCS compressed air receiver. The existing Station Air and Instrument Air lines going to the precipitator room will be valved out and capped. Each cross-tie will be furnished with a manual isolation valve.

4.0 Terminal Point List

The AQCS Compressed Air System will have the following terminal points:

- The AQCS Compressed Air System will tie in to the Station Air system near the existing emergency cross-tie with the Instrument Air System.

- The AQCS Compressed Air System will tie in to the Instrument Air system near the existing emergency cross-tie with Station Air System.

Modifications, Interfaces, and Tie-Ins Description
Unit 1
Service Water

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Service Water System and the new Air Quality Control System (AQCS) Service Water System. Actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Service Water System withdraws river water from the Ohio River through the screenhouse intake structure and provides cooling, wash, makeup, back-up fire protection, quench, seal, and sluicing water to all Mill Creek station users. The screenhouse intake structure includes four long shaft service pumps, four traveling water screens, and two service water booster pumps.

2.2 Description of New Infrastructure

The Service Water System will extend existing service water systems for hose stations, makeup, and seal water for equipment in the AQCS areas. Existing service water quality will be sufficient to protect the AQCS systems.

3.0 Interface

A service water connection shall be supplied between existing Service Water System and AQCS Service Water System.

4.0 Terminal Point List

The AQCS Service Water System will have the following terminal points:

- The AQCS Service Water for Unit 1 will tie into the 12” Units 1 and 2 SDRS service water header near the Unit 1 and 2 cooling water heat exchangers.

Modifications, Interfaces, and Tie-Ins Description
Unit 1
Ammonia Supply

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek existing Ammonia Storage and Supply System and the new Unit 1 Ammonia Supply System. Actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Ammonia System consists of the following equipment:

- Two ammonia tanker truck unloading stations.
- Two 60,000 gallon anhydrous ammonia storage tanks.
- Two full capacity ammonia pumps.
- A common supply header to Units 3 & 4 SCRs.
- Four half capacity Ammonia Injection skids, two located at Unit 3 SCR and the other two located at Unit 4.

2.2 Description of New Infrastructure

Unit 1 Ammonia Supply System will consist of the following equipment:

- One ammonia injection skid includes two full capacity mass flow meters and ammonia flow control valve trains.
- Two full capacity ammonia dilution air blowers common for Unit 1 and Unit 2 SCRs.
- Two full capacity steam coil air heaters common for Unit 1 and Unit 2 SCRs.

Unit 1 Ammonia Supply System equipment will be located as follows.

- Unit 1 ammonia injection skid will be located at the unit 1 SCR reactor area.
- Common ammonia dilution air blowers and steam coil air heaters will be located between Unit 1 and Unit 2 SCR reactors.

3.0 Interface

Unit 1 Ammonia Supply System will cross tie with the existing Ammonia Storage and Supply System at the above ground to below ground interface at Unit 3. The piping will then run above grade to Unit 1 and 2 SCRs.

The steam supplied to the common Unit 1 and Unit 2 ammonia dilution steam coil air heaters will cross tie with the existing steam header.

4.0 Terminal Point List

The Ammonia Supply System will have the following terminal points:

- Tie into existing ammonia supply header for Units 3 and 4.
- Tie into existing station auxiliary steam header.

Modifications, Interfaces, and Tie-Ins Description
Unit 2
AQCS Power Supply System

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Power Supply System and the new Air Quality Control System (AQCS) Power Supply System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing 4.16 kV Medium Voltage System does not connect to the Unit 2 AQC Auxiliary Power. The Common AQC Reserve Auxiliary System does tie-in and is discussed in 41.0804.1.MC01.

There will be a 22kV feed to the primary of the Unit 2 AQC Main Auxiliary transformer. The existing Unit 2 Isolated Phase Bus Duct (IPB) will be tapped to provide the interface from the generator to the auxiliary transformer.

2.2 Description of New Infrastructure

The new AQCS AC power supply system shall consist of the following equipment:

- 4.16 kV Switchgear,
- Main Auxiliary Transformer.
- 4.16 kV ID Fan motor soft motor starters,
- 480 volt transformers, switchgear, and motor control centers; and
- DC and Uninterruptible Power Supply (UPS) systems to provide DC power to switchgear and UPS power to the Distributed Control System (DCS).

Cable bus will provide the connections from the main auxiliary transformer to the switchgear. Cable connections will connect all other electrical loads.

3.0 Interface

A new IPB tap will have to be installed. This IPB tap will terminate at the Main Auxiliary Transformer.

4.0 Terminal Point List

The AQCS Power Supply System will have the following terminal points:

- 22kV IPB tap at the existing IPB to furnish power to the primary side of the Main Auxiliary Transformer.

Modifications, Interfaces, and Tie-Ins Description
Unit 2
Communication

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Communication systems and the new Air Quality Control System (AQCS) Communication Systems; detailed interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing public address system is a multi-channel Gai-Tronics system.

2.2 Description of New Infrastructure

The Communication System shall include a page/party public address system compatible with Gai-Tronics equipment.

3.0 Interface

The AQCS page party system shall connect to the existing Gai-Tronics system equipment.

4.0 Terminal Point List

The Communication System will have the following terminal points:

- Interface of new system to existing.
- 120VAC power.

Modifications, Interfaces, and Tie-Ins Description
Unit 2
Control and Monitoring

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Control and Monitoring System and the new Air Quality Control System (AQCS) Control and Monitoring; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing DCS is a Honeywell Experion system.

2.2 Description of New Infrastructure

The AQCS DCS shall provide a means to manually and automatically control AQCS plant components individually and as a coordinated plant system. The system will be an extension of the existing system.

3.0 Interface

The new high performance manager (HPM) processors and associated I/O modules will be connected to the existing redundant universal control network (UCN) 01.

4.0 Terminal Point List

The AQCS Power Supply System will have the following terminal points:

- Main 120 VAC UPS panel board
- General 208/120 VAC panel board

Modifications, Interfaces, and Tie-Ins Description
Unit 2
Buildings and Enclosures

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Buildings and the new Air Quality Control System (AQCS) Buildings and Enclosures; actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

Numerous miscellaneous buildings used for various purposes exist as part of the Unit 2 facility. These buildings, in general, are composed of both "stick-built" (individually-designed-and-constructed specialty structures) such as the Unit 2 Boiler Building and pre-engineered metal buildings such as the Unit 1 Auxiliary Boiler Building. These buildings consist of a metal panel exterior on a steel frame supported by a concrete foundation. Details, arrangement, and degree of finish depend on the building's intended function, but all structures protect and provide the necessary environmental control for the functions they enclose. The exterior of the buildings are to some extent coordinated for a pleasing aesthetic appearance throughout the site. Unit 1 and Unit 2 structures are closely related and from both internal and exterior appearances Unit 2 is a natural continuation of Unit 1.

An existing 345kV Unit 1/2 transmission line runs overhead along the east and north side of Unit 2, through areas that will be in use during construction of Unit 2, if not actually occupied by new Unit 2 structures.

2.2 Description of New Infrastructure

The miscellaneous buildings and structures for the Unit 2 AQCS modifications will be designed similarly to those existing and will reflect the function and arrangement of the systems they enclose or support. The new buildings and structures proposed for Unit 2 are identified as follows:

- Unit 1 & 2 Common Fly Ash Handling Building
- Unit 2 and Common AQCS Electrical Building
- Unit 2 ID Fans Variable Frequency Drive (VFD) Enclosure
- Unit 2 Selective Catalytic Reduction (SCR) Module Support Structure.
- Ductwork support structure.

Pre-engineered metal buildings, because of their lower capital cost and versatility, will be used where practical and are proposed for the Unit 1 & 2 Common Fly Ash Handling

Building and the Unit 2 and Common AQCS Electrical Building. These buildings consist of a fabricated steel frame of a "standard" size and arrangement enclosed by metal panel wall and roof systems. The buildings will be insulated, include utilities but no plumbing, have an unfinished interior, and include only heating and ventilation, except where required otherwise the system(s) enclosed.

Where practical and cost effective, small buildings housing one or two related functions provided by a single equipment vendor will be prefabricated with the equipment already installed. This type of structure is proposed for the Unit 2 ID Fan Variable Frequency Drive Enclosure. Prefabricated enclosures usually result in a higher capital cost but a significant savings in onsite installation labor. This relatively small structure will be delivered complete for installation on a constructed foundation with any outside utilities or services required to be connected to a prefabricated terminal point on the structure. This enclosure is expected to consist of a steel frame with metal panel enclosure. Where prefabricated construction turns out to be impractical or not cost effective, the structures usually revert to pre-engineered buildings.

The Unit 2 SCR module will be installed in the location currently occupied by the Unit 2 electrostatic precipitator on top of the low roof above the existing ID fans in the Unit 2 Boiler Building. Removal of the ESP will result in significant excess capacity in the existing Unit 2 structure being available for supporting the SCR. During detailed design the load removed will be evaluated versus the load to be added in this location and modifications, if required, to the existing superstructure will be determined. The resulting combination of existing building superstructure and new superstructure will provide support and access to the SCR module. This "SCR Module Support Structure" will be an integral part of the existing Unit 2 Boiler Building superstructure and will continue support of the adjacent ductwork and building enclosure as well as the SCR module. The additional superstructure will also be designed to further distribute any new loads in excess of those removed to the foundations to avoid or at least minimize modifications to the existing foundations. Final design of the modifications making up the SCR Module Support Structure must await final determination of the loads to be imposed at time of detailed design.

All new Unit 2 miscellaneous buildings, of whatever type, will be supported on cast-in-place concrete foundations. To minimize the foundation footprint, and thus the potential impact to existing underground utilities in the area, all foundations are expected to be supported on drilled piers rather than larger-footprint shallow footings. Further, in areas of extreme congestion where large drill rigs are unable to access, the foundations will be supported on micropiles which can be installed used in areas of limited access.

None of the new structures at Unit 2 are expected to be continuously manned. That, together with the close proximity of existing facilities, allows plumbing and sanitary utilities, interior finishes, and the interior space conditioning for personnel comfort to be eliminated. However, the structures will be provided with appropriate personnel, vehicle, and equipment maintenance access, and a Life Safety review of egress will be completed for each structure. To the extent practical, the exteriors of the Unit 2 miscellaneous

buildings will be coordinated to complement and match the appearances and colors of the existing site buildings.

3.0 Interface

The Unit 1 and 2 Ash Handling Building, Unit 2 and Common AQCS Electrical Building, and Unit 2 ID Fan VFD Enclosure will be physically and functionally separate with little or no intended interface to existing structures. Methods of construction, especially installation of the new foundations, will be evaluated to minimize any impact of the new structure on those existing. By definition, the SCR Module Support Structure will be an integral extension of the existing Unit 2 Boiler Building. The interface between existing and new structure will be complex and will be defined during detailed design. Depending on the service required, the new structures may receive drainage, power, or other services from existing site systems and will interface with those systems accordingly.

Installation of the Unit 2 AQCS equipment will require the footprint currently occupied by the Unit 1 Auxiliary Boiler Building. This structure was previously re-purposed for use as storage and exists primarily as a shell. This existing building will be demolished and not replaced as part of the Unit 2 AQCS installation.

Installation of the Unit 2 AQCS equipment will also require the 345kV Unit 1/2 transmission line to be re-routed around the Unit 2 construction area. Relocation of the overhead line will occur prior to start of construction in the area.

Unit 2 equipment will also block access to the existing loading dock located east of the existing warehouse. The loading dock will no longer be useable in this location and it will either be abandoned in place or relocated to a more accessible location. The location of the loading dock will correspond to the ultimate location of the plant warehouse (refer to the Modifications, Interfaces, and Tie-ins Description for Unit 4, File 41.0804.1.M404 for further description).

4.0 Terminal Point List

Specific terminal points for each of the new Unit 2 buildings and structures will be identified during detailed design.

Modifications, Interfaces, and Tie-Ins Description
Unit 2
Ductwork

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Plant Flue Gas Exhaust System and the new Air Quality Control System (AQCS) Ductwork System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing flue gas exhaust system downstream of the Unit 2 economizer outlet consists of a single electrostatic precipitator (ESP), two parallel vertical axis air heaters, two parallel ID fans, two parallel booster fans, and a single wet scrubber with dual inlet and discharge, plus interconnecting ductwork. Treated flue gas from the wet scrubber is discharged to a dedicated exhaust flue in a chimney shell common with Unit 1 via lined ductwork. The ductwork interior to the Boiler Building and ESP equipment are supported from structural steel and foundation systems within the building. Exterior ductwork and downstream equipment are supported by exposed above-grade steel framing and individual concrete foundations. Ductwork is provided with expansion joints to maintain gas tight structural support throughout the equipment operating system flow and temperature range.

2.2 Description of New Infrastructure

The major equipment proposed in the Phase II AQC modifications include the physical replacement of the ESP with an SCR module, addition of sorbent and powdered activated carbon (PAC) injection systems, addition of a pulse jet fabric filter (PJFF), and replacement of the existing fans with two new parallel ID fans. The scope of Phase II work ends at the inlet flange to the existing scrubber unit. The new SCR will be located in the gas path downstream of the economizer and upstream of the air heaters. All other new equipment will be located in the gas path between the outlet of the air heater and the inlet to the scrubber module. New ductwork will be installed to interconnect all new components, plus the air heaters, and will terminate at the inlet flanges to the scrubber.

3.0 Interface

Several new interfaces will be established between existing and new equipment and several existing pieces of equipment will be eliminated from the gas path. The individual interfaces are described as follows.

- The ductwork between the economizer outlets and the air heaters will be cut and two elbows installed in each train of duct. The first elbow will connect the economizer outlet to the inlet of the new SCR, making the first interface in the exhaust path.
- The outlet from the SCR will be ducted to the second elbow installed above the air heater, resulting in separate interfaces between common SCR and the two air heaters.
- The outlet from each air heater will be ducted via new ductwork to a point outside the existing Boiler Building. In the process the two existing ID fans will be bypassed and the ESP removed to make way for the SCR module, eliminating both of those existing interfaces.
- The two trains of exhaust duct will intersect and become a single common duct in the area east of the Boiler Building. In this area sorbent injection and PAC injection will be introduced to the common duct. The common duct will then be routed to the inlet of the new PJFF, resulting in the next interface. The common duct will bypass the existing booster fans, eliminating those existing interfaces.
- A single common duct will exit the PJFF outlet and bifurcate into two parallel duct runs, one to each new ID fan.
- The outlet from each new ID fan will be routed to the existing scrubber inlet ducts, one on the north and one on the south side of the existing scrubber.

All ductwork described above will be new, and supported independently where existing ductwork supports cannot be incorporated. Ductwork will be of carbon steel construction and unlined, since temperatures and conditions upstream of the wet scrubber will not require corrosion-resistant liners. Expansion joints, slide plates, and anchor points will be provided where required to ensure gastight operation under all operating temperatures without inducing unacceptable stresses into the interfacing equipment.

4.0 Terminal Point List

The Unit 2 Ductwork terminal points list is summarized as follows, pending final confirmation at time of detailed design:

- Economizer outlet (two required)
- SCR inlet (two required)
- SCR outlet (two required)
- Air heater inlet (two required)
- Air heater outlet (two required, combine to one common duct)
- PJFF inlet (one common required). Interface with sorbent and PAC injection systems occurs upstream of this location.
- PJFF outlet (one common, split into two duct)
- ID fan inlets (two required)
- ID fan outlets (two required)
- Wet scrubber module inlets (two required)

Modifications, Interfaces, and Tie-Ins Description
Unit 2
Fly Ash

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Ash Systems and the new Air Quality Control System (AQCS) Fly Ash System. Actual interfaces will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Fly Ash System consists of pneumatic conveying lines that sequentially remove ash from the economizer breeching, air preheater gas duct, and precipitator hoppers. The ash is vacuum conveyed to an existing Fly Ash Transfer Tank which also services Unit 1. From the transfer tank, the ash is pressure conveyed to the existing east or west fly ash storage silos.

2.2 Description of New Infrastructure

The new Fly Ash System will consist of new vacuum conveying lines that will pneumatically remove fly ash from the pulse jet fabric filter (PJFF) hoppers, SCR hoppers, the existing economizer breeching hoppers, and the air preheater gas duct hoppers. A new sequence will be established to remove ash from the new and existing hoppers. The ash will be transported to a new Unit 2 Fly Ash Transfer Tank. From the transfer tank, the ash will be transported to the west silo or to a new fly ash waste silo via a new pressure conveying system utilizing a single pressure conveying line. The existing Unit 2 vacuum exhausters and ash pick-up valves may be used in the new system depending on the condition and capacity of the existing equipment. This will be identified during detailed design.

3.0 Interface

To construct the new SCR, the existing precipitator will be demolished. The existing vacuum conveying system connections to the precipitator hoppers will be abandoned. New vacuum conveying lines will connect to the PJFF hoppers as well as any intermediate duct hoppers, as required. The ash lines from the SCR hoppers will tie into the lines coming from the economizer breeching hoppers. Existing lines to these intermediate hoppers will be used where practical as determined during detailed design. A new main pressure line will be provided to connect the transfer tank to the storage silos including a branch line to the new ash silo.

4.0 Terminal Point List

The new Fly Ash System will have the following terminal points:

- PJFF hopper flanges
- New fly ash silo dry ash spout discharge and conditioned ash discharge.

Modifications, Interfaces, and Tie-Ins Description
Unit 2
Induced Draft

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Induced Draft Systems and the new Induced Draft System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Induced Draft System consists of two induced draft (ID) fans and two booster fans to maintain furnace draft pressure and to overcome the draft system resistance. The ID fans are driven by 2,500 hp, 720 rpm motors and hydrokinetic fluid drives that allow variable speed operation. The booster fans are driven by 3,000 hp, 900 rpm motors with hydrokinetic fluid drives as well. The existing draft system consists of the boiler, air heaters, an electrostatic precipitator (ESP) system, ID fans, booster fans, wet flue gas desulfurization (WFGD) system, and associated ductwork, dampers, and other supporting equipment.

2.2 Description of New Infrastructure

The new Induced Draft System shall consist of two new ID fans designed to maintain furnace draft pressure and to overcome the resistance of the new draft system. The new ID fans would be driven by approximately 9,400 hp motors with variable frequency drives for variable speed control. The new draft system would consist of the existing boiler, a new selective catalytic reduction (SCR) system with an economizer bypass, the existing air heaters, a new pulse jet fabric filter (PJFF) system, new ID fans, refurbished WFGD system, and associated new and existing ductwork, dampers, and other supporting equipment.

3.0 Interface

The new ID fans shall be connected to the new ductwork at the outlet of the new PJFF system and the new ductwork entering the refurbished WFGD system. The new variable frequency drives shall be supplied with new power feeds and connections to the existing DCS to allow control of furnace pressure. The new variable frequency drives and new lube oil skids may be cooled by ambient air or by plant cooling water. For the basis of the cost estimate, the drives and skids will be ambient air cooled.

4.0 Terminal Point List

The Induced Draft System will have the following terminal points:

- Ductwork outlet of the new PJFF system
- Ductwork inlet of the refurbished WFGD system
- Existing ID fan DCS controls
- New ID fan medium voltage power feeds to variable frequency drives
- New ID fan low voltage power feeds to variable frequency drives, lube oil skids, and other accessories

Modifications, Interfaces, and Tie-Ins Description
Unit 2
AQCS Compressed Air

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Air Systems and the new Air Quality Control System (AQCS) Compressed Air System. Actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing air systems provide station air and instrument air to the existing plant infrastructure.

2.2 Description of New Infrastructure

The AQCS Compressed Air Systems will provide the clean, dry, oil free compressed air at an adequate pressure and adequate capacity for the pulse jet fabric filter, sonic horns, actuators, controls, instrumentation, and other air users in the AQCS addition.

3.0 Interface

A cross tie will be provided between the existing air systems and the new AQCS Compressed Air Systems. A cross-tie with the existing Station Air System will be provided by tying in before the new air filter/dryer skid. In addition, a cross tie with the existing Instrument Air System will be provided by tying in after the AQCS compressed air receiver. The existing Station Air and Instrument Air lines going to the precipitator room will be valved out and capped. Each cross-tie will be furnished with manual isolation valves.

4.0 Terminal Point List

The AQCS Compressed Air System will have the following terminal points:

- The AQCS Compressed Air System will tie in to the Station Air system near the existing emergency cross-tie with the Instrument Air System.

- The AQCS Compressed Air System will tie in to the Instrument Air system near the existing emergency cross-tie with Station Air System.

Modifications, Interfaces, and Tie-Ins Description
Unit 2
Service Water

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Service Water System and the new Air Quality Control System (AQCS) Service Water System. Actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Service Water System withdraws river water from the Ohio River through the screenhouse intake structure and provides cooling, wash, makeup, back-up fire protection, quench, seal, and sluicing water to all Mill Creek station users. The screenhouse intake structure includes four long shaft service pumps, four traveling water screens, and two service water booster pumps.

2.2 Description of New Infrastructure

The Service Water System will extend existing service water systems for hose stations, makeup, and seal water for equipment in the AQCS areas. Existing service water quality will be sufficient to protect the AQCS systems.

3.0 Interface

A service water connection shall be supplied between existing Service Water System and AQCS Service Water System.

4.0 Terminal Point List

The AQCS Service Water System will have the following terminal points:

- The AQCS Service Water for Unit 2 will tie into the 12” Units 1 and 2 SDRS service water header near the Unit 1 and 2 cooling water heat exchangers.

Modifications, Interfaces, and Tie-Ins Description
Unit 2
Ammonia Supply

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek existing Ammonia Storage and Supply System and the new Unit 2 Ammonia Supply System. Actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Ammonia System consists of the following equipment:

- Two ammonia tanker truck unloading stations.
- Two 60,000 gallon anhydrous ammonia storage tanks.
- Two full capacity ammonia pumps.
- A common supply header to Units 3 & 4 SCRs.
- Four half capacity Ammonia Injection skids, two located at Unit 3 SCR and the other two located at Unit 4.

2.2 Description of New Infrastructure

Unit 2 Ammonia Supply System will consist of the following equipment:

- One ammonia injection skid includes two full capacity mass flow meters and ammonia flow control valve trains.
- Two full capacity ammonia dilution air blowers common for Unit 1 and Unit 2 SCRs.
- Two full capacity steam coil air heaters common for Unit 1 and Unit 2 SCRs.

Unit 2 Ammonia Supply System equipment will be located as follows.

- Unit 2 ammonia injection skids will be located at the Unit 2 SCR reactor area.
- Common ammonia dilution air blowers and steam coil air heaters will be located between Unit 1 and Unit 2 SCR reactors.

3.0 Interface

Unit 2 Ammonia Supply System will cross tie with the existing Ammonia Storage and Supply System at the above ground to below ground interface at Unit 3. The piping will then run above grade to Unit 1 and 2 SCRs.

The steam supplied to the common Unit 1 and Unit 2 ammonia dilution steam coil air heaters will cross tie with the existing steam header.

4.0 Terminal Point List

The Ammonia Supply System will have the following terminal points:

- Tie into existing ammonia supply header for Units 3 and 4.
- Tie into existing station auxiliary steam header.

Modifications, Interfaces, and Tie-Ins Description
Unit 3
AQCS Power Supply System

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Power Supply System and the new Air Quality Control System (AQCS) Power Supply System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing 4.16 kV Medium Voltage System does not connect to the Unit 3 AQC Auxiliary Power. The Common AQC Reserve Auxiliary System does tie-in and is discussed in 41.0804.1.MC01.

The Unit 4 scrubber will be used for Unit 3. The auxiliary electrical systems associated with the Unit 4 scrubber are presently powered by the existing Unit 4, 4.16 kV Switchgear. The medium voltage feeder cable from the existing Unit 4 to the existing Unit 4 scrubber loads will be abandoned. There will be a new feed to this equipment from the existing Unit 3 switchgear. The Unit 3 feeder breaker that powers existing Unit 3 scrubber loads will be used to power what is now the Unit 4 scrubber loads. The Unit 3 medium voltage cable feeding existing scrubber loads will be abandoned.

There will be a 22kV feed to the primary of the Unit 3 AQC Main Auxiliary transformer. The existing Unit 3 Isolated Phase Bus Duct (IPB) will be tapped to provide the interface from the generator to the auxiliary transformer.

2.2 Description of New Infrastructure

The new AQCS AC power supply system shall consist of the following equipment:

- 4.16 kV Switchgear,
- Main Auxiliary Transformer.
- 4.16 kV ID Fan motor soft motor starters,
- 480 volt transformers, switchgear, and motor control centers; and
- DC and Uninterruptible Power Supply (UPS) systems to provide DC power to switchgear and UPS power to the Distributed Control System (DCS).

Cable bus will provide the connections from the main auxiliary transformer to the switchgear. Cable connections will connect all other electrical loads.

3.0 Interface

A new IPB tap will have to be installed. This IPB tap will terminate at the Main Auxiliary Transformer.

Two feeds from existing Unit 3, 4160V switchgear will be installed to power the existing Unit 4 scrubber loads.

4.0 Terminal Point List

The AQCS Power Supply System will have the following terminal points:

- 22kV IPB tap at the existing IPB to furnish power to the primary side of the Main Auxiliary Transformer.
- Feeds from existing Unit 3 switchgear to Unit 4 scrubber loads.

Modifications, Interfaces, and Tie-Ins Description
Unit 3
Communication

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Communication systems and the new Air Quality Control System (AQCS) Communication Systems; detailed interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing public address system is a multi-channel Gai-Tronics system.

2.2 Description of New Infrastructure

The Communication System shall include a page/party public address system compatible with Gai-Tronics equipment.

3.0 Interface

The AQCS page party system shall connect to the existing Gai-Tronics system equipment.

4.0 Terminal Point List

The Communication System will have the following terminal points:

- Interface of new system to existing.
- 120VAC power.

Modifications, Interfaces, and Tie-Ins Description
Unit 3
Control and Monitoring

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Control and Monitoring System and the new Air Quality Control System (AQCS) Control and Monitoring; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing DCS is a Honeywell Experion system.

2.2 Description of New Infrastructure

The AQCS DCS shall provide a means to manually and automatically control AQCS plant components individually and as a coordinated plant system. The system will be an extension of the existing system.

3.0 Interface

The new high performance manager (HPM) processors and associated I/O modules will be connected to the existing redundant universal control networks (LCNs) 03 and 13. The existing Unit 4 Scrubber HPM 25 and HPM 27/28 will be switched over to Unit 3 DCS UCN 03 and 13.

4.0 Terminal Point List

The AQCS Power Supply System will have the following terminal points:

- Main 120 VAC UPS panel board
- General 208/120 VAC panel board

Modifications, Interfaces, and Tie-Ins Description
Unit 3
Buildings and Enclosures

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Buildings and the new Air Quality Control System (AQCS) Buildings and Enclosures; actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

Based on the recommendations proposed by the Phase II Study, modifications to the existing Unit 3 facility will be concentrated downstream of the existing Unit 3 ID fans and will involve components from both Unit 3 and Unit 4. The Unit 3 wet scrubber will be demolished to make way for a new Unit 3 PJFF and the existing Unit 4 wet scrubber and chimney will be re-purposed for use by Unit 3. All Unit 3 AQC components upstream of the ID fans will remain unmodified and in service. The existing Unit 3 wet scrubber is a "stick-built" (individually-designed-and-constructed specialty) structure with extensive below-grade concrete substructure. The Unit 4 wet scrubber will be refurbished and upgraded for service as a Unit 3 component, keeping its dedicated chimney intact for discharge of treated gas from Unit 3. An existing pre-engineered metal building housing switchgear and electrical equipment for the Unit 4 wet scrubber will remain in place to serve the scrubber when its function is revised for Unit 3. With the exception of some ductwork and other ancillary facilities, these are the major buildings and structures impacted by modifications to the Unit 3 AQC system

2.2 Description of New Infrastructure

The miscellaneous buildings and structures for Unit 3 will be designed similarly to those existing and will reflect the function and arrangement of the systems they enclose or support. The new buildings and structures proposed for Unit 3 are identified as follows:

- Unit 3 Pulse Jet Fabric Filter (PJFF) Support Structure
- Unit 3 Fly Ash Handling Building
- Unit 3 AQCS Electrical Building
- Unit 3 Booster Fans Variable Frequency Drive (VFD) Enclosure
- Ductwork support structure.

Pre-engineered metal buildings, because of their lower capital cost and versatility, will be used where practical and are proposed for the Unit 3 Fly Ash Handling and AQCS Electrical Buildings. These buildings consist of a fabricated steel frame of a "standard" size and arrangement enclosed by metal panel wall and roof systems. The buildings will

be insulated, include utilities but no plumbing, have an unfinished interior, and only heating and ventilation, except as otherwise required by the system(s) enclosed.

Where practical and cost effective, small buildings housing one or two related functions provided by a single equipment vendor will be prefabricated with the equipment already installed. This type of structure is proposed for the Unit 3 Booster Fans Variable Frequency Drive Enclosure. Prefabricated enclosures usually result in a higher capital cost but a significant savings in onsite installation labor. This relatively small structure will be delivered complete for installation on a constructed foundation with any outside utilities or services required to be connected to a prefabricated terminal point on the structure. This enclosure is expected to consist of a steel frame with metal panel enclosure. Where prefabricated construction turns out to be impractical or not cost effective, the structures usually revert to pre-engineered buildings.

The pre-engineered and prefabricated buildings will be supported on cast-in-place concrete foundations. To minimize the foundation footprint, and thus the potential impact to existing underground utilities in the area, all foundations are expected to be supported on drilled piers rather than larger-footprint shallow footings. Further, in areas of extreme congestion where large drill rigs are unable to access, the foundations will be supported on micropiles which can be installed used in areas of limited access.

The PJFF Support Structure is not an enclosure per se and is required primarily as a supports for the Unit 3 PJFF assembly. As such it is a very specialized structure and must be designed and constructed as a stick-built installation. The PJFF Support Structure will allow the new PJFF to span across the main east loop road without impacting normal traffic. Columns will be stopped short of the existing coal delivery loop track on the east side of the road, although portions of the unused rail spur west of the rail loop may be demolished if required. The elevation of the superstructure will provide a minimum of 16’-6” clear distance between the road surface elevation of the east loop road and the bottom of steel superstructure above. The remaining area under the support structure west of the road will be reserved for the Unit 3 Fly Ash Handling Building and associated equipment. As an unenclosed structure, no HVAC would be required for the PJFF Support Structure.

The configuration of the foundation for the PJFF Support Structure will be determined during detailed design. The substructure under the existing wet scrubber must be filled, modified, or demolished to allow installation of the foundation for the Support Structure. Until loads and orientation of the new PJFF are available, the best means of installing the new foundation in place of the existing superstructure cannot be determined. Foundations outside the footprint of the existing substructure will be supported on drilled piers.

None of the new structures at Unit 3 are expected to be continuously manned. That, together with the close proximity of existing facilities, allows plumbing and sanitary utilities, interior finishes, and the interior space conditioning for personnel comfort to be eliminated. However, the structures will be provided with personnel, vehicle, and

equipment maintenance access, and a Life Safety review of egress will be completed for each structure. To the extent practical, the exteriors of the Unit 3 miscellaneous buildings will be coordinated to complement and match the appearances and colors of the existing miscellaneous site buildings.

3.0 Interface

Once the existing Unit 3 wet scrubber and its superstructure have been demolished or incorporated into the foundations for the new structures, the new Unit 3 buildings and structures will be physically and functionally separate with little or no intended direct interface to existing structures. Methods of construction, especially installation of the new foundations, will be evaluated to minimize any impact of the new structure on the existing facilities other than the demolished wet scrubber. Depending on the service required, the new structures may receive drainage, power, or other services from existing site systems and will interface with those systems accordingly.

Installation of the PJFF Support Structure will temporarily interrupt traffic along the east plant loop road. Detours or other accommodations in routing traffic around the construction area must be made accordingly until the support structure and the PJFF above are complete. The foundations supporting the east end of the PJFF Support structure may also require partial demolition of the rail spur located just west of the main coal delivery loop. This spur is not currently in use and its partial demolition is not considered significant to plant operations. Neither the physical components not the operation of the existing coal delivery rail loop will be impacted by the installation of the PJFF Support Structure.

4.0 Terminal Point List

Specific terminal points for each of the new Unit 3 buildings and structures will be identified during detailed design

Modifications, Interfaces, and Tie-Ins Description
Unit 3
Ductwork

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Plant Flue Gas Exhaust System and the new Air Quality Control System (AQCS) Ductwork System; actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing flue gas exhaust system downstream of Unit 3 boiler consists of two exhaust trains, each with the following components: one selective catalytic reduction (SCR) system, one vertical axis regenerative air heater, one electrostatic precipitator (ESP), one ID fan, and interconnecting ductwork. Each ID fan is ducted to an inlet to the common Unit 3 wet scrubber. A single common outlet from the scrubber module is directed to the Unit 3 chimney inlet. The ductwork and ESP equipment are supported from structural steel and foundation systems and provided with expansion joints to maintain gas tight structural support throughout the equipment operating system flow and temperature range.

2.2 Description of New Infrastructure

The modifications proposed in the Phase II AQC modifications are intended not to impact any of the existing Unit 3 AQC system upstream of the existing ID fan outlets. The SCRs, ESPs, air heaters, and ID fans, together with the interconnecting ductwork, will remain unchanged and in service. The Phase II AQC modifications will add a pulse jet fabric filter (PJFF) and booster fans downstream of the existing ID fans. Sorbent and powdered activated carbon (PAC) will be injected into the gas stream ahead of the PJFF. The outlet from the PJFF will be directed to the booster fans and then connected to the existing Unit 4 wet scrubber refurbished for use as a part of the Unit 3 AQC train. Treated gas will be discharged via the existing Unit 4 chimney, which will become the new Unit 3 chimney. The existing Unit 3 wet scrubber will be demolished to make room for the new PJFF and booster fans. The scope of Phase II work starts at the Unit 3 ID fan outlets and ends at the inlet flanges to the Unit 4 scrubber unit. New ductwork will be installed to interconnect all new components terminating at the ID fan outlet flanges and at the inlet flanges to the Unit 4 scrubber.

3.0 Interface

Interfaces will be established between existing and new equipment and one major piece of existing equipment will be eliminated from the gas path. The individual interfaces are described as follows.

- New ductwork will mate to the outlet flanges at the existing Unit 3 ID fans, combine into one common duct, and extend to the inlet to the PJFF. Note: prior to construction of the PJFF and the booster fans this ductwork will temporarily be routed directly to the inlets of the Unit 4 scrubber. This will allow operation of Unit 3 while the PJFF and booster fans are being installed.
- A single common duct will exit the PJFF outlet and bifurcate into two parallel duct runs, one to each new booster fan.
- The outlet from each new booster fan will be routed to the existing Unit 4 scrubber inlet ducts, one on the north and one on the south side of the existing scrubber.

All ductwork described above will be new, and supported independently where existing ductwork supports cannot be incorporated. Ductwork will be of carbon steel construction and unlined, since temperatures and conditions upstream of the wet scrubber will not require corrosion-resistant liners. Expansion joints, slide plates, and anchor points will be provided where required to ensure gastight operation under all operating temperatures without inducing unacceptable stresses into the interfacing equipment.

4.0 Terminal Point List

The Unit 3 Ductwork terminal points list is summarized as follows, pending final confirmation at time of detailed design:

- ID fan outlet (two required)
- PJFF inlet (one common required). Interface with sorbent and PAC injection systems occurs upstream of this location.
- PJFF outlet (one common required)
- Booster fan inlets (two required, split from common PJFF outlet duct)
- Booster fan outlets (two required, combine into common duct)
- Unit 4 wet scrubber module inlets (two required, split from common booster fan outlet duct)

Modifications, Interfaces, and Tie-Ins Description
Unit 3
Fly Ash

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Ash Systems and the new Air Quality Control System (AQCS) Fly Ash System. Actual interfaces will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Fly Ash System consists of pneumatic conveying lines that sequentially remove ash from the economizer breeching, air preheater gas duct, and precipitator hoppers. The ash is vacuum conveyed to the existing Unit 3 Fly Ash Transfer Tank. From the transfer tank, the ash is pressure conveyed to the existing east or west fly ash storage silos.

2.2 Description of New Infrastructure

The new Fly Ash System will consist of new vacuum conveying lines that will pneumatically remove fly ash from the pulse jet fabric filter (PJFF) hoppers and the duct hoppers. The ash will be transported to a new Unit 3 Fly Ash Transfer Tank. From the transfer tank, the ash will be transported to the west silo or to a new fly ash waste silo via a new pressure conveying system utilizing a single pressure conveying line. New vacuum exhausters, pressure blowers, and ash pick-up valves will be provided along with other required new equipment identified during detailed design. The existing ESP fly ash conveying system will continue to operate independently of the new PJFF conveying system. The ash from the Unit 3 ESP hoppers will be conveyed to the east silo which is initially designated as the saleable fly ash silo. The west silo will be an alternate destination since a connection to this silo exists. ESP ash directed to the west silo will not be considered saleable.

3.0 Interface

As noted above, the existing ESP conveying system will continue to operate independent of the new PJFF conveying system. New vacuum conveying lines will connect to the PJFF hoppers as well as any intermediate duct hoppers, as required. A new main pressure line will be provided to connect the new transfer tank to the west silo and the new ash silo.

4.0 Terminal Point List

The new Fly Ash System will have the following terminal points:

- PJFF hopper flanges
- New fly ash silo dry ash spout discharge and conditioned ash discharge.

Modifications, Interfaces, and Tie-Ins Description
Unit 3
Induced Draft

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Induced Draft Systems and the new Induced Draft System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Induced Draft System consists of two induced draft (ID) fans that maintain furnace draft pressure and overcome the draft system resistance. The ID fans are driven by 7,500 hp, 900 rpm motors and hydrokinetic fluid drives that allow variable speed operation. The existing draft system consists of the boiler, selective catalytic reduction (SCR) system, air heaters, electrostatic precipitators (ESP), ID fans, wet flue gas desulfurization (WFGD) system, and associated ductwork, dampers, and other supporting equipment.

2.2 Description of New Infrastructure

The new Induced Draft System shall consist of the two existing ID fans and two new booster fans designed to maintain furnace draft pressure and to overcome the resistance of the new draft system. The new booster fans would be driven by approximately 6,400 hp motors with variable frequency drives for variable speed control. The new draft system would consist of the existing boiler, existing SCR system, existing air heaters, existing ESPs, existing ID fans, a new pulse jet fabric filter (PJFF) system, new booster fans, refurbished Unit 4 WFGD system, and associated new and existing ductwork, dampers, and other supporting equipment.

3.0 Interface

The new booster fans shall be connected to the new ductwork at the outlet of the new PJFF system and the new ductwork entering the refurbished Unit 4 WFGD system. The new variable frequency drives shall be supplied with new power feeds and new connections to the DCS to allow control of duct pressure between the existing ID fans and new PJFF system. The new variable frequency drives and new lube oil skids may be cooled by ambient air or by plant cooling water. For the basis of the cost estimate, the drives and skids will be ambient air cooled.

4.0 Terminal Point List

The Induced Draft System will have the following terminal points:

- Ductwork outlet of the new PJFF system
- Ductwork inlet of the refurbished Unit 4 WFGD system re-purposed for Unit 3
- New booster fan DCS controls
- New booster fan medium voltage power feeds to variable frequency drives
- New booster fan low voltage power feeds to variable frequency drives, lube oil skids, and other accessories.

Modifications, Interfaces, and Tie-Ins Description
Unit 3
AQCS Compressed Air

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Air Systems and the new Air Quality Control System (AQCS) Compressed Air System. Actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing air systems provide station air and instrument air to the existing plant infrastructure.

2.2 Description of New Infrastructure

The AQCS Compressed Air Systems will provide the clean, dry, oil free compressed air at an adequate pressure and adequate capacity for the pulse jet fabric filter, actuators, controls, instrumentation, and other air users in the AQCS addition.

3.0 Interface

A cross tie will be provided between the existing air systems and the new AQCS Compressed Air Systems. A cross-tie with the existing Station Air System will be provided by tying in before the new air filter/dryer skid. In addition, a cross tie with the existing Instrument Air System will be provided by tying in after the AQCS compressed air receiver. Each cross-tie will be furnished with manual isolation valves.

4.0 Terminal Point List

The AQCS Compressed Air System will have the following terminal points:

- The AQCS Compressed Air System will tie in to the Station Air system near the existing emergency cross-tie with the Instrument Air System.
- The AQCS Compressed Air System will tie in to the Instrument Air system near the existing emergency cross-tie with Station Air System.

Modifications, Interfaces, and Tie-Ins Description
Unit 3
Service Water

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Service Water System and the new Air Quality Control System (AQCS) Service Water System. Actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Service Water System withdraws river water from the Ohio River through the screenhouse intake structure and provides cooling, wash, makeup, back-up fire protection, quench, seal, and sluicing water to all Mill Creek station users. The screenhouse intake structure includes four long shaft service pumps, four traveling water screens, and two service water booster pumps.

2.2 Description of New Infrastructure

The Service Water System will extend existing service water systems for hose stations, makeup, and seal water for equipment in the AQCS areas. Existing service water quality will be sufficient to protect the AQCS systems.

3.0 Interface

A service water connection shall be supplied between existing Service Water System and AQCS Service Water System.

4.0 Terminal Point List

The AQCS Service Water System will have the following terminal points:

- The AQCS Service Water for Unit 3 will tie into the 8” Unit 3 SDRS service water header which comes off of the service water 30” primary header.

Modifications, Interfaces, and Tie-Ins Description
Unit 3
Continuous Emission Monitoring

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Continuous Emission Monitoring System (CEMS) and the new Air Quality Control System (AQCS) modifications; actual interface shall be determined during detailed design.

2.0 Description

The existing Unit 3 WFGD system and stack would be abandoned and Unit 3 will utilize the existing Unit 4 WFGD system and stack. Hence, the CEMS which is connected to existing Unit 4 stack will be reused by Unit 3. New opacity monitors will be required downstream of the new PJFF system for Unit 3. The reuse of existing opacity monitors shall be determined during detailed engineering design.

3.0 Interface

The new opacity monitors may use the existing Data Acquisition and Handling System (DAHS) of the CEMS. There will be no new interface for Unit 3 CEMS as the existing CEMS DAHS is connected to the Distributed Control System (DCS) of the plant.

4.0 Terminal Point List

The new opacity monitors and existing CEMS will have the following terminal points:

- Main 480 VAC Panel Board for Opacity monitors
- Analog and Digital input/output (I/O) ports for CEMS shelter

Modifications, Interfaces, and Tie-Ins Description
Unit 3
Wet Flue Gas Desulfurization

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Wet Flue Gas Desulfurization System (WFGD) and the new Air Quality Control System (AQCS) modifications; actual interface shall be determined during detailed design.

2.0 Description

The existing Unit 3 WFGD system would be abandoned and Unit 3 will utilize the existing Unit 4 WFGD system.

3.0 Interface

There will be no new interface for Unit 3 WFGD.

4.0 Terminal Point List

There will be no new terminal points for Unit 3 WFGD system.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
AQCS Power Supply System

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Power Supply System and the new Air Quality Control System (AQCS) Power Supply System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing 4.16 kV Medium Voltage System does not connect to the Unit 4 AQC Auxiliary Power. The Common AQC Reserve Auxiliary System does tie-in and is discussed in 41.0804.1.MC01.

The existing Unit 4 scrubber will be used for Unit 3. The auxiliary electrical systems associated with the Unit 4 scrubber are presently powered by the existing Unit 4, 4.16 kV Switchgear. The medium voltage feeder cable from the existing Unit 4 to the existing Unit 4 scrubber loads will be abandoned. There will be a new feed to this equipment from the existing Unit 3 switchgear. The Unit 3 feeder breaker that powers existing Unit 3 scrubber loads will be used to power what is now the Unit 4 scrubber loads.

There will be a 22kV feed to the primary of the Unit 4 AQC Main Auxiliary transformer. The existing Unit 4 Isolated Phase Bus Duct (IPB) will be tapped to provide the interface from the generator to the auxiliary transformer.

2.2 Description of New Infrastructure

The new AQCS AC power supply system shall consist of the following equipment:

- 4.16 kV Switchgear,
- Main Auxiliary Transformer.
- 4.16 kV ID Fan motor soft motor starters,
- 480 volt transformers, switchgear, and motor control centers; and
- DC and Uninterruptible Power Supply (UPS) systems to provide DC power to switchgear and UPS power to the Distributed Control System (DCS).

Cable bus will provide the connections from the main auxiliary transformer to the switchgear. Cable connections will connect all other electrical loads.

3.0 Interface

A new IPB tap will have to be installed. This IPB tap will terminate at the Main Auxiliary Transformer.

Two feeds from existing Unit 3, 4.16 kV switchgear will be installed to power the existing Unit 4 scrubber loads.

4.0 Terminal Point List

The AQCS Power Supply System will have the following terminal points:

- 22kV IPB tap at the existing IPB to furnish power to the primary side of the Main Auxiliary Transformer.
- Feeds from existing Unit 3 switchgear to Unit 4 scrubber loads.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
Communication

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Communication systems and the new Air Quality Control System (AQCS) Communication Systems; detailed interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing public address system is a multi-channel Gai-Tronics system.

2.2 Description of New Infrastructure

The Communication System shall include a page/party public address system compatible with Gai-Tronics equipment.

3.0 Interface

The AQCS page party system shall connect to the existing Gai-Tronics system equipment.

4.0 Terminal Point List

The Communication System will have the following terminal points:

- Interface of new system to existing.
- 120VAC power.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
Control and Monitoring

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Control and Monitoring System and the new Air Quality Control System (AQCS) and new wet scrubber Control and Monitoring; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing DCS is a Honeywell Experion system.

2.2 Description of New Infrastructure

The AQCS and new wet scrubber DCS shall provide a means to manually and automatically control AQCS and new wet scrubber plant components individually and as a coordinated plant system. The system will be an extension of the existing system.

3.0 Interface

The new high performance manager (HPM) processors and associated I/O modules will be connected to the existing redundant universal control networks (LCNs) 04 and 14. The existing Unit 4 Scrubber HPM 25 and HPM 27/28 will be switched over to Unit 3 DCS UCN 03 and 13

4.0 Terminal Point List

The AQCS Power Supply System will have the following terminal points:

- Main 120 VAC UPS panel board
- General 208/120 VAC panel board

Modifications, Interfaces, and Tie-Ins Description
Unit 4
Buildings and Enclosures

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Buildings and the new Air Quality Control System (AQCS) Buildings and Enclosures; actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

Numerous miscellaneous buildings used for various purposes exist as part of the Unit 4 facility. These buildings, in general, are composed of both "stick-built" (individually-designed-and-constructed specialty structures) such as the Unit 4 Boiler Building and pre-engineered metal buildings such as the Unit 4 Scrubber Switchgear Building. These buildings consist of a metal panel exterior on a steel frame supported by a concrete foundation. Details, arrangement, and degree of finish depend on the building's intended function, but all structures protect and provide the necessary environmental control for the functions they enclose. The exterior of the buildings are to some extent coordinated for a pleasing aesthetic appearance throughout the site.

Based on the recommendations proposed by the Phase II Study, modifications to the existing Unit 4 facility will be concentrated downstream of the existing Unit 4 ID fans. The existing Unit 4 wet scrubber and chimney will be re-purposed for use by Unit 3 and will no longer be considered as part of the Unit 4 AQC train. All Unit 4 AQC components upstream of the ID fans will remain unmodified and in service upon completion of the AQC modifications proposed in Phase II.

In addition to the buildings and structures currently in use as part of Unit 4, other facilities, both in use and removed from service, are located in the area south of Unit 4. the limestone receiving and storage and reagent preparation facilities for the entire station are located in this area and must remain in service during Unit 4 modifications. Station-wide slurry and ash line piperacks also run through this area and must remain in service throughout construction. Further south, the 345kV Unit 3/4 transmission line runs overhead through this area and the concrete foundation for a demolished thickener vessel is located in the same area. Finally, the existing ammonia receiving and storage facility lies to the south and may or may not be impacted by Unit 4 construction, depending on the arrangement selected.

2.2 Description of New Infrastructure

Two different arrangements of the new equipment proposed for Unit 4 under the Phase II AQC Study have been developed and both remain under consideration. The impact on existing structures in the Unit 4 area will be different depending on the arrangement ultimately selected. For that reason a description of each arrangement and the new structures will be presented separately.

2.2.1 Arrangement A. In Arrangement A the new equipment proposed by Phase II is located along a north-south axis extending south of the existing Reagent Preparation Building. This arrangement includes a PJFF, a Unit 4 Fly Ash Handling Building, a Unit 4 AQC Electrical Building, two new booster fans and a supporting Fan VFD Enclosure, a wet FGD module and associated Pump and Electrical Buildings, and a new Unit 4 Chimney. To install the new equipment in this location the existing ammonia storage facility and an associated electrical building must be relocated.

The miscellaneous buildings for Unit 4 will be designed similarly to those existing and will reflect the function and arrangement of the systems they enclose or support. Disregarding the "non-building" equipment which simply require foundations, the new buildings and structures proposed for Unit 4 are identified as follows:

- Unit 4 Fly Ash Handling Building
- Unit 4 AQCS Electrical Building
- Unit 4 Booster Fans Variable Frequency Drive (VFD) Enclosure
- Unit 4 Wet FGD Module and Pump Building
- Unit 4 FGD Electrical Building
- Ductwork support structure.

Pre-engineered metal buildings, because of their lower capital cost and versatility, will be used where practical and are proposed for the Unit 4 Fly Ash Handling, AQCS Electrical, and FGD Electrical Buildings. These buildings consist of a fabricated steel frame of a "standard" size and arrangement enclosed by metal panel wall and roof systems.

Where practical and cost effective, small buildings housing one or two related functions provided by a single equipment vendor will be prefabricated with the equipment already installed. This type of structure is proposed for the Unit 4 Booster Fans Variable Frequency Drive Enclosure. This relatively small structure will be delivered complete for installation on a constructed foundation with any outside utilities or services required to be connected to a prefabricated terminal point on the structure. This enclosure is expected to consist of a steel frame with metal panel enclosure. Where prefabricated construction turns out to be impractical or not cost effective, the structures usually revert to pre-engineered buildings.

In Arrangement A the Unit 4 pulse jet fabric filter need not be installed at an elevation higher than grade. Accordingly, no separate superstructure beyond that supplied as part of the PJFF itself is required. A concrete foundation supported on drilled piers will be

provided for the PJFF similar to any other piece of furnished "equipment" such as the booster fans or the chimney

Similarly, the wet flue gas desulfurization module is expected to be furnished as an item of field-assembled "equipment" and the module itself will not require a separate enclosure. However, the slurry recirculation piping, pumps, and associated support equipment located outside the module is housed in the adjacent WFGD Pump Building. The WFGD Pump Building, due to the complexity, size, and number of systems enclosed, cannot reasonably conform to the limitations of a pre-engineered building. Accordingly, this building will be individually designed and constructed, with arrangements, floors, services, and construction specified to best serve the installation and operation of the WFDG piping and equipment. The WFGD Pump Building will consist of a multi-level steel frame supporting and enclosing the slurry delivery, recycle, and waste systems. Enclosed areas within the building will be covered with metal panel or (due to the expected wet conditions) concrete masonry. Elevated floors will be steel grating with suspended slabs only where necessitated by the equipment supported.

All new Unit 4 buildings, of whatever type, will be supported on cast-in-place concrete foundations. It is expected, due to the weight of most of the structures and the geotechnical conditions onsite, the majority of new foundations will be supported on drilled piers or potentially micropiles where congestions does not allow large piers to be drilled. However, in areas of little existing congestion and for smaller and lighter buildings, shallow foundations (footings and slabs-on-grade) will be used.

In Arrangement A the Unit 4 FGD area is relatively isolated and a significant distance from existing manned structures. Accordingly, a single unisex toilet and washroom will be provided in the Pump Building, with potable water supply and a sewage lift station to forward sewage to the existing onsite sanitary facilities. None of the other new structures at Unit 4 are expected to be continuously manned and, with the Pump Building facilities nearby, will require no plumbing or sanitary utilities. None of the buildings will require interior finishes. Space conditioning will be limited to heating and ventilation only, except as otherwise required for equipment enclosed. All buildings will be provided with necessary personnel, vehicle, and equipment maintenance access, and a Life Safety review of egress will be completed for each structure. To the extent practical, the exteriors of the Unit 4 miscellaneous buildings will be coordinated to complement and match the appearances and colors of the existing site buildings.

2.2.2 Arrangement B. In Arrangement B the new equipment proposed by Phase II is located along an east-west axis located south of the existing Unit 4 Boiler Building. This arrangement includes the same PJFF, Fly Ash Handling Building, AQC Electrical Building, two new booster fans and Fan VFD Enclosure, wet FGD module and associated Pump Building and Electrical Building, and new Chimney as Arrangement A. To install the new equipment in this location the existing Unit 4 Aux Boiler Building, Sample Lab, and Office Annex Building must be relocated or demolished. In addition the existing Unit 4 Scrubber Switchgear Building, which will remain in service for Unit 3, must be accommodated in the arrangement.

Although arranged differently, the new buildings and structures required for Arrangement B will be essentially identical to that described for Arrangement A, with one exception. The Unit 4 PJFF will be located above the space occupied by the existing Unit 4 Scrubber Switchgear Building. Since the systems enclosed in this building must remain in operation throughout Unit 4 construction, the new PJFFs must be elevated and supported on a new Unit 4 PJFF Support Structure.

The PJFF Support Structure is not an enclosure per se and is required primarily as a support for the Unit 4 PJFF assemblies. As such it is a very specialized structure and must be designed and constructed as a stick-built installation. The PJFF Support Structure will allow the new PJFF to span across the Unit 4 Scrubber Switchgear Building without impacting its operation. The unenclosed structure will consist of a structural steel superstructure mounted on a concrete foundation. The elevation of the superstructure will clear the top of the Switchgear Building beneath plus provide room for the Unit 4 Fly Ash Handling and Unit 4 AQC Electrical Buildings. As an unenclosed structure, no HVAC would be required for the PJFF Support Structure.

The description of other buildings and structures required in Arrangement B are unchanged from those provided above for Arrangement A.

3.0 Interface

The impact to and interface with existing facilities resulting from the modifications to Unit 4 will differ depending on the arrangement ultimately selected. Accordingly, Arrangement A and Arrangement B Interfaces will be addressed separately. In either case, methods of construction, especially installation of the new foundations, will be evaluated to minimize any impact of the new structure on the existing one. Depending on the location of the building or structure, individual new Unit 4 buildings may receive plumbing/drainage, power, or other services from existing site systems and will interface with those systems accordingly

3.1 Arrangement A

The equipment as located for Arrangement A will require that the existing ammonia receiving and storage facility be relocated. This includes the unloading, storage, and containment structure as well as the adjacent electrical structure serving the ammonia equipment. In addition, piping and utilities to the ammonia facility will have to be reestablished to the new location.

Installation of Arrangement A will require at least partial demolition of the existing foundation left behind by the demolished thickener vessel south of the Reagent Prep Building. Demolition will be limited to only those portions of the foundation that interfere with the new structures. The remainder of the foundation can be abandoned in place.

Arrangement A requires that a significant run of ductwork between the existing Unit 4 ID fans and the new PJFF pass west of the Reagent Prep Building. The duct is preliminarily routed such that overhead doors and access to the west side of the Reagent Prep Building is not impacted. The ductwork also must not impact the limestone conveyor between the limestone reclaim pit and the Reagent Prep Building. Since insufficient room exists for the ductwork expected to pass beneath the limestone conveyor and still remain clear of the doors to the building, the ductwork must also be routed over the conveyor. Further south, the ductwork must also pass over the existing slurry and utility pipeline. Ductwork support steel in this area will be substantial and the ductwork will contain several relatively sharp changes in elevation, which may result in ash dropout. As h loading and possibly extra ash pickup points to the ash handling system may be required accordingly. The need for special design due to ductwork routing will be determined at time of detailed design.

If ductwork is routed over the existing piperack south of the Reagent Building, it will pass close to the Unit 3/4 345kV overhead line routed through the area. Safety concerns, both during construction and later during operation, will dictate that the clearances between energized overheads and equipment and material beneath required by code be maintained. Final determination of available clear distance between the ductwork routed through the area and the overhead lines must await detailed design. The Phase II Study recommends that the 345kV lines be rerouted to ensure safe and code-compliant construction and operation in this area.

Except as described above, the new structures intended for Arrangement A are independent and physically separate from existing structures. With the exception of potential interferences with and connections to existing underground systems and services, minimal interface is expected between new and existing structures.

3.2 Arrangement B

Arrangement B will have several real and potential interfaces and impacts to existing structures and systems. By definition the Unit 4 PJFF Support Structure is intended not to impact the existing Unit 4 FGD Switchgear Building. The structure will span over the building and will be of a height sufficient to clear the building.

Installation of Arrangement B will, however, require relocation or demolition of the Aux Boiler Building, Sample Lab, and Office Annex Building to make way for new construction. The remaining shell of the Aux Boiler Building will be demolished and not replaced. Impact due to the loss of this building is expected to be minimal.

Both the Sample Lab and the Annex Building remain in use and their function must be reestablished at a new location. Both are of masonry construction on concrete foundations and will be extremely difficult to salvage or relocate. Accordingly, new structures will be erected as replacements and these structures will be demolished. The tentative location of these structures is in the area north of the Unit 2 Boiler Building currently occupied by the existing warehouse. The existing warehouse would then be

replaced with a new warehouse and loading dock located in the lower-tiered area between the coal delivery loop and the Unit 2 cooling tower. Alternately, the existing warehouse shell could be remodeled to accommodate both these facilities. At time of detailed design, further investigation will be required to determine if remodeling the existing warehouse to house the Lab and Annex facilities is feasible.

Although new construction will not directly interfere with the existing limestone storage pile, the need to maintain vehicle access between new construction and the limestone pile must be considered. A concrete retaining wall along the north side of the limestone pile would allow the pile to remain centered over the reclaim structure yet keep the toe of the pile from encroaching unacceptably on the new access road south of the new equipment train. Arrangement B would not have any direct interface or interference with the existing 345kV overhead line, although its relocation would simplify crane operation during Unit 4 construction.

Except as described above, the new structures intended for Arrangement B are independent and physically separate from existing structures. With the exception of potential interferences with and connections to existing underground systems and services, minimal interface is expected between new and existing structures.

4.0 Terminal Point List

Specific terminal points for each of the new Unit 4 buildings and structures will be identified during detailed design once the appropriate arrangement is ultimately selected.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
Ductwork

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Plant Flue Gas Exhaust System and the new Air Quality Control System (AQCS) Ductwork System; actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing flue gas exhaust system downstream of the Unit 4 boiler consists of two exhaust trains, each with the following components: one selective catalytic reduction (SCR) system, one vertical axis regenerative air heater, one electrostatic precipitator (ESP), one ID fan, and interconnecting ductwork. Each ID fan is ducted to an inlet to the common Unit 4 wet scrubber. Dual scrubber outlets exit the scrubber module and are directed to a common flue in the Unit 4 chimney via dual inlets. The ductwork and ESP equipment are supported from structural steel and foundation systems and provided with expansion joints to maintain gas tight structural support throughout the equipment operating system flow and temperature range.

2.2 Description of New Infrastructure

The modifications proposed in the Phase II AQC modifications are intended not to impact any of the existing Unit 4 AQC system upstream of the existing ID fan outlets. The SCRs, ESPs, air heaters, and ID fans, together with the interconnecting ductwork, will remain unchanged and in service. The Phase II AQC modifications will add two 50% capacity pulse jet fabric filters (PJFFs) downstream of the existing ID fans. Sorbent and powdered activated carbon (PAC) will be injected into the gas stream ahead of the PJFFs. The outlet from each PJFF will be directed into a dedicated booster fan. The fan outlets will header together and connect to a new Unit 4 wet scrubber. Treated gas from the scrubber will be exhausted via a new Unit 4 chimney. The scope of Phase II work starts at the Unit 4 ID fan outlets and ends at the outlet from the new Unit 4 chimney. New ductwork will be installed to interconnect all new components downstream of the ID fan outlet flanges.

Two different arrangements of the new equipment proposed for Unit 4 under the Phase II AQC Study have been developed and both remain under consideration. Although the physical location and orientation of the AQC components will differ depending on the arrangement selected, the sequence, operation, and interface between each component will remain the same. The interface description that follows is valid for either

Arrangement A or Arrangement B for Unit 4 and the impact on existing structures for Unit 4.

3.0 Interface

Interfaces will be established between existing and new equipment and between new equipment in the gas path. The individual interfaces are described as follows.

- New ductwork will mate to the outlet flanges at the existing Unit 4 ID fans, and combine into one common duct. The common duct will bifurcate into two duct, each mating to the inlet at one of the two 50% PJFFs.
- A single duct will exit each PJFF outlet and extend to the inlet of a dedicated new booster fan.
- Duct from the outlet from each new booster fan will combine into a common duct and header into the new Unit 4 scrubber inlet.
- A single common duct will exit the scrubber outlet and connect to a single breeching inlet at the new Unit 4 chimney.

All ductwork described above will be new, and supported independently where existing ductwork supports cannot be incorporated. Ductwork upstream of the wet scrubber will be of carbon steel construction and unlined, since temperatures and conditions will not require corrosion-resistant liners. Ductwork between the scrubber and the chimney will be corrosion resistant, either FRP or alloy lined carbon steel, due to the extremely corrosive environment in this location. Expansion joints, slide plates, and anchor points will be provided where required to ensure gastight operation under all operating temperatures without inducing unacceptable stresses into the interfacing equipment.

4.0 Terminal Point List

The Unit 4 Ductwork terminal points list is summarized as follows, pending final confirmation at time of detailed design:

- ID fan outlet (two required, combine into common duct)
- PJFF inlet (two required, split from common). Interface with sorbent and PAC injection systems occurs upstream of this location in the common duct.
- PJFF outlet (two required)
- Booster fan inlets (two required)
- Booster fan outlets (two required, combine into common duct)
- Wet scrubber module inlet (one required)
- Wet scrubber module outlet (one required)
- Chimney inlet (one required)

Modifications, Interfaces, and Tie-Ins Description
Unit 4
Fly Ash

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Ash Systems and the new Air Quality Control System (AQCS) Fly Ash System. Actual interfaces will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Fly Ash System consists of pneumatic conveying lines that sequentially remove ash from the economizer breeching, air preheater gas duct, and precipitator hoppers. The ash is vacuum conveyed to the existing Unit 4 Fly Ash Transfer Tank. From the transfer tank, the ash is pressure conveyed to the existing east or west fly ash storage silos.

2.2 Description of New Infrastructure

The new Fly Ash System will consist of new vacuum conveying lines that will pneumatically remove fly ash from the pulse jet fabric filter (PJFF) hoppers, , and duct hoppers. The ash will be transported to a new Unit 4 Fly Ash Transfer Tank. From the transfer tank, the ash will be transported to the west silo or to a new fly ash waste silo via a new pressure conveying system utilizing a single pressure conveying line. New vacuum exhausters, pressure blowers, and ash pick-up valves will be provided along with other required new equipment identified during detailed design. The existing ESP fly ash conveying system will continue to operate independently of the new PJFF conveying system. The ash from the Unit 4 ESP hoppers will be continue to be conveyed by the existing system to the east silo which is initially designated as the saleable fly ash silo. The west silo will be an alternate destination since a connection to this silo exists. Ash directed to the west silo will not be considered saleable.

Two arrangements for Unit 4 are currently under consideration: Arrangement A with the AQC train on a north-south axis and Arrangement B on an east-west axis. The location of the PJFF and the amount of ductwork and fly ash conveying lines differ between the two arrangements. However, for either the A or B arrangement, the ash handling arrangement is typical since both will use the existing ESP conveying system and both provide a new conveying system to service the PJFF hoppers.

3.0 Interface

As noted above, the existing ESP conveying system will continue to operate independent of the new PJFF conveying system. New vacuum conveying lines will connect to the PJFF hoppers as well as any intermediate duct hoppers, as required.. Two new main pressure lines will be provided to connect the new transfer tank to the west silo and the new ash silo with future capability to connect to the east silo.

4.0 Terminal Point List

The new Fly Ash System will have the following terminal points:

- PJFF hopper flanges
- New fly ash silo dry ash spout discharge and conditioned ash discharge.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
Induced Draft

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Induced Draft Systems and the new Induced Draft System; actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Induced Draft System consists of two induced draft (ID) fans that maintain furnace draft pressure and overcome the draft system resistance. The ID fans are driven by 9,000 hp, 900 rpm motors and hydrokinetic fluid drives that allow variable speed operation. The existing draft system consists of the boiler, selective catalytic reduction (SCR) system, air heaters, electrostatic precipitators (ESP), ID fans, wet flue gas desulfurization (WFGD) system, and associated ductwork, dampers, and other supporting equipment.

2.2 Description of New Infrastructure

The new Induced Draft System shall consist of the two existing ID fans and two new booster fans designed to maintain furnace draft pressure and to overcome the resistance of the new draft system. The new booster fans would be driven by approximately 6,800 hp motors with variable frequency drives for variable speed control. The new draft system would consist of the existing boiler, existing SCR system, existing air heaters, existing ESPs, existing ID fans, a new pulse jet fabric filter (PJFF) system, new booster fans, a new WFGD system, and associated new and existing ductwork, dampers, and other supporting equipment.

3.0 Interface

The new booster fans shall be connected to the new ductwork at the outlet of the new PJFF system and the new ductwork entering the refurbished new WFGD system. The new variable frequency drives shall be supplied with new power feeds and new connections to the DCS to allow control of duct pressure between the existing ID fans and new PJFF system. The new variable frequency drives and new lube oil skids may be cooled by ambient air or by plant cooling water. For the basis of the cost estimate, the drives and skids will be ambient air cooled.

4.0 Terminal Point List

The Induced Draft System will have the following terminal points:

- Ductwork outlet of the new PJFF system
- Ductwork inlet of the new WFGD system
- New booster fan DCS controls
- New booster fan medium voltage power feeds to variable frequency drives
- New booster fan low voltage power feeds to variable frequency drives, lube oil skids, and other accessories.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
AQCS Compressed Air

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the existing Mill Creek Air Systems and the new Air Quality Control System (AQCS) Compressed Air System. Actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing air systems provide station air and instrument air to the existing plant infrastructure.

2.2 Description of New Infrastructure

The AQCS Compressed Air Systems will provide the clean, dry, oil free compressed air at an adequate pressure and adequate capacity for the pulse jet fabric filter, actuators, controls, instrumentation, and other air users in the AQCS addition.

3.0 Interface

A cross tie will be provided between the existing air systems and the new AQCS Compressed Air Systems. A cross-tie with the existing Station Air System will be provided by tying in before the new air filter/dryer skid. In addition, a cross tie with the existing Instrument Air System will be provided by tying in after the AQCS compressed air receiver. Each cross-tie will be furnished with manual isolation valves.

4.0 Terminal Point List

The AQCS Compressed Air System will have the following terminal points:

- The AQCS Compressed Air System will tie in to the Station Air system near the existing emergency cross-tie with the Instrument Air System.
- The AQCS Compressed Air System will tie in to the Instrument Air system near the existing emergency cross-tie with Station Air System.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
Service Water

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Service Water System and the new Air Quality Control System (AQCS) Service Water System. Actual interface shall be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing Service Water System withdraws river water from the Ohio River through the screenhouse intake structure and provides cooling, wash, makeup, back-up fire protection, quench, seal, and sluicing water to all Mill Creek station users. The screenhouse intake structure includes four long shaft service pumps, four traveling water screens, and two service water booster pumps.

2.2 Description of New Infrastructure

The Service Water System will extend existing service water systems for hose stations, makeup, and seal water for equipment in the AQCS areas. Existing service water quality will be sufficient to protect the AQCS systems.

3.0 Interface

A service water connection shall be supplied between existing Service Water System and AQCS Service Water System.

4.0 Terminal Point List

The AQCS Service Water System will have the following terminal points:

- The AQCS Service Water for Unit 4 will tie into the 8” Unit 4 SDRS service water header which comes off of the service water 30” primary header.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
Continuous Emission Monitoring

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant Continuous Emission Monitoring System (CEMS) and the new Air Quality Control System (AQCS) modifications; actual interface shall be determined during detailed design.

2.0 Description

The existing Unit 4 CEMS system will be reused by Unit 3. A new CEMS for Unit 4 will be required. Also, new opacity monitors will be required downstream of the new PJFF system for Unit 4. The reuse of existing opacity monitors shall be determined during detailed engineering design.

3.0 Interface

The new Unit 4 CEMS Data Acquisition and Handling System (DAHS) will interface with the existing Distributed Control System (DCS) of the plant. The new opacity monitors will interface with the new Unit 4 CEMS DAHS.

4.0 Terminal Point List

The new Unit 4 CEMS and new opacity monitors will have the following terminal points:

- Main 480 VAC Panel Board at CEMS shelter
- Compressed air port at CEMS shelter
- DCS Signal hotwire or Fiber optics connection port at CEMS shelter
- Analog and Digital input/output (I/O) ports at CEMS shelter
- Main 480 VAC Panel Board for opacity monitors

Modifications, Interfaces, and Tie-Ins Description
Unit 4
WFGD Reagent Preparation

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant WFGD Reagent Preparation System and the Air Quality Control System (AQCS) modifications. Actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing WFGD Reagent Preparation System is a common system for all units. The WFGD Preparation System receives limestone, creates limestone slurry, and stores and supplies the slurry for use in the scrubbers.

2.2 Description of New Infrastructure

The existing WFGD Reagent Preparation System will supply limestone slurry to the new Unit 4 WFGD.

3.0 Interface

Since the existing Unit 4 system will be modified for use with Unit 3, the Unit 4 limestone slurry supply will tie into the existing reagent slurry supply. The existing reagent supply system will need to be analyzed to verify that it can meet the requirements of the Unit 4 WFGD during detailed design.

4.0 Terminal Point List

The Unit 4 AQCS WFGD will have the following terminal points with the existing WFGD Reagent Preparation System:

- The new Unit 4 reagent supply will tie in to the existing reagent supply header in the existing reagent preparation building.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
WFGD Makeup Water

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Plant WFGD Makeup Water System and the Air Quality Control System (AQCS) modifications. Actual interfaces will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The existing WFGD Makeup Water System receives, stores, and pumps water from the Clearwell Pond for distribution to the scrubbers and associated systems.

2.2 Description of New Infrastructure

The Unit 4 WFGD System will tie into the existing WFGD Makeup Water System to supply water to the Unit 4 WFGD and associated systems.

3.0 Interface

Since the existing Unit 4 system will be modified for use with Unit 3, the Unit 4 WFGD System will tie into the existing Makeup Water System in place of the demolished Unit 3 makeup water users. The existing makeup water supply pumps and piping will be analyzed during detailed design to verify that they can meet the requirements of the Unit 4 WFGD Makeup Water System.

4.0 Terminal Point List

The existing WFGD Makeup Water System will have the following terminal points:

- The Unit 4 WFGD will tie into the existing Unit 3 scrubber makeup water header.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
WFGD Byproduct Dewatering

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Station Dewatering System and the Air Quality Control System (AQCS) modifications. Actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

In the existing configuration hydrocyclone feed pumps draw slurry from the reaction tank and pump it to the hydrocyclones. The hydrocyclones send overflow back to the scrubber reaction tank and underflow to the underflow transfer tank. Underflow transfer pumps will pump the gypsum slurry from the underflow transfer tank to the station gypsum storage tanks for dewatering.

2.2 Description of New Infrastructure

Since the existing Unit 4 dewatering system will be used on Unit 3, new hydrocyclones will be added to Unit 4 along with a hydrocyclone underflow transfer tank and pumps. The underflow transfer tank will serve as the absorber holding tank during unit trips and outages. The new hydrocyclone underflow transfer pumps will pump the gypsum slurry to the gypsum storage tank for dewatering, or when serving as the absorber holding tank, the underflow transfer pumps will return the slurry to the absorber.

3.0 Interface

The WFGD Byproduct Dewatering System shall tie into the existing primary and secondary gypsum tanks using the header near tanks at the dewatering facility.

4.0 Terminal Point List

The Unit 4 WFGD Byproduct Dewatering System will have the following terminal points:

- The Unit 4 WFGD underflow transfer piping will tie-in to the existing header near the gypsum tanks.

Modifications, Interfaces, and Tie-Ins Description
Unit 4
Wastewater

1.0 Introduction

The purpose of this description is to describe the conceptual interface between the Mill Creek Wastewater Collection System with the Air Quality Control System (AQCS) additions. Actual interface will be determined during detailed design.

2.0 Description

2.1 Description of Existing Infrastructure

The filtrate from the existing common dewatering system will be discharged to the Settling Ponds. In the Settling Ponds, the suspended solids are settled down and the wastewater from the Settling Ponds will be finally discharged to the Ohio River. Dewatered gypsum produced from the existing common Dewatering System will be haled to the on-site landfill or sold.

2.2 Description of New Infrastructure

Chloride bleed from the new Unit 4 hydrocyclone overflow tank will be pumped by the new Chloride Bleed pumps and routed to the Ash Pond via the “rim ditch” trench. The new Unit 4 underflow hydrocyclone slurry will be pumped to the existing common dewatering system by the new underflow transfer pumps.

3.0 Interface

The New Unit 4 chloride bleed will discharge to the Ash Pond via the existing “rim ditch” trench. The underflow transfer pump discharge will tie into the existing dewatering system at the existing gypsum tanks.

4.0 Terminal Point List

The Unit 4 Wastewater System will have the following terminal points:

- The Unit 4 Chloride Bleed stream from the new Unit 4 hydrocyclone will be discharged into the existing “rim ditch” trench by the new chlorine bleed pumps.