

PRELIMINARY

**American Electric Power, Inc.
Columbus, Ohio
Limestone Unloading System Study Report
Big Sandy Unit 2
Louisa, Kentucky**

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1. WorleyParsons Drawings
2. Specification for Limestone Handling System, AEBS-2-SP-092602, Rev. A, dated June 2, 2005
3. Cost Estimate Detail

1. Executive Summary

The purpose of this study is to develop the preliminary engineering and indicative cost estimate for the unloading, stacking and reclaiming of limestone for the Big Sandy Unit 2 FGD system. The scope of this study includes the complete limestone handling system from unloading to the inlet of the limestone day bins. For purposes of this study, the limestone preparation building will be located adjacent to the main FGD Building. Freeze protection and dust control measures for the limestone storage pile will also be addressed as part of this study.

The unloading option considered for this study consisted of delivering limestone to the plant site by truck. The limestone unloading facility would be located within the plant site to the west of an existing oil storage tank. The limestone would be unloaded, stored and reclaimed to the limestone preparation building all within the same general area.

The cost for this Limestone Unloading Option was determined from pricing received for the limestone handling system for Muskingum River Unit 5 based on their similar designs. General arrangement drawings and technical requirements for Muskingum River were sent out to material handling system suppliers for budget pricing. Bids were received from three system bidders and evaluated with the quotation from FMC Technologies, Inc. being used in the preparation of the estimate pricing study. The material handling system budgetary cost was combined with the other cost estimates for civil scope, electrical scope, balance of other equipment, installation, etc. to form the total estimated cost contained in Section 5 of this study report. The detailed cost breakdown is shown in Appendix 3.

The total installed cost for the Limestone Unloading Option 1 is \$7,172,700. The cost estimate details are included on Appendix 3.

2. Design Basis

The following forms the design basis for the study:

Boiler MCR Heat Input:	8,180 MMBtu/hr
Limestone Usage at MCR:	33.1 STPH
Plant Operation:	24 hrs/day, 7 days/wk at full load firing 4.5 lb SO ₂ /MMBtu coal

Limestone Specifications:

Moisture Content:	1 to 12% (by weight)
Bulk Density:	
For volumetric sizing of system components (i.e. hoppers, chutes, bins belt width, etc.)	80 lb/ft ³
For sizing of piles and silos	95 lb/ft ³
For structural loading calculations	120 lb/ft ³
Lump Size:	¾" x 0"
Angle of Repose (Static):	40°
Surcharge Angle	25°
Duration of Limestone Truck Unloading:	12 hrs/day for 5 days wk (design rate)
Required Average Truck Unloading Rate:	4,740 short tons required to be unloaded assuming 12 hours/day, 5 days/wk unloading schedule and 85% capacity factor (33.1 TPH x 24 hrs/day x 365 days/yr x .85 / 52 wks/yr) or 80 short tons/hr (4,470 tons/wk / 60 hrs/wk)

Based on utilizing 25 ton trucks: 80 STPH / 25 tons/truck = 3.2 trucks/hr (average rate). Use 4 trucks/hr to be consistent with MR5.

Unloading and Stacking Capacity:

Limestone unloading requirement @ 4 trucks/hr = 100 TPH, use 400 TPH to handle surges during peak unloading times in the early morning and late afternoon to minimize truck waiting time.

Limestone Unloading Belt Feeder L1	400 STPH
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Limestone Unloading Conveyor L2	400 STPH
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Reclaiming Capacity:

Set reclaim capacity to replenish daily consumption of limestone within a 4 hour time period ($33.1 \text{ TPH} \times 24 \text{ hrs/day} / 4 \text{ hr replacement period}$) = 240 TPH (rounded to match MR5 for consistency)

Limestone Reclaim Belt Feeder L3	240 STPH
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Limestone Reclaim Conveyor L4	240 STPH
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Limestone Transfer Conveyor L5	240 STPH
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Annual Limestone Consumption (Total)	246,465 short tons / year based on 85% plant capacity of Unit 2 ($33.1 \text{ TPH} \times 24 \text{ hrs/day} \times 365 \text{ days/wk} \times .85$)
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Limestone Storage Pile

Active Storage Capacity Required	3,000 short tons based on three days usage @ 100% plant capacity for Unit 2 ($33.1 \text{ tph} \times 24 \text{ hrs/day} \times 3 \text{ days} = 2,383 \text{ tons}$ rounded to 3,000 to be consistent with MR5)
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Total Capacity Required	25,000 short tons (includes active and dead storage) for a 30 day supply based on 85% capacity factor. Total capacity achieved by usage of mobile equipment. ($33.1 \text{ TPH} \times 24 \text{ hrs/day} \times 30 \text{ days} \times .85 = 20,257 \text{ tons}$ rounded to 25,000 tons to be consistent with MR5)
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3. System Drawings

The following WorleyParsons system drawings show the arrangement and material flow of the limestone unloading system and are part of this study:

<u>Drawing Number</u>	<u>Revision</u>	<u>Drawing Title</u>
2-517018	A	Flow Diagram
12-507000R	A	Site Layout FGD Project
AEBS-2-SK-ZU-002-002	B	System Elevations

The following AEP drawings along with others have been used as reference in preparation of this study:

<u>Drawing Number</u>	<u>Revision</u>	<u>Drawing Title</u>
2-3008-21	20	Unit 2 Track Layout & Yard Drainage
150776-DM-3001 (B&W)	A	Limestone Preparation & Gypsum Dewatering Building – Plan View

4. System Description

OPTION - Limestone Unloading by Truck

The Limestone Truck Unloading Facility will be located within the plant site to the west of an existing oil storage tank. Limestone will be delivered to the Big Sandy plant via over-the-road type dump trucks. The dump trucks will have a capacity of 25 tons each and be unloaded at an average rate of 4 trucks per hour in order to meet the desired limestone storage capacity and usage rate for Unit 2. The unloading system will be designed to receive limestone trucks over a 12 hour period each day for 5 days per week. Each dump truck will exit Highway 23 to the south at the easternmost plant entrance. The trucks will follow a paved access road parallel to Highway 23 heading west towards the Limestone Unloading Building. Located on the paved access road will be a truck scale for weighing the trucks as they enter and exit the Unloading Facility. After being weighed, the trucks will continue on the access road to the Unloading Building where they will drive over a below-grade unloading hopper in order to dump their load. The below-grade unloading hopper will have a capacity of 50 tons. The hopper will be supported by a concrete pit and be covered by the Limestone Unloading Building steel structure. The top of the unloading hopper will be covered by a steel grizzly designed to support the weight of a dump truck. The openings in the grizzly will be sized to prevent any oversize material from entering the system. The unloading hopper will be constructed of a steel outer shell with abrasion resistant wear liners in the area of contact with the limestone. The hopper will have a single discharge outlet at the bottom which will feed the limestone onto a belt feeder. A manually operated rack and pinion cut-off gate will be located in between the hopper outlet and the belt feeder inlet in order to prevent material flow when isolating the feeder for maintenance purposes. The belt feeder will be designed to handle a maximum capacity of 400 STPH at a belt speed of 70 FPM utilizing a 42" wide belt. The belt feeder will include a steel leveling gate to allow the ability to manually set the opening in the skirtboard to adjust the material flow. The 42" Limestone Belt Feeder L1 will transfer the limestone onto a limestone stackout conveyor. The 30" Limestone Stackout Conveyor L2 will convey limestone at a maximum rate of 400 STPH at a belt speed of 260 FPM. The limestone will be discharged through a telescoping chute to form a conical storage pile. The telescoping chute will automatically rise as the pile is being built by use of pile sensing devices linked to the control system in order to minimize dusting during operation. The pile is designed to hold 25,000 short tons of limestone which is equivalent to a 30 day supply. The storage pile will be approximately 62 ft. high with a diameter of 148 ft. Approximately 3,000 short tons of limestone will be considered as live storage. The drive for Conveyor L2 will be located in an intermediate drive tower along the length of the conveyor. The intermediate drive tower will also enclose the vertical gravity take-up assembly.

The limestone will be reclaimed by a combination of gravity and mobile equipment. Gravity reclaim will be utilized for the live reclaim volume and assisted by use of a vibrating pile discharger located underneath the pile. The vibrating pile discharger will activate the material above it to maximize the active reclaim volume. Mobile

equipment will be utilized for the material outside of the live reclaim zone. The interior surface of the pile discharger will be lined with an abrasion resistant liner. From the vibrating pile discharger, the limestone will be fed onto a belt feeder. The vibrating pile discharger and belt feeder will be located inside of a below-grade concrete pit. The reclaim pit will include an emergency escape tunnel to provide a second means of egress. A manually operated rack and pinion cut-off gate will be located in between the hopper outlet and the belt feeder inlet in order to prevent material flow when isolating the feeder for maintenance purposes. The belt feeder will be designed to handle a maximum capacity of 240 STPH at a belt speed of 70 FPM utilizing a 36" wide belt. The belt feeder will include a steel leveling gate to allow the ability to manually set the opening in the skirtboard to adjust the material flow. The 36" Limestone Reclaim Belt Feeder L3 will transfer the limestone to the 24" Limestone Reclaim Conveyor L4 traveling at a belt speed of 260 FPM. A belt scale with an accuracy of one half percent will be located on Conveyor L4 to track and monitor the amount of material conveyed. Conveyor L4 will also have an in-line magnetic separator located above the discharge pulley to remove any tramp metal that may have entered the material stream. A tramp iron bin will be provided to collect any material picked up by the magnetic separator. The limestone will be conveyed on Conveyor L4 to the top of the two (2) Limestone Day Bins. At the discharge of the Limestone Reclaim Conveyor L4, a diverter gate will direct the limestone into Day Bin 1 or to 24" Limestone Transfer Conveyor L5 to feed Day Bin 2.

After leaving the Unloading Building, the empty trucks will be weighed by a second truck scale. A Tire Wash Station will be installed after the trucks are weighed to remove dust and loose material from the tires and undercarriage of the trucks before re-entering the highway.

It is estimated that a minimum of 60 to 70 trucks will be able to be staged on the limestone unloading access road from the truck entrance from Highway 23 to the Unloading Building based on a 30 ft spacing of trucks.

The study includes the costs for limestone truck access road improvements including grading, installation of a sub-base and paving.

All belt feeders and conveyors will be equipped with control and safety devices such as emergency pull cord switches, zero speed switches and belt drift switches. Each belt feeder and conveyor will have a warning horn and rotating beacon to alert personnel that the system is starting. All electrical equipment will be rated for the appropriate environment based on its location.

All elevated conveyors will be supported by trusses designed as an open box type truss with a single 36" wide walkway on one side for access and maintenance. Conveyor sections at grade or inside of tunnels will be supported by channel stringers with angle support legs. Galvanized corrugated conveyor covers will be provided to protect the belt from the environment. Safety guards will be designed and supplied per OSHA Standards. Access will be provided to equipment requiring regular maintenance. Sufficient room will be provided around equipment for maintenance

and/or removal. Access doors will be provided in the transfer chutes for inspection purposes.

A dry fogging-type dust suppression system will be provided in the Limestone Unloading Building. This system will cover the limestone unloading hopper, the transfer of limestone from the 42" Limestone Unloading Belt Feeder L1 to the 30" Limestone Unloading Conveyor L2 and the discharge of limestone into the storage pile. During the truck dumping operation, the hopper will be charged with the dust suppression dry fog prior to material entering the hopper. This will ensure that the material passes through a curtain of dry fog to minimize dust from escaping. Insertable dust collectors will be provided at all transfer points for the reclaim system. The insertable dust collectors will be mounted on the receiving conveyor loading skirtboards.

All conveyor transfer points will include dust seals to minimize dust leakage. These include rubber seals on the skirtboards, rubber dust curtains at the entrance of the head chutes and exit of skirtboard sections, shaft seals and return belt seals on the head chutes. Transfer towers will be enclosed with uninsulated roofing and siding for portions where equipment is located. The transfer towers will not be heated but will include a forced air ventilation system.

No redundancy has been included for the limestone reclaim system. Based on this, a spare motor and reducer for Conveyor L4 will be supplied and located in Transfer Tower #1. In addition, sufficient spare belting for Conveyor L4 will be supplied to resplice the belt in the event of a belt failure. A spray de-icing system will also be supplied at the tail end of Conveyor L4.

This study is based on the assumption that the Limestone Day Bins will provide support for the head end of Conveyor L4, Transfer Tower #1 and Conveyor L5. Transfer Tower #1 will be enclosed and contain the head end of Conveyor L4 and the tail end of Conveyor L5. The remaining portion of Conveyor L5 will not be enclosed to minimize loads to the Limestone Day Bins.

The addition of Unit 1 FGD would not significantly affect the design of the limestone unloading system for Unit 2. The belt speed of the conveyors can be increased to account for the marginal increase in limestone capacity required. The increase in cost for this change would be negligible as compared to the overall cost of the system.

The Limestone Unloading Building will be a pre-engineered type structure equipped with two (2) motorized roll-up doors and sized to accommodate one dump truck at a time. The building will be enclosed with roofing and siding but not be heated or insulated. The roofing and siding will be supplied to match the existing plant color scheme. The main building area will be ventilated by powered roof ventilators and fixed wall intake louvers. An electrical equipment room will be included as part of the unloading building. This room will include an HVAC system for a consistent environment for the electrical equipment. The concrete unloading pit including tunnel and reclaim pit including tunnel will be supplied with a forced air ventilation system.

For fire protection, the underground portion of the limestone unloading conveyor will be provided with a deluge spray system. The portion of the unloading conveyor located more than 40 feet above grade will be provided with hose connections. The remaining conveyors will be completely protected with a deluge spray system. The transfer tower will be protected with a preaction sprinkler system. All suppression systems will be provided with Protectowire detection systems. The limestone prep building will be provided with Class III hose stations.

The Electrical Distribution System supporting the Limestone Unloading System shall include a 480V Motor Control Center (MCC), 480 volt distribution panels and mini-power centers. The MCC shall include two incoming lines and two main circuit breakers. The Electrical Distribution System shall be powered from two independent 480 volt switchgears located at the electrical room in the Byproduct Dewatering Building.

Lighting systems shall be provided for all conveyors, transfer towers and unloading facilities.

A Closed Circuit Television (CCTV) scanning and monitoring system will be provided to assist the operators with remote viewing of the equipment at pre-determined locations throughout the system.

The limestone unloading system will be controlled by a plant wide DCS system. A remote panel will be installed in the electrical equipment room located in the Limestone Unloading Building. This panel will be used to collect and marshal IO for the limestone unloading system. The control signals will be carried by Multi-Mode Fiber Optic Cabling between remote locations and the plant DCS.

The following is a summary of freeze protection and dust control measures that may be considered to protect the limestone storage pile:

Freeze Protection:

Above-ground Emergency Reclaim Hopper & Belt Feeder – In order to break up frozen lumps, an above-ground emergency reclaim hopper with a belt feeder can be utilized. The reclaim hopper would be a free standing unit located adjacent to the limestone storage pile and be loaded by front end loaders. The belt feeder, located below the hopper, would be used to regulate the amount of limestone reclaimed. The hopper and feeder would be orientated 90 degrees to the 24" Limestone Reclaim Conveyor L4A. The reclaim hopper would be equipped with a sloped grizzly so that frozen lumps can roll off onto the ground and be broken up by the bucket of the front end loader. The belt feeder would have a reclaim rate of 240 TPH. Ramps and retaining walls would be provided as required by the final design. The budgetary install cost for this option is \$325,000.

Under-pile Feeder-Breaker – A Feeder-Breaker would be installed on top of the reclaim tunnel at the toe of the pile to reclaim the limestone and breakup any frozen lumps. The design would be similar to what is currently being supplied for the limestone emergency reclaim on the Mitchell project. The Feeder-Breaker would be located such that the limestone storage pile formed by 30" Limestone Unloading Conveyor L2 would be constructed over top of the feed end of the unit. The limestone would be reclaimed by the chain conveyor (feeder) and transported through wing walls attached to the unit into the breaker rolls. The reclaim rate of the Feeder-Breaker would be 240 TPH. An intermediate skirtboard section would be supplied on Conveyor L4A and would have flared ends in order not to impact the normal flow of limestone being reclaimed. The budgetary installed cost for this option is \$550,000.

Dust Control:

Enclosed Structure – The most positive means for minimizing dust migration from the limestone storage pile during windy conditions is to cover the pile with an enclosed structure. The enclosed structure can either be a large pre-engineered type building with roofing and siding or a dome type structure. The dome type structure can be designed as a monolithic concrete thin shell dome or as a geodesic frame made from steel or aluminum. The benefit of enclosing the entire limestone pile is that environmental factors that can impact the material such as wind are minimized. Dust collection or dust suppression systems can be employed for use inside of the enclosed structure as the material is being conveyed to the pile. An enclosed structure would also eliminate the need for runoff collection ponds as no runoff would occur based on the material being covered. The budgetary installed cost for a 185 FT diameter galvanized steel dome is \$650,000.

Limestone Pile Dust Suppression System – A water spray dust suppression system could be installed to minimize dust generation from the limestone storage pile. The dust suppression system piping would be run up the inclined portion of Limestone Unloading Conveyor L2. The water cannons would be located above the limestone storage pile and be supported by Conveyor L2. The system would be activated by preset timers to allow the water to be sprayed on the pile. The pile would be broken into zones for more flexibility in spraying the pile for dust control. The dust suppression pump skid and associated controls would be located within the Limestone Unloading Building. By mounting the dust suppression cannons above the pile, it reduces the chances of them being hit by mobile equipment working the pile. Also by attaching the water piping to the inclined conveyor, the system can easily be drained to the unloading pit for maintenance and/or fire freeze protection. The budgetary installed cost for this option is \$150,000.

Wind Screens – Wind screens can be erected around the pile to minimize the effects of the wind on the limestone storage pile. The wind screens are made of a porous fabric that can reduce wind velocities by 50% or more. The porous material can be knitted from an industrial grade woven polyester material. The porous fabric is more effective than a solid surface type wind screen as wind forces tend to increase at the

outer portions of the solid surface due to differential pressures that result on each side. Wind screens are most effective when used in combination with a fogging type dust suppression system located on the stackout system. The limestone handling system that has currently been specified includes fogging type dust suppression nozzles at the discharge of the stackout conveyor prior to the material being placed in the pile. It is estimated that a 550 ft x 30 ft high wind screen is required to partially enclose the 30 day limestone storage pile on 3 sides. The wind screen would be supported by wooden poles spaced on 20 ft centers with guy wires used as tie backs. The actual location of the wind screen would need to take into account sufficient clearance to allow mobile equipment access to the pile. The budgetary installed cost for this option is \$223,615.

FLOW CONTROL TRANSFER CHUTES

An option to install flow control chutes to reduce that amount of dust generated at the transfer points was investigated. Budgetary pricing information was generated from quotations provided for the Mitchell project. M&J Engineering, located in South Africa, are the designers and manufacturers of Weba flow control chutes. Preliminary pricing and sketches of the required transfer points were not available from the supplier. Based on this, an evaluation could not be made as to the impact to the current limestone system work point elevations and resulting overall conveyor lengths. It is however expected that the addition of the Weba flow control chutes would increase the required height at each transfer point and result in longer conveyor lengths. This may impact conveyor horsepower, support structures and other equipment currently selected. The installed budgetary cost for the three (3) flow control chutes is \$750,000.

Costs for the freeze protection, dust control measures and flow control chutework noted above are "order-of-magnitude" estimates only and are not based on detailed quantity input. These options have not been included in the overall limestone handling system estimated price.

Refer to Appendix 2 – Limestone Handling System Technical Requirements, June 2005, Rev. A for a description of the mechanical, structural and electrical components of the limestone unloading system. Note: This technical specification is preliminary and was generated to solicit budget pricing for the limestone handling system only. A more detailed technical specification will be generated later to solicit firm pricing based on the final design of the limestone handling system.

5. Estimate Summary

An indicative cost estimate has been prepared for the Limestone Unloading System for the Big Sandy Unit 2 FGD system project.

The following scope is included in the estimate:

- Vendor supplied furnish & erect Limestone Unloading System including structural steel and complete electrical scope (as quoted for MR5 Limestone Handling System and modified for BS2).
- Civil/Structural BOP scope to support the Limestone Unloading System option.
- Electrical BOP scope to support the additional loads required for the limestone unloading equipment.

The Limestone Unloading System equipment and steel pricing is based upon vendor quotations solicited for the above system equipment and erection. The balance of BOP equipment pricing is based on quotations for recent FGD projects and in-house database information, and has been adjusted to reflect design parameter differences.

Bulk quantity development was based on a combination of engineering quantity input, estimating takeoff from engineering drawings, and factoring based on equipment sizes. Lengths were based on the equipment locations per the general arrangement drawing. Input from engineering was solicited for major bulk commodities such as civil commodities, and electrical equipment and electrical bulks.

Costs are based on the third quarter of 2005. No additional escalation has been applied to account for unpredictable fluctuations in market pricing of raw materials. Labor pricing is based on local union rates in effect until August 2005, and includes 3.5% overhead and 4% profit. No additional escalation is included. It is recommended that additional escalation be applied at a rate of 4% annually.

Material Take Off (MTO)/Design/Procurement/Contingency

Quantities in the direct cost estimate file are not "neat" quantities. Quantities were factored or routed manually, based on the general arrangement drawing and were not downloaded from engineering models. Consequently the

quantities in the direct cost file include a 7% MTO allowance and a 3% design/procurement allowance on bulk materials. Bulk material unit man-hour rates have also been adjusted to account for work in an existing, operating plant.

Commercial/Construction Clarifications

- The expected accuracy of this option price is +/- 30%.
- All federal, state and local taxes are excluded, with the exception of payroll taxes.
- Since a labor survey for the BS2 project is in progress, the estimate is based on union shop craft rates for the Moundsville, West Virginia area based on the AEP Mitchell Plant. The wage rates are based on the 90% rate granted in the NMAPC agreements.
- The estimate is based on normal market conditions in effect in the third quarter of 2005 regarding material procurement and construction.
- No contingency has been applied to the estimate.
- The estimate includes no costs for mitigation of for any pre-existing hazardous materials.
- Lead and asbestos abatement are excluded.
- Archeological investigation is excluded.
- Owner's costs are excluded.

Cost Summary

The total installed construction costs for the Limestone Unloading Option is as follows:

Option 1: \$7,172,700

The cost estimate details are included on Appendix 3:

Due to the preliminary nature of the design, the operation and maintenance costs have been determined based on a function of the total installed cost and the additional auxiliary load associated with each option. The O&M costs are conceptual in nature and can fluctuate widely being influenced by the final detailed design, manufacturer's warranties, plant maintenance schedules, equipment operational characteristics and durations, etc. Following are the expected annual O&M costs for the option:

Expected Annual Operating Costs

Option 1: \$15,000

Expected Annual Maintenance Costs

Option 1: \$155,000

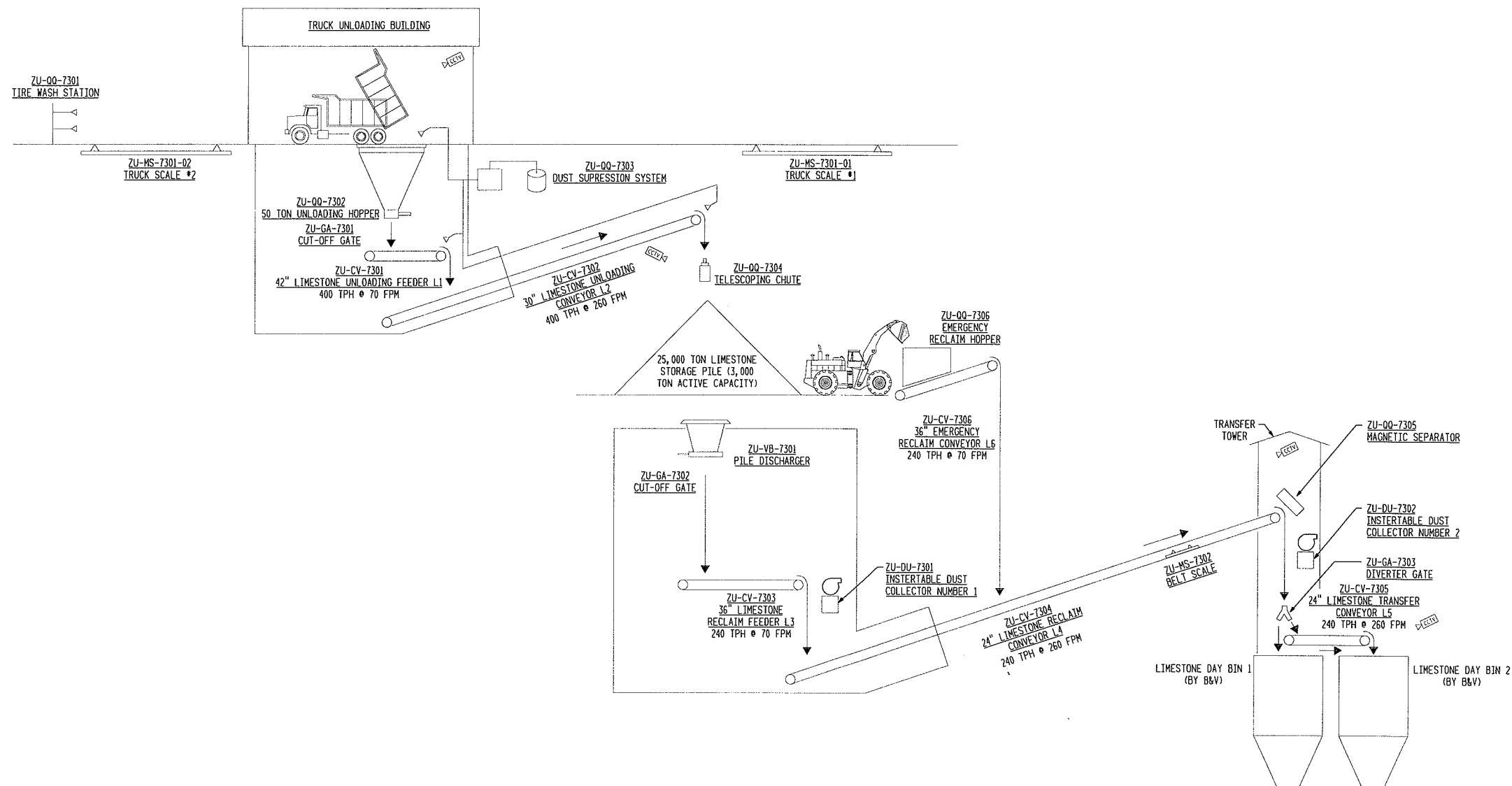
APPENDIX 1

WORLEYPARSONS DRAWINGS

DWG. NO. 2-517018

NOTES

FOR GENERAL NOTES, SYMBOLS
AND SYSTEM CODES SEE DRAWING
Z-517000
ALL TAG NOS. ARE PREFIXED BY
PLANT CODE "BS".
ALL TAG NOS. HAVE UNIT TAG NO. "2"
UNLESS OTHERWISE NOTED.



ISSUED FOR REVIEW AND COMMENT

REV	DATE	BY	CHKD	APPD	DESCRIPTION	APPROV
1	12/09/05	SHM	BP	WPF	BP	FOR

REVISIONS

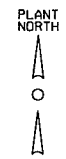
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WorleyParsons resources & energy	
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APPROVED STATUS	DATE
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DRAWN BY	
CHECKED BY	
LEAD DESIGNER	
ENGINEER/TECH SPECIALIST	
PROJECT ENGINEERING MANAGER	
PROJECT MANAGER	
F. G. NADEAU	

KENTUCKY POWER COMPANY	
BIG SANDY UNIT 2	
BIG SANDY	KENTUCKY
FLOW DIAGRAM	
LIMESTONE UNLOADING	
MATERIAL HANDLING	
DWG. NO. 2-517018-A	
SCALE:	
DATE:	
APPROVED BY:	
DATE:	
DOCUMENT PREPARED BY PARSONS E&C	
AEP SERVICE CORP. 1 RIVERSIDE PLAZA COLUMBUS, OH 43215	

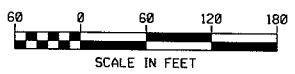
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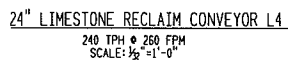
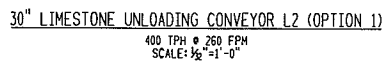
- LEGEND:
1. JET BUBBLING REACTOR (JBR)
 2. JBR PUMP BUILDING
 3. CONTROL/ELECTRICAL BUILDING
 4. REAGENT PREP BUILDING
 5. CHIMNEY
 6. FGD FANS
 7. FGD SUBSTATION
 8. FGD STATION SERVICE TRANSFORMERS
 9. FILTER FEED TANK
 10. MAINTENANCE STORAGE TANK & PUMPS
 11. REAGENT STORAGE TANK
 12. RECLAIM WATER TANK
 13. MAKE-UP WATER STORAGE TANK
 14. LIMESTONE SILO
 15. NEW WAREHOUSE
 16. IN-DUCT SORBENT UNLOADING & STORAGE SILO
 17. OXIDATION AIR BLOWER BUILDING
 18. EMERGENCY QUENCH DIESEL PUMP
 19. LIMESTONE CONVEYOR
 20. MERCURY REMOVAL BAGHOUSE (FUTURE)
 21. WEI ESP (FUTURE)
 22. LIMESTONE STORAGE PILE - 25,000 TON
 23. CEMS BUILDING (IN BOTTOM OF CHIMNEY)
 24. LIMESTONE TRUCK UNLOADING FACILITY
 25. LIMESTONE TRUCK SCALE
 26. LIMESTONE TIRE WASH STATION
 27. RELOCATED OLD WAREHOUSE (PAD ONLY)
 28. REHYDRATION TANKS & PUMP HOUSE
 29. DEWATERING BUILDING
 30. BYPRODUCT CONVEYOR
 31. NEW OFFICE BUILDING
 32. NEW HAZARDOUS WASTE STORAGE BUILDING
 33. JBR STAIRTOWER
 34. ELECTRICAL BUILDING
 35. EMERGENCY LIMESTONE RECLAIM CONVEYOR

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WorleyParsons resources & energy	
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ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
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LEAD DESIGNER B PIASECKI	
ENGINEER/TECH SPECIALIST JS WHITE	
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PROJECT MANAGER FG NADEAU	

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SITE LAYOUT FGD PROJECT NORTH - DUAL AXIAL FANS	
DWG. NO. 12-507000R-A	
SCALE: 1"=40'	DATE: 8/23/05
OR: 1"=40'	APPROVED BY: [Signature]
DOCUMENT PREPARED BY PARSONS E&C	
AEP AMERICAN ELECTRIC POWER	AEP SERVICE CORP. 1 RIVERSIDE PLAZA COLUMBUS, OH 43216



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KENTUCKY POWER COMPANY
BIG SANDY PLANT
BIG SANDY KENTUCKY
LIMESTONE UNLOADING
MATERIAL HANDLING GA
OPTION 1 - TRUCK ELEVATION

DWG. NO. AEBS-2-SK-ZU-002-002

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DR:	

On _____

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LDE			
ORIGINATING PERSONNEL		PROFESSIONAL ENGINEER'S SEAL	
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PROJECT ENGINEERING MANAGER			
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PROJECT MANAGER			
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APPENDIX 2

SPECIFICATION FOR LIMESTONE HANDLING SYSTEM, AEBS-2-SP-092602,
Rev. A, dated June 2, 2005

**AMERICAN ELECTRIC POWER
BIG SANDY UNIT 2 FGD
BIG SANDY, KENTUCKY**

SPECIFICATION

FOR

LIMESTONE HANDLING SYSTEM

AEBS -2-SP-092602

REVISION A

JUNE 2, 2005

Parsons E&C
2675 Morgantown Road
Reading, PA 19607

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1.0 SCOPE

1.1 GENERAL

- a. This specification covers the requirements for the unloading, stockpiling and reclaiming of pre-crushed limestone for the AEP-Big Sandy Power Plant near Louisa, Kentucky. The Limestone Handling System is summarized as follows:

Unload limestone from dump trucks at the new Limestone Truck Unloading Facility and conveying it to a storage pile at a rate of 400 TPH. The limestone will be reclaimed and conveyed to one of two Day Bins at a rate of 240 TPH.

- b. This specification, together with the data sheets, flow diagram, preliminary arrangement drawing(s) and the referenced Technical Specifications, covers the minimum requirements for the design, furnishing, fabrication, assembly, shop painting, shop testing, inspection, packaging and delivery to the jobsite of the Limestone Handling System.
- c. The Supplier shall refer to Section 12 for Site Specific Data.

1.2 ITEMS INCLUDED

The following items and services shall be included as part of the Supplier scope of work:

1. Truck Unloading

One (1) Truck Scale → 2 truck scales ?

One (1) Truck Wash System to wash/spray dump trucks after unloading.

One (1) Pre-Engineered type Limestone Unloading Building with one (1) unloading bay. The building will include a ventilation system, hoist beam over equipment well, washroom facility and electrical control room. Two (2) electrically operated roll-up doors will be provided. Limestone Unloading Building to be approx. 55 ft long x 35 ft wide.

One (1) Drive-Over type Limestone Truck Unloading Hopper (50 ton capacity) including Grizzly complete with liners, supports, stiffeners, etc.

One (1) Manual Rack & Pinion Cutoff Gate

One (1) 42" Limestone Unloading Belt Feeder L1 complete with idlers, pulleys, belting, drive unit, one (1) primary and one (1) secondary belt scrapers, V-shaped return belt plow, horizontal screw belt take-up, fully covered and lined skirtboards, safety switches, head chute and transition chute.

One (1) Dust Suppression system for Unloading Hopper, Unloading Belt Feeder L1 and tail end of Limestone Unloading Conveyor L2.

One (1) Ventilation System for Unloading Pit and Tunnel.

One (1) Sump Pump for Unloading Pit.

One (1) 30" Limestone Unloading Conveyor L2 complete with idlers, pulleys, belting, drive unit, one (1) primary and two (2) secondary belt scrapers, V-shaped return belt plow, vertical gravity belt take-up, fully covered and lined skirtboards, conveyor covers, safety switches, head chute and transition chutes.

One (1) Telescoping Chute L2

One (1) Insertable Dust Collector for head chute of Conveyor L2

One (1) Pile Discharger

One (1) Manual Rack & Pinion Cutoff Gate

One (1) 36" Limestone Reclaim Belt Feeder L3 complete with idlers, pulleys, belting, drive unit, one (1) primary and one (1) secondary belt scrapers, V-shaped return belt plow, horizontal screw belt take-up, fully covered and lined skirtboards, safety switches, head chute and transition chute.

One (1) Ventilation System for Reclaim Pit and Tunnel.

One (1) Sump Pump for Reclaim Pit.

One (1) Limestone Reclaim Conveyor L4 complete with idlers, pulleys, belting, drive unit, one (1) primary and two (2) secondary belt scrapers, V-shaped return belt plow, vertical gravity belt take-up, fully covered and lined skirtboards, conveyor covers, safety switches, head chute and transition chutes.

One (1) Belt Scale L4 (.5% accuracy)

One (1) Cross Belt Magnetic Separator L4 (at exit of reclaim tunnel)

One (1) Insertable Dust Collector for head chute of L4

One (1) Metal Detector L4

One (1) Jib Crane including Hoist for head end of L4

One (1) Diverter Gate L4/L5 and transfer chutework

One (1) Support structure for Conveyor L4 head end and L4/L5 diverter gate at top of Day Bin A

One (1) Limestone Transfer Conveyor L5 complete with idlers, pulleys, belting, drive unit, one (1) primary and two (2) secondary belt scrapers, V-shaped return belt plow, horizontal screw belt take-up, fully covered and lined skirtboards, conveyor covers, safety switches, head chute and transition chutes.

One (1) Support platform for Conveyor L5 spanning between Day Bin A and B

One (1) CCTV system with one (1) monitor and four (4) cameras

2. Lining materials where Limestone may come in contact with chutework, etc. including head chutes, transition chutes and skirtboards.
3. All support structures including transfer towers, trusses, bents, stringers and stub legs, drive supports and any other miscellaneous support steel that may be required for a complete system.
4. Walkways, platforms, stairs and ladders for accessing all equipment requiring periodic maintenance including Telescoping Chute L2 from Limestone Unloading Conveyor L2 walkway & platforms.
5. Nuts, bolts, fasteners, gaskets and sealants for chutework as required for the assembly and installation of the equipment being supplied.
6. Safety and control devices for all the equipment being supplied including, but not limited to, low speed switches, emergency stop switches, belt drift switches, limit switches, material sensors, plugged chute switches, etc. as required for a complete operational system.
7. All required warning horns, beacons and safety signs.

8. Lighting and receptacle systems
9. A fully operational electrical distribution system for provision of power to all electrical loads associated with the conveyors and transfer towers. Loads include all those required for material handling, lighting, receptacles, heating, and ventilation.
10. Conveyor system and transfer tower grounding.
11. Lightning Protection.
12. Motors and local control panels. Provide local control panels to operate system for maintenance. Devices on local panels will operate through Owner's DCS. Emergency stop functions, pushbuttons or pull stations, will be hardwired directly to motor drive controllers.
13. The control functions and logic requirements will be part of a Distributed Control System (DCS) programmed and provided by Owner.
14. Provide a detailed system description of operation in conjunction with logic drawings for the conveyor system and auxiliaries in all modes of operation, fully automatic, start-up and shutdown.
15. Monorail beams and hoists with trolleys required for the removal and maintenance of the drive equipment (i.e. motors, gear boxes, etc.) associated with the equipment being supplied.
16. Technical field assistance services during erection, start-up & commissioning of the equipment being supplied.
17. Supply all documentation, drawings, manuals, procedures, instructions, engineering and technical data, reports, lists, etc. specified herein.
18. Supply touch-up paint for field application.

1.3 ITEMS NOT INCLUDED

The following items are not included as part of the Supplier scope of work. They will be provided by the Owner.

1. Receiving, unloading and installation of the equipment provided by the Supplier.
2. Design, supply and installation of all concrete foundations for the equipment being supplied.
3. Design, supply and installation of the Limestone Preparation System.
4. Supply and installation of all anchor bolts and concrete embedment.
5. Design, supply and erection of all FGD buildings, including the Limestone Preparation Building ^{and} including Limestone Day Bins. X 
6. Field application of touch-up paint.
7. Supply and programming of Distributed Control System (DCS).
8. Supply and installation of all control I/O cabinets and operator interface stations.
9. Below- grade grounding system and lightning protection system materials, and pigtails for above-grade connections, by the Supplier, to his systems.

2.0 SUBMITTALS

With Bid:

The Supplier shall submit the following with the bid:

1. Preliminary electrical load list
2. Utility requirement list

After Award:

The Supplier shall submit the following drawings, documents, data, lists, manuals, instruction and reports, after contract award, for review and approval. Each submittal shall include three (3) copies of each item being submitted.

1. Conveyor plan and profile drawings (small scale general arrangement drawing). These drawings shall have sufficient details and overall dimensions to define the entire system space requirements and interface points.
2. Dimensional outline drawings showing entire equipment with major dimensions and weight, method of support, platform and access requirements as well as space requirements for disassembly and maintenance.
3. Assembly/installation/erection drawings with erection/piece marks for all equipment, sub-assemblies and components.
4. Shop detail drawings used for steel fabrication of conveyor system.
5. Final certified G.A. drawings.
6. Utility location drawings showing the location, size and type of each interface connection between the Supplier and the Owner for all piping, control devices and electrical interface connections.
7. Plot plan and material flow diagram.
8. Structural load drawings indicating the magnitude, direction and point of application of all dead, live, wind, snow, seismic and impact loads being imposed upon the support steel and foundations by the equipment.
9. Foundation outline drawings including anchor bolt schedule, locations and details.
10. Erection drawings for the steel structures.
11. Logic and SAMA diagrams of all required logic for all equipment.
12. Electrical drawings including electrical schematics and wiring diagrams suitable for the design of controls, power distribution and terminations.
13. Panel and device wiring diagrams.
14. Motor list including auxiliary motors.
15. Motor data sheets.
16. Equipment wiring termination drawings.
17. Instrument and control device list
18. Input/Output list.

19. Alarm List.
20. Instrument mounting, hook-up and termination details.
21. Instrument ISA data sheets.
22. System components list.
23. System descriptions for all equipment.
24. Final electrical load and utility requirement lists.
25. Structural calculations for the design of the transfer towers, conveyor support structures, as well as connection design calculations for all structural steel. All structural calculations and drawings shall be prepared and sealed by a registered engineer in the state of Ohio
26. Welding procedures and welder qualification records.
27. Quality assurance and control program manuals.
28. Description of all test methods and procedures to be used.
29. Shop testing procedure to verify compliance with the contract requirements.
30. Installation, operation and maintenance procedures/instructions.
31. Handling, storage and shipping procedures/instructions.
32. Monthly progress reports.
33. Bills of material.
34. Catalog cuts and equipment/product data sheets.
35. Lubrication requirements data sheets with cross references.
36. Acoustical data for every piece of equipment.
37. Spare Parts list.

3.0 CODES AND STANDARDS

1. The latest edition and published addenda at the time of contract signing of the following publications are applicable to the extent indicated by the specific reference. All equipment furnished and work performed under this section shall comply with the approved standards, specifications, regulations, codes and tests of the following:
 - a. Air Movement & Control Association, Inc. (AMCA).
 - b. American Gear Manufacturers Association (AGMA).
 - c. Anti-Friction Bearing Manufacturers Association (AFBMA).
 - d. Conveyor Equipment Manufacturer's Association (CEMA) Standards.
 - e. National Electrical Manufacturers Association (NEMA).
 - f. Rubber Manufacturer Association (RMA).
 - g. Society of Automotive Engineers (SAE).
 - h. American Petroleum Institute (API).
 - i. American Society of Mechanical Engineers (ASME).
 - j. American Society for Nondestructive Testing, Inc. (ASNT).

- k. American Institute of Steel Construction (AISC).
 - l. American Society for Testing and Materials (ASTM).
 - m. Instrumentation, Systems, and Automation Society (ISA).
 - n. Institute of Electric and Electronics Engineers (IEEE).
 - o. Pipe Fabrication Institute (PFI).
 - p. American Welding Society (AWS).
 - q. Environmental Protection Agency (EPA).
 - r. Factory Mutual Insurance Company (FM).
 - s. Occupational Safety and Health Administration (OSHA):
 - t. Hydraulic Institute Standards (HIS).
 - u. Manufacturers Standardization Society (MSS).
 - v. Mechanical Power Transmission Association (MPTA).
 - w. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
 - x. The Society for Protective Coatings (SSPC).
 - y. Underwriters Laboratories (UL).
 - z. National Fire Protection Association (NFPA).
 - aa. State of Ohio Building Code, latest Edition.
 - bb. National Electrical Code (NEC).
 - cc. American National Standards Institute (ANSI).
 - dd. Illuminating Engineering Society (IES).
2. Where the above referenced codes and standards contain recommendations in addition to requirements, the recommendations shall be considered requirements and shall be followed unless stated otherwise in this specification.
3. In the event of any conflict between codes, or the specifications and codes, the more stringent regulation shall apply.

4.0 GENERAL

The Supplier is expected to comply fully with the complete requirements of this specifications, referenced Technical Specifications, Limestone Handling System Data Sheets, Flow Diagrams and General Arrangement drawings. Any deviations must be clearly stated in the proposal.

5.0 DESIGN REQUIREMENTS

5.1 SYSTEM DESCRIPTION

The Limestone Handling System shall be designed to receive limestone from rear dump trucks and convey it to the limestone storage area. The limestone will be reclaimed and conveyed to the Limestone Day Bins. Refer to the system flow diagram for material flow path.

5.2 MATERIAL SPECIFICATION

Limestone Properties:

Material Size – $\frac{3}{4}$ " x 0"

Moisture Content – 1 to 12%

Bulk Density Used For
Volumetric Sizing of System
Components (i.e. chutes, bins,
belt widths, etc.) – 80 pcf

Bulk Density Used For
Volumetric Sizing of Piles
And Silos – 95 pcf

Bulk Density Used For
Volumetric Structural
Loading Calculations – 120 pcf

Angle of Repose – 40 degrees

5.3 MATERIALS OF CONSTRUCTION

All materials shall be new, free of defects and suitable for the application. Materials shall be selected with consideration to both erosion and chemical corrosion effects of the system.

5.4 EQUIPMENT PERFORMANCE & DESIGN REQUIREMENTS

1. All equipment shall be designed for outdoor conditions.
2. The system shall be designed for continuous operation - 24 hours per day 7 days per week, for 25 year plant life.
3. The Supplier shall supply a complete Limestone Handling System capable of satisfying the design capacities, flow rates and flow paths indicated on the flow diagram.
4. The design parameters specified, such as design capacities, belt width, etc., are minimum requirements. If the Supplier's design or experience dictates that these minimum requirements be exceeded to meet the specified performance, or to provide a safe and reliable operating system, the Supplier shall provide equipment capable of doing so.
5. The system shall be capable of operating continuously at the specified design capacity without pluggage, spillage and/or motor overload. All equipment shall be designed to start under full load when loaded to the design capacity.
6. The bulk densities and angle of repose for the material being handled shall be as specified on the Limestone Handling System data sheet.
7. The equipment types, design features and operator types shall be as specified on the flow diagram.
8. The minimum CEMA classification for all conveyor idlers shall be C5. Spacing for load carrying idlers shall not exceed 4 feet, and spacing for return idlers shall not exceed 10 feet. All idler bearings shall be lubricated and sealed for life.

9. Belt speed shall be based on the design capacity, minimum density and a maximum of 90% CEMA loadings for all conveyors.
10. The maximum incline for all limestone conveyors shall be 16° .
11. All outdoor conveyors shall be enclosed with $\frac{3}{4}$ cover hinged hood covers, fabricated using flat galvanized steel sheet and supported by formed angle bands, to allow for ease in maintenance, inspection and removal. The covers shall extend for the entire length of the outdoor portion of the conveyor. Provisions are required to interface the conveyor covers with enclosed structures/towers.
12. Skirtboard covers shall be a minimum of $\frac{3}{16}$ " A-36 carbon steel plate for the entire length of the skirtboards.
13. Material of construction for all skirtboards, head and transition chutes shall be a minimum of $\frac{1}{4}$ " thick A-36 carbon steel.
14. All chutes shall be designed for plugged chute condition loads. All chutes shall be sized for a minimum of 3 times the free fall area. Minimum chute valley angles are 65 degrees.
15. All skirtboards, head and transition chutes shall be lined with $\frac{1}{2}$ " minimum thickness AR 400 plate on impact surfaces and $\frac{3}{8}$ " minimum thickness A304 Stainless Steel on sliding surfaces. Liner attachment shall be via countersunk bolts.
16. The vertical travel distance of the Telescoping Chute L2 shall be 55 feet (chute outlet shall be approximately 7 feet above grade). The telescoping chute shall be sized for free fall material. The cones will be constructed from $\frac{1}{4}$ " thick AR 400.
17. The Telescoping Chute L2 shall be provided with level sensing units. The Telescoping Chute L2 shall rise automatically as pile height increases. The sensing units shall be provided with electric cable reel with cable.

5.5 STRUCTURAL REQUIREMENTS

1. Head chutes and support frames shall have access to the drive on three sides.
2. The maximum deflection on trusses at normal dead and live load shall not exceed $L/240$ or 3" whichever is less.
3. Minimum spacing between conveyor bents shall be 60 feet. Clearance over roadways shall be 18 feet minimum.
4. Walkways shall be at least 3'-0" wide (clear unobstructed width). For a single conveyor configuration, a walkway shall be provided on one side of the conveyor.
5. Walkway grating shall be $1\frac{1}{4}$ " x $\frac{3}{16}$ " welded non-slip galvanized grating or 11 ga. Gripstrut. Hand railing and stairs shall be provided as required. Walkways, handrails and stairs shall comply with the requirements of OSHA and all state and local building codes.
6. All access to platforms used for regular maintenance shall be by stairway only.
7. All bents shall be the Supplier's standard design. Structural shapes shall be used for all members.
8. Structural and plate steel shall be ASTM A36 or ASTM A529 Grade 50. Primary field connections shall use A325 bolts, nuts and washers. All secondary connections, such as purlins, girts and stairs, shall be A307 bolts, nuts and washers.

9. Structures shall be designed to accommodate the dead, live, dynamic and impact loadings of the equipment, as well as the site specific loadings per the codes and standards named in Section 12.0 "Site Specific Data".
10. Welding shall be in accordance with AWS D1.1/D1.1M-2004.
11. All conveyor trusses shall be provided with drip pans below the return belt of the conveyor where the trusses span building roofs, equipment and plant roads. The drip pans shall extend 10 feet beyond the edge of the building roofs, equipment and plant roads.
12. All transfer towers shall be enclosed with uninsulated roofing and siding. All enclosed towers shall include a ventilation system designed for 6 air changes per hour.

5.6 INSTRUMENT AND CONTROLS

1. All instruments shall be suitable for outdoor conditions.

5.7 ELECTRICAL

1. The limestone handling electrical distribution system shall be designed to accept two permanently connected sources of 480 volt power – normal and alternate – provided by the Owner. The Supplier shall design his electrical system to ensure reasonable continuity of electrical service to material handling and other loads if the normal source of Owner-supplied power becomes de-energized. Manual operation – local or DCS - of Supplier-provided switching equipment to connect the Owner's alternate source to limestone handling loads is acceptable to meet the reasonable continuity criterion.
2. All electrical equipment shall be suitable for outdoor conditions, NEMA 3R
3. Motors shall be provided in accordance with Technical Specification AEBS-5-TS-16221– "575 Volt and Lower Electric Motors, Revision A". Motors greater than
4. Electrical equipment provided with and in direct support of mechanical equipment shall be provided in accordance with Technical Specification AEBS-5-TS-16180– "Electrical Requirements for Packaged Mechanical Equipment, Revision A".
5. Lighting systems shall be provided for all conveyors, transfer towers and unloading facility. Fixtures shall be heavy duty, corrosion resistant, enclosed and gasketed 100 watt metal halide units. Foot-candle illumination requirements shall, in general, be in accordance with IES recommendations. For conveyor walkways, 2 foot-candles are required for general use, with 5 foot-candles required for areas where maintenance activities are anticipated. For transfer towers, 30 foot-candles are required for general interior lighting, and 10 foot-candles are required for stairwells and platforms.
6. 120 volt convenience receptacles shall be provided within the unloading facility and transfer towers. 600 volt weatherproof receptacles shall be provided at each elevation within the unloading facility and transfer towers and at approximately 100 foot intervals along the length of the conveyors for powering the Owner's 600 volt welding equipment.
7. Above grade lightning protection systems shall be provided in accordance with NFPA 780. The Supplier shall connect above grade lightning protection equipment to ground pigtails provided by Others.
8. Grounding materials shall be provided in accordance with NFPA 70 (National Electrical Code). The Supplier shall connect above grade grounding materials to ground pigtails provided by Others.

9. Cable tray shall be aluminum ladder type with 9-inch rung spacing. Separate tray shall be provided for a) medium voltage power cable, b) low voltage power cable, c) control cable, and d) instrumentation cable. Power cable tray shall have 4-inch loading depth and control and instrumentation tray shall have 6-inch loading depth
10. Exposed conduit shall be rigid aluminum, conduit embedded in concrete or direct buried shall be rigid galvanized steel, and schedule 40 PVC conduit shall be used for underground duct runs. Liquid-tight flexible metallic conduit shall be used for connections to motors and to equipment which may move due to expansion or adjustment.
11. Medium voltage power cable shall be shielded, 105 degrees C copper conductor temperature, 133% ethylene propylene rubber (EPR) insulation, with a flame retardant (FR) chlorinated polyethylene jacket (CPE).
12. Low voltage power and control cable shall be 90 degrees C copper conductor temperature, 600 volt EPR or cross-linked polyethylene (XLPE) insulation with an FR CPE jacket.
13. Instrumentation cable shall be 90 degrees C copper conductor temperature, 600 volt EPR or XLPE insulation. Cables shall consist of single or multiple shielded twisted pairs, with multiple pair cables having an overall shield. Overall jacketing shall be FR CPE.
14. Medium voltage switchgear assemblies shall comply with the ANSI C37 family of standards and NEMA SG-4 and SG-5. The anticipated short circuit current interrupting requirement at the point of delivery of 480 volt power is 65kA. Low voltage switchgear shall comply with the ANSI C37 family of standards. Low voltage motor controllers and motor control centers shall comply with the appropriate NEMA ICS standards, along with NEMA AB 1, and UL 489 and 845.

5.8 NOISE EMISSIONS

The sound power level emitted from the equipment provided shall not exceed 85 dBA at a distance of 3 feet from the source surface and 4.5 feet above grade. Measurement requirement shall comply with applicable portion of ANSI S.4 and S1.25.

5.9 PAINTING

All conveyor trusses, bents, chutework, transfer towers & miscellaneous conveyor fabrication, etc., which are not galvanized or stainless steel, shall be shop painted after fabrication. All surfaces except the inside surfaces of chutes, shall be prepared, primed and finish painted as follows:

Surface Preparation – SSPC-SP6

Primer Coat – Inorganic Zinc (2-3 mils)

Intermediate Coat – Polyamide Epoxy (3-6 mils)

Top Coat – Aliphatic Polyurethane (3-5 mils)

Checkered plate, grating, stairs, ladders and handrails shall be galvanized in accordance with ASTM A123 and ASTM A385. All bolts, nuts and washers shall be mechanically galvanized.

6.0 INSPECTION & TESTING

The Buyer reserves the right to inspect all materials during fabrication prior to shipping. The Supplier's standard shop tests shall be performed on all equipment being supplied. In addition, the Supplier shall perform all shop tests required to certify that the equipment and material being supplied meet contract requirements.

7.0 SPARE PARTS

The Supplier shall provide a preliminary list of recommended spare parts with prices, and the expected operating life (in months) of all routing replacement parts.

8.0 PERFORMANCE GUARANTEE

The Supplier shall guarantee that the system/equipment being provided will operate safely, satisfactorily and reliably, without plugging at the specified design capacities.

9.0 MARKING AND IDENTIFICATION

Each piece of equipment will be provided with a permanent corrosion-resistant nameplate with the following information. The information will be stamped or engraved with at least 3/16" high letters:

- Name of equipment.
- Manufacturer's name.
- Manufacturer's shop order number.
- Owner's equipment identification number (tag number).
- Operating data.

10.0 SHOP ASSEMBLY

Shop assembly will be furnished to the maximum extent possible for shipments with standard shipping sizes. Shop assembly will include the following items:

- Mounting carry and return idlers to stringers and trusses.
- Mounting head, tail and bend pulleys to their supports.
- Mounting belt cleaners and plows.
- Mounting stair treads to stair stringers.
- Complete shop assembly of belt feeders including belting.

11.0 SHIPPING, HANDLING & STORAGE

Seller shall assemble, match mark and suitable package all components in order to protect them during shipment and allow for rapid unloading, accurate tracking and proper storage at the site. Seller shall supply inspection requirements and short and long term storage instructions for each component shipped. Components will be suitable packages for shipment to prevent damage during transit to the jobsite. Surfaces will be coated to protect them from corrosion prior to shipment.

12.0 SITE SPECIFIC DATA

The following tabulation provides the site data for the Big Sandy Power Plant:

SITE SPECIFIC DATA (To be revised to eliminate repeating data in other sections)

Location:	5 miles north of Louisa, KY	
Maximum Outdoor Ambient Temperature Range (Huntington, WV) (°F):	-21	to 102
Design Outdoor Temperature Range (Based on 0.4% ASHRAE Huntington, WV), °F	6	91
Design Indoor Ambient Temperature Range (Heated and Ventilated only), °F	65	101
Indoor Ambient Temperature Range (Control/computer Rooms), °F	70	75
Indoor Ambient Temperature Range (Office Areas), °F	72	78
Design Indoor Ambient Temperature Range (Switchgear/ Relay Rooms), °F	65	101
Maximum Indoor Temperature (<12 hrs/yr Ventilated Areas/Switchgear/Relay Room)		110
Design Wet Bulb Temperature (Based on 0.4% ASHRAE Huntington, WV), °F	7	
Relative Humidity, %	25	to 100
Closed Cycle Cooling Water (generally not available for use, see Section 5)		
WFGD Makeup water Temperature – minimum/maximum, °F	33/(later by AEP)	
Instrument Air Maximum pressure, psig	125	
Instrument Air Minimum pressure, psig	80	
Instrument Air Dewpoint, °F	-40	
Service Air Maximum Pressure, psig	125	
Service Air Minimum Pressure, psig	80	
Service Water Normal / Maximum Pressure (Refer to Section 5 of criteria)		
Seal Water Normal / Maximum Pressure, psig (Not available to FGD/SCR Project – use Service Water)	NA	
Elevation (feet above mean sea level)		568 (main plant)
Wind (Per IBC 2000 & ASCE 7-98)		
Basic Wind Speed, V (IBC 2000 Fig 1609)		90 mph
Exposure Category (IBC 2000 Section 1609.4)		C
Building & Structure Classification (IBC 2000 Table 1604.5)		Category II
Importance Factor, I _w (IBC 2000 Table 1604.5)		1.15
Rain		
10 year, 24 hour, inches		4.0
25 year, 24 hour, inches		4.6
100 year, 24 hour, inches		5.5
Frost		
Maximum Depth, inches (NAVFAC DM 7.1, p 7.1-42)		32
Snow (Per IBC 2000 & ASCE 7-98)		
Ground Snow Load, Pg (IBC 2000 Figure 1608.2, ASCE 7-98, Figure 7-1)		15 psf
Exposure (Terrain) Category (IBC 2000 Section 1609.4)		C
Exposure Factor, Ce (IBC 2000 Table 1608.3.1) Based pm Roof Exposure		0.9-1.1
Thermal Factor, Ct (based on unheated structure) (IBC 2000 Table 1608.3.2)		1.2
Building & Structure Classification (IBC 2000 Table 1604.5)		Category II
Importance Factor, I _s (IBC 2000 Section 1604.5)		1.1
Seismic (Per IBC 2000)		
Site Class (IBC 2000 Table 1615.1.1)		D
Seismic Use Group (IBC 2000 Section 1616.2)		II

Mapped Spectral Response Acceleration, short period (IBC 2000 Figure 1615(1))
Mapped Spectral Response Acceleration, 1 second period (IBC 2000 Figure 1615(2))
Seismic Design Category (IBC 2000 Table 1616.3(1) & Table 1616.3(2))

Building & Structure Classification (IBC 2000, Table 1604.5)
Importance Factor, I_E (IBC 2000, Table 1604.5)

$S_s = 0.25g$
$S_1 = 0.10g$
C
Category II
1.25

Electrical Power Supplies Available (Nominal Value) for new equipment, unless identified otherwise are as follows:

13,800 VAC, 3- phase, 60 Hz, Motor Sizes 4000 HP and Up
4160 VAC, 3-phase, 60 Hz, Motor Sizes greater than 250 HP, but less than 4000 HP
480 VAC, 3-phase, 60 Hz, Motor Size 0.5 to 250 HP and all Reversing Starter
208 VAC 3-phase, 60 Hz
120 VAC, 1-phase, 60 Hz
120 VAC, 1-phase 60 Hz, UPS Source
125 VDC

13.0 ATTACHMENTS

The following flow diagram and drawings, data sheet and technical specifications shall be considered as an integral part of this specification:

13.1 DRAWINGS

Drawing No.	Title	Rev No.
AEBS-2-SK-ZU-002-001	Plot Plan Limestone Handling System	A
AEBS-2-SK-ZU-002-002	Flow Diagram Limestone Handling System	A
AEBS-2-SK-ZU-002-003	General Arrangement Limestone Handling System	A

13.2 DATA SHEET

Limestone Handling System Data Sheets – AEBS-2-DS-092602-0001, Revision A.

13.3 TECHNICAL SPECIFICATIONS

1. Technical Specification AEBS-2-TS-16180 - Electrical Requirements for Packaged Mechanical Equipment, Revision A.
2. Technical Specification AEBS-2-TS-16221 - 460 Volt and Lower Electric Motors, Revision A.

APPENDIX 3

COST ESTIMATE DETAIL

PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power				Present Day: 7/15/2005				I-06							
Project Name: Big Sandy Unit 2 - Limestone Unloading Study				Revision Number: 1											
Location: Louisa, KY				Estimate Coordinator:											
Capacity: 1 @ 800 MW				Lead Estimator: Ericke											
Type: Wet FGD				Checked By:											
Currency: USD		Seismic Zone: 1		Proposal Number: 53770701		Partner(s):									
				Configuration: LIMESTONE UNLOADING STUDY - Rev 1											
User 1	User 2	PBS	Acct	Mat	Description	Quantity	U/M	Material Unit	Labor Unit	Crew	Crew Rate	Material Cost	Labor Cost	Total Cost	Manhour:

Option 1 (Truck)

620 CONTROL ROOM BUILDING																	
64100 PLANT DC POWER SYSTEM																	
pt1 4G2	620	I02	64100	0510	35	DCS Addition	1.00	LS	143,000.00	120.000	E02BS	92.91	143,000	11,149	154,149	120.0	
Subtotal For PBS64100PLANT DC POWER SYSTEM														143,000	11,149	154,149	120.0
Subtotal For Island 620 CONTROL ROOM BUILDING																	
630 POWER HOUSE ELECTRICAL EQUIPMENT & BOP																	
63103 MOTOR CONTROL CENTERS, 380V TO 480V																	
pt1 4G2	630	E05	63103	0232	35	Limestone Handling System MCC, 600V, outdoor rated	2.00	EA	5,000.00	12.000	E02BS	92.91	10,000	2,230	12,230	24.0	
pt1 4G2	630	E05	63103	0232	35	Power Circuit Breaker, 480 V	4.00	EA	1,500.00	8.000	E02BS	92.91	6,000	2,973	8,973	32.0	
Subtotal For PBS63103MOTOR CONTROL CENTERS, 380V TO 480V														16,000	5,203	21,203	56.0
Subtotal For Island 630 POWER HOUSE ELECTRICAL EQUIPMENT & B																	
720 SORBENT HANDLING EQUIPMENT & BOP																	
11100 SITE PREPARATION																	
pt1 4I0	720	C03	11100	4011	35	Site cut, remove containment dike	7,940.00	CY	0.00	0.035	C01CS	90.02	0	25,017	25,017	277.9	
pt1 4I0	720	C05	11100	4022	35	Spoils, remove containment dike	7,940.00	CY	0.00	0.032	C01CS	90.02	0	22,872	22,872	254.1	
Subtotal For PBS11100SITE PREPARATION														0	47,889	47,889	532.0
11301 ROADS AND PARKING LOTS																	
pt1 4I0	720	C03	11301	4061	35	Subgrade prep, main & loop road	8,932.00	SY	0.00	0.009	C01CS	90.02	0	7,237	7,237	80.4	
pt1 4I0	720	C13	11301	4812	35	4" Paving, wearing course, main & loop road	6,699.00	SY	6.95	0.021	C01BS	86.23	46,558	12,131	58,689	140.7	
pt1 4I0	720	C13	11301	4812	35	6" Paving, base course, main & loop road	6,699.00	SY	10.43	0.032	C01BS	86.23	69,871	18,485	88,356	214.4	
pt1 4I0	720	C13	11301	4813	25	16" aggregate base course, shoulders, main & loop road	2,233.00	SY	16.60	0.028	C01CS	90.02	37,202	5,628	42,830	62.5	
pt1 4I0	720	C13	11301	4813	25	6" aggregate base course, main & loop road	6,699.00	SY	6.25	0.012	C01CS	90.02	41,869	7,237	49,105	80.4	
pt1 4I0	720	C13	11301	4835	35	Geotextile (Amoco 2016), main & loop road	8,932.00	SY	0.91	0.002	C01BS	86.23	8,128	1,540	9,669	17.9	
Subtotal For PBS11301ROADS AND PARKING LOTS														203,627	52,258	255,885	596.2
15501 SORBENT HANDLING-RECEIVING/UNLOADING FOUNDATIONS																	
pt1 4I0	720	C05	15501	4022	35	Spoils, limestone dumper pit and tunnel	1,769.00	CY	0.00	0.032	C01CS	90.02	0	5,096	5,096	56.6	
pt1 4I0	720	C03	15501	4051	35	Excavate, limestone dumper pit and tunnel	27,232.00	CY	0.00	0.020	C01CS	90.02	0	49,028	49,028	544.6	
pt1 4I0	720	C03	15501	4055	35	Backfill & compact, limestone dumper pit and tunnel	25,463.00	CY	0.00	0.095	C01CS	90.02	0	217,757	217,757	2,419.0	
pt1 4I0	720	F01	15501	4118	35	Rebar, limestone dumper pit	25.03	TN	800.00	26.000	S01BS	88.58	20,024	57,646	77,670	650.8	

PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power
 Project Name: Big Sandy Unit 2 - Limestone Unloading Study
 Location: Louisa, KY
 Capacity: 1 @ 800 MW
 Type: Wet FGD
 Currency: USD
 Seismic Zone: 1
 Proposal Number: 53770701
 Configuration: LIMESTONE UNLOADING STUDY - Rev 1
 Partner(s):
 Present Day: 7/15/2005
 Revision Number: 1
 Estimate Coordinator:
 Lead Estimator: Ericke
 Checked By:

L-06

User 1	User 2	PBS Code	Acct Code	Mat Stat	Description	Quantity	U/M	Material Unit	Labor Unit	Crew	Crew Rate	Material Cost	Labor Cost	Total Cost	Manhours
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Option 1 (Truck)

720 SORBENT HANDLING EQUIPMENT & BOP

15501 SORBENT HANDLING-RECEIVING/UNLOADING FOUNDATIONS

pt1	410	720	F01	15501	4120	35	Formwork, limestone dumper pit	10,992.00	SF	3.11	0.300	S01AS	71.65	34,185	236,273	270,458	3,297.6
pt1	410	720	F01	15501	4123	35	Concrete, limestone dumper pit	402.00	CY	85.60	1.200	S01CS	94.90	34,411	45,780	80,191	482.4
pt1	410	720	F03	15501	4127	35	Embeds, limestone dumper pit	0.00	TN	3,500.00	120.000	S01BS	88.58	0	0	0	0.0
pt1	410	720	S01	15501	4310	35	Str steel, xx heavy, >120 LB/FT, limestone dumper pit	0.00	TN	1,450.00	14.000	S03AS	91.06	0	0	0	0.0
pt1	410	720	S01	15501	4312	35	Str steel, heavy, 40 TO 79 LB/FT, limestone dumper pit	0.00	TN	1,873.00	16.000	S03AS	91.06	0	0	0	0.0
pt1	410	720	S01	15501	4314	35	Str steel, light, 12 TO 19 LB/FT, limestone dumper pit	0.00	TN	2,880.00	23.000	S03AS	91.06	0	0	0	0.0
pt1	410	720	S02	15501	4330	35	GRATING FLOOR, 1-1/4" GALV., limestone dumper pit	0.00	SF	9.12	0.210	S03BS	83.88	0	0	0	0.0
pt1	410	720	S02	15501	4330	35	Handrail, PIPE, 1-1/2" GALV, limestone dumper pit	0.00	LF	52.51	0.340	S03BS	83.88	0	0	0	0.0
pt1	410	720	S02	15501	4330	35	STAIR TREADS, limestone dumper pit	0.00	EA	39.73	0.530	S03BS	83.88	0	0	0	0.0
pt1	410	720	C03	15501	4890	35	Dewatering Allowance	1.00	LS	80,000.00	0.000	C02BS	172.15	80,000	0	80,000	0.0
Subtotal For PBS15501SORBENT HANDLING-RECEIVING/UNLOADING FO																	

15503 SORBENT HANDLING-STORAGE/STACKOUT & RECLAIM FOUNDATIO

pt1	410	720	C05	15503	4022	35	Spoils, limestone reclaim pit	348.00	CY	0.00	0.032	C01CS	90.02	0	1,002	1,002	11.1
pt1	410	720	C05	15503	4022	35	Spoils, limestone reclaim tunnel (incl with pit)	0.00	CY	0.00	0.032	C01CS	90.02	0	0	0	0.0
pt1	410	720	C03	15503	4051	35	Excavate, limestone reclaim pit	6,829.00	CY	0.00	0.020	C01CS	90.02	0	12,295	12,295	136.6
pt1	410	720	C03	15503	4051	35	Excavate, limestone reclaim tunnel (incl with pit)	0.00	CY	0.00	0.020	C01CS	90.02	0	0	0	0.0
pt1	410	720	C03	15503	4055	35	Backfill & compact, limestone reclaim pit	6,481.00	CY	0.00	0.095	C01CS	90.02	0	55,425	55,425	615.7
pt1	410	720	C03	15503	4055	35	Backfill & compact, limestone reclaim tunnel (incl with pit)	0.00	CY	0.00	0.095	C01CS	90.02	0	0	0	0.0
pt1	410	720	F01	15503	4118	35	Rebar, limestone reclaim pit	10.06	TN	800.00	26.000	S01BS	88.58	8,048	23,169	31,217	261.6
pt1	410	720	F01	15503	4118	35	Rebar, limestone reclaim tunnel	9.94	TN	800.00	26.000	S01BS	88.58	7,952	22,893	30,845	258.4
pt1	410	720	F01	15503	4118	35	Rebar, escape tunnel	4.00	TN	800.00	26.000	S01BS	88.58	3,200	9,212	12,412	104.0
pt1	410	720	F01	15503	4120	35	Formwork, limestone reclaim pit	2,944.00	SF	3.11	0.300	S01AS	71.65	9,156	63,281	72,437	883.2
pt1	410	720	F01	15503	4120	35	Formwork, limestone reclaim tunnel	2,911.00	SF	3.11	0.300	S01AS	71.65	9,053	62,572	71,625	873.3
pt1	410	720	F01	15503	4120	35	Formwork, escape tunnel	1,747.00	SF	2.31	0.300	S01AS	71.65	4,036	37,552	41,587	524.1
pt1	410	720	F01	15503	4123	35	Concrete, limestone reclaim pit	182.00	CY	85.60	1.200	S01CS	94.90	15,579	20,726	36,305	218.4

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PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power
 Project Name: Big Sandy Unit 2 - Limestone Unloading Study
 Location: Louisa, KY
 Capacity: 1 @ 800 MW
 Type: Wet FGD
 Currency: USD
 Seismic Zone: 1
 Proposal Number: 53770701
 Configuration: LIMESTONE UNLOADING STUDY - Rev 1
 Partner(s):
 Present Day: 7/15/2005
 Revision Number: 1
 Estimate Coordinator:
 Lead Estimator: Ericke
 Checked By:

I-06

Parsons Energy and Chemicals Inc. (Power Sector) Estimate Report: Unit x Island x PBS - Deta

User	User	PBS	Acct	Mat	Description	Quantity	U/M	Material	Labor	Crew	Rate	Material	Labor	Total	Manhours:
1	Island	2	Code	Stat				Unit	Unit			Cost	Cost	Cost	

Option 1 (Truck)

720 SORBENT HANDLING EQUIPMENT & BOP

15503 SORBENT HANDLING-STORAGE/STACKOUT & RECLAIM FOUNDATION

pt1 410	720	F01 15503	4123	35	Concrete, limestone reclaim tunnel	180.00	CY	85.6C	1.200	S01CS	94.90	15,408	20,498	35,906	216.0
pt1 410	720	F01 15503	4123	35	Concrete, escape tunnel	108.00	CY	85.6C	1.200	S01CS	94.90	9,245	12,299	21,544	129.6
pt1 410	720	F03 15503	4127	35	Embeds, limestone reclaim pit	0.33	TN	3,500.0C	120.000	S01BS	88.58	1,155	3,508	4,663	39.6
pt1 410	720	F03 15503	4127	35	Embeds, limestone reclaim tunnel	0.00	TN	3,500.0C	120.000	S01BS	88.58	0	0	0	0.0
pt1 410	720	S01 15503	4314	35	Str steel, light, 12 TO 19 LB/FT, limestone reclaim pit	2.00	TN	2,880.0C	23.000	S03AS	91.06	5,760	4,189	9,949	46.0
pt1 410	720	S01 15503	4314	35	Str steel, x light, 0 TO 11# / FT, limestone reclaim tunnel	2.00	TN	3,421.0C	23.000	S03AS	91.06	6,842	4,189	11,031	46.0

Subtotal For PBS15503SORBENT HANDLING-STORAGE/STACKOUT & REC 95,434 352,810 448,244 4,363.6

15505 SORBENT HANDLING-PREPARATION FOUNDATIONS

pt1 410	720	C05 15505	4022	35	Spoils, misc. pumps & tanks	68.00	CY	0.00	0.032	C01CS	90.02	0	196	196	2.2
pt1 410	720	C03 15505	4051	35	Excavate, misc. pumps & tanks	96.00	CY	0.00	0.250	C01BS	86.23	0	2,070	2,070	24.0
pt1 410	720	C03 15505	4055	35	Backfill & compact, misc. pumps & tanks	28.00	CY	0.00	0.400	C01BS	86.23	0	966	966	11.2
pt1 410	720	F01 15505	4118	35	Rebar, misc. pumps & tanks	7.40	TN	800.0C	15.000	S01BS	88.58	5,920	9,832	15,752	111.0
pt1 410	720	F01 15505	4120	35	Formwork, misc. pumps & tanks	754.00	SF	2.31	0.200	S01AS	71.65	1,742	10,805	12,547	150.8
pt1 410	720	F01 15505	4123	35	Concrete, misc. pumps & tanks	148.00	CY	85.6C	1.200	S01CS	94.90	12,669	16,854	29,523	177.6
pt1 410	720	F03 15505	4127	35	Embeds, misc. pumps & tanks	0.22	TN	3,500.0C	120.000	S01BS	88.58	770	2,339	3,109	26.4

Subtotal For PBS15505SORBENT HANDLING-PREPARATION FOUNDATION 21,101 43,061 64,162 503.2

15509 SORBENT HANDLING-MISC.

pt1 410	720	C05 15509	4022	35	Spoils, conveyor piers	34.00	CY	0.00	0.032	C01CS	90.02	0	98	98	1.1
pt1 410	720	C05 15509	4022	35	Spoils, conveyor L-1 tunnel	581.00	CY	0.00	0.032	C01CS	90.02	0	1,674	1,674	18.6
pt1 410	720	C05 15509	4022	35	Spoils, conveyor L-4	126.00	CY	0.00	0.032	C01CS	90.02	0	363	363	4.0
pt1 410	720	C03 15509	4051	35	Excavate, conveyor piers	119.00	CY	0.00	0.250	C01BS	86.23	0	2,565	2,565	29.8
pt1 410	720	C03 15509	4051	35	Excavate, conveyor L-1 tunnel	1,474.00	CY	0.00	0.020	C01CS	90.02	0	2,654	2,654	29.5
pt1 410	720	C03 15509	4051	35	Excavate, conveyor L-4	441.00	CY	0.00	0.250	C01BS	86.23	0	9,507	9,507	110.3
pt1 410	720	C03 15509	4055	35	Backfill & compact, conveyor piers	85.00	CY	0.00	0.400	C01CS	90.02	0	3,061	3,061	34.0
pt1 410	720	C03 15509	4055	35	Backfill & compact, conveyor L-1 tunnel	893.00	CY	0.00	0.095	C01CS	90.02	0	7,637	7,637	84.8
pt1 410	720	C03 15509	4055	35	Backfill & compact, conveyor L-4	315.00	CY	0.00	0.400	C01BS	86.23	0	10,865	10,865	126.0
pt1 410	720	F01 15509	4118	35	Rebar, conveyor piers	17.00	TN	800.0C	15.000	S01BS	88.58	13,600	22,588	36,188	255.0
pt1 410	720	F01 15509	4118	35	Rebar, conveyor L-1 tunnel	14.97	TN	800.0C	15.000	S01BS	88.58	11,976	19,891	31,867	224.6

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PARSONS E&C PROPRIETARY INFORMATION

Parsons Energy and Chemicals Inc. (Power Sector)				Estimate Report: Unit x Island x PBS - Deta				I-06	
Client: American Electric Power				Present Day: 7/15/2005					
Project Name: Big Sandy Unit 2 - Limestone Unloading Study				Revision Number: 1					
Location: Louisa, KY				Estimate Coordinator:					
Capacity: 1 @ 800 MW				Lead Estimator: Ericke					
Type: Wet FGD	Currency: USD	Seismic Zone: 1	Partner(s):	Checked By:					
Proposal Number: 53770701				Configuration: LIMESTONE UNLOADING STUDY - Rev 1					

Parsons Energy and Chemicals Inc. (Power Sector) Estimate Report: Unit x Island x PBS - Deta

User	1	User	2	PBS	Acct	Mat	Description	Quantity	U/M	Material	Labor	Crew	Crew Rate	Material	Labor	Total	Manhours
		Island			Code	Stat				Unit	Unit			Cost	Cost	Cost	
Option 1 (Truck)																	
720 SORBENT HANDLING EQUIPMENT & BOP																	
15509 SORBENT HANDLING-MISC.																	
pt1	410	720	F01	15509	4118	35	Rebar, conveyor L-4	6.30	TN	800.00	15.000	S01BS	88.58	5,040	8,371	13,411	94.5
pt1	410	720	F01	15509	4120	35	Formwork, conveyor piers	246.00	SF	2.31	0.300	S01AS	71.65	568	5,288	5,856	73.8
pt1	410	720	F01	15509	4120	35	Formwork, conveyor L-1 tunnel	5,568.00	SF	3.11	0.300	S01AS	71.65	17,316	119,684	137,001	1,670.4
pt1	410	720	F01	15509	4120	35	Formwork, conveyor L-4	912.00	SF	2.31	0.200	S01AS	71.65	2,107	13,069	15,176	182.4
pt1	410	720	F01	15509	4123	35	Concrete, conveyor piers	34.00	CY	85.60	1.250	S01CS	94.90	2,910	4,033	6,944	42.5
pt1	410	720	F01	15509	4123	35	Concrete, conveyor L-1 tunnel	241.00	CY	85.60	1.200	S01CS	94.90	20,630	27,445	48,075	289.2
pt1	410	720	F01	15509	4123	35	Concrete, conveyor L-4	126.00	CY	85.60	1.200	S01CS	94.90	10,786	14,349	25,134	151.2
pt1	410	720	F03	15509	4127	35	Embeds, conveyor piers	0.05	TN	3,500.00	120.000	S01BS	88.58	175	531	706	6.0
pt1	410	720	F03	15509	4127	35	Embeds, conveyor L-1 tunnel	0.00	TN	3,500.00	120.000	S01BS	88.58	0	0	0	0.0
pt1	410	720	F03	15509	4127	35	Embeds, conveyor L-4	0.20	TN	3,500.00	120.000	S01BS	88.58	700	2,126	2,826	24.0
Subtotal For PBS15509 SORBENT HANDLING-MISC.										85,808	275,798	361,606					

15519 MISC. MATERIALS HANDLING-MISC.																	
pt1	410	720	M01	15519	1550	35	Pump, Unloading Pit Sump, (1/H cost based on FMC quote)	1.00	EA	10,000.00	150.000	M02AS	76.87	10,000	11,531	21,531	150.0
pt1	410	720	M01	15519	1550	35	Pump, Reclaim Pit Sump, (1/H cost based on FMC quote)	1.00	EA	10,000.00	150.000	M02AS	76.87	10,000	11,531	21,531	150.0
pt1	410	720	C05	15519	4022	35	Spoils, onsite stockpile, Truck Scale Fdn	65.00	CY	0.00	0.032	C01CS	90.02	0	187	187	2.1
pt1	410	720	C05	15519	4022	35	Spoils, onsite stockpile, Truck Wash Fdn	94.40	CY	0.00	0.032	C01CS	90.02	0	272	272	3.0
pt1	410	720	C03	15519	4051	35	Excavate, Truck Scale Fdn	132.50	CY	0.00	0.120	C01CS	90.02	0	1,431	1,431	15.9
pt1	410	720	C03	15519	4051	35	Excavate, Truck Wash Fdn	194.50	CY	0.00	0.120	C01CS	90.02	0	2,101	2,101	23.3
pt1	410	720	C03	15519	4055	35	Backfill & compact, Truck Scale	21.50	CY	0.00	0.095	C01AS	61.29	0	125	125	2.0
pt1	410	720	C03	15519	4056	35	Backfill & Compact, Crushed Stone, for Truc Scale Pad	46.00	CY	13.75	0.400	C01AS	61.29	633	1,128	1,760	18.4
pt1	410	720	C03	15519	4056	35	Backfill & Compact, Crushed Stone, for Truc Wash Pad	44.50	CY	13.75	0.400	C01AS	61.29	612	1,091	1,703	17.8
pt1	410	720	F01	15519	4118	35	Rebar, Truck Scale Fdn	2.00	TN	800.00	15.000	S01BS	88.58	1,600	2,657	4,257	30.0
pt1	410	720	F01	15519	4118	35	Rebar, Truck Wash Fdn	7.00	TN	800.00	15.000	S01BS	88.58	5,600	9,301	14,901	105.0
pt1	410	720	F01	15519	4120	35	Formwork, Truck Scale Fdn	1,283.90	SF	2.31	0.200	S01AS	71.65	2,966	18,398	21,364	256.8
pt1	410	720	F01	15519	4120	35	Formwork, Truck Wash Fdn	1,701.00	SF	2.31	0.200	S01AS	71.65	3,929	24,375	28,305	340.2
pt1	410	720	F01	15519	4123	35	Concrete, Truck Scale Fdn, total- walls, piers, base slabs, approaches	65.00	CY	76.85	1.000	S01CS	94.90	4,995	6,169	11,164	65.0

PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power
 Project Name: Big Sandy Unit 2 - Limestone Unloading Study
 Location: Louisa, KY
 Capacity: 1 @ 800 MW
 Type: Wet FGD
 Currency: USD
 Seismic Zone: 1
 Proposal Number: 53770701
 Configuration: LIMESTONE UNLOADING STUDY - Rev 1
 Partner(s):
 Present Day: 7/15/2005
 Revision Number: 1
 Estimate Coordinator:
 Lead Estimator: Ericke
 Checked By:

1-06

Parsons Energy and Chemicals Inc. (Power Sector) Estimate Report: Unit x Island x PBS - Deta

User 1	Island 2	User PBS 3	Acct 4	Mat 5	Description 6	Quantity 7	U/M 8	Material Unit 9	Labor Unit 10	Crew 11	Crew Rate 12	Material Cost 13	Labor Cost 14	Total Cost 15	Manhours 16
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Option 1 (Truck)

720 SORBENT HANDLING EQUIPMENT & BOP

15519 MISC. MATERIALS HANDLING-MISC.

pt1	410	720	F01	15519	4123	35	Concrete, Truck Scale, modules (4) total, rough dim's - 12' x 20' ea.	35.00	CY	76.85	1.000	S01CS	94.90	2,690	3,322	6,011	35.0
pt1	410	720	F01	15519	4123	35	Concrete, Truck Wash Fdn	113.30	CY	76.85	1.000	S01CS	94.90	8,707	10,752	19,459	113.3
pt1	410	720	F03	15519	4127	35	Embeds, Truck Scale Fdn, allow	0.13	TN	3,500.00	120.000	S01BS	88.58	455	1,382	1,837	15.6
pt1	410	720	F03	15519	4127	35	Embeds, Truck Wash Fdn, allow	1.00	TN	3,500.00	120.000	S01BS	88.58	3,500	10,630	14,130	120.0

Subtotal For PBS15519MISC. MATERIALS HANDLING-MISC. 55,687 116,382 172,069 1,463.5

16111 TRANSFORMER, BUS DUCT AND GENERATOR CIRCUIT BREAKER STR

pt1	410	720	C05	16111	4022	35	Spoils, Service transformers	54.00	CY	0.00	0.032	C01CS	90.02	0	156	156	1.7
pt1	410	720	C03	16111	4051	35	Excavate, Service transformers	65.00	CY	0.00	0.250	C01BS	86.23	0	1,401	1,401	16.3
pt1	410	720	C03	16111	4055	35	Backfill & compact, Service transformers	11.00	CY	0.00	0.400	C01BS	86.23	0	379	379	4.4
pt1	410	720	F01	16111	4118	35	Rebar, Service transformers	4.68	TN	800.00	15.000	S01BS	88.58	3,744	6,218	9,962	70.2
pt1	410	720	F01	16111	4120	35	Formwork, Service transformers	264.00	SF	2.31	0.200	S01AS	71.65	610	3,783	4,393	52.8
pt1	410	720	F01	16111	4123	35	Concrete, Service transformers	72.00	CY	85.60	1.200	S01CS	94.90	6,163	8,199	14,363	86.4
pt1	410	720	F03	16111	4127	35	Embeds, Service transformers	0.11	TN	3,500.00	120.000	S01BS	88.58	385	1,169	1,554	13.2

Subtotal For PBS16111TRANSFORMER, BUS DUCT AND GENERATOR CIRC 10,902 21,306 32,208 245.0

52501 SERVICE WATER SYSTEM

pt1	410	720	M	52501	4210	35	Piping/Fittings, HDPE, 4 in, Class 125, SDR 7.3, U/G, Service Water	250.00	LF	12.45	1.140	M02AS	76.87	3,123	21,908	25,030	285.0
pt1	410	720	M	52501	4210	35	Piping/Fittings, HDPE, 4 in, Class 125, SDR 7.3, U/G, Flush Water	250.00	LF	12.45	1.140	M02AS	76.87	3,123	21,908	25,030	285.0

Subtotal For PBS52501SERVICE WATER SYSTEM 6,245 43,816 50,061 570.0

54301 SERVICE AIR SYSTEM

pt1	410	720	M	54301	4211	35	Piping/Fittings, CS, Sch 80, 2 in, Field Fab., Service Air piping	250.00	LF	23.22	0.654	P02AS	78.50	5,805	12,835	18,640	163.5
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Subtotal For PBS54301SERVICE AIR SYSTEM 5,805 12,835 18,640 163.5

56900 LIMESTONE HANDLING SYSTEM

pt1	410	720	M01	56900	2010	35	Truck Scale (1/H cost based on FMC quote)	1.00	EA	110,000.00	550.000	M02AS	76.87	110,000	42,279	152,279	550.0
pt1	410	720	M01	56900	2010	35	Truck Wash System (1/H cost based on FMC quote)	1.00	EA	300,100.00	1,100.000	M02AS	76.87	300,100	84,557	384,657	1,100.0

PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power										Present Day: 7/15/2005		I-06																					
Project Name: Big Sandy Unit 2 - Limestone Unloading Study										Revision Number: 1																							
Location: Louisa, KY										Estimate Coordinator:																							
Capacity: 1 @ 800 MW										Lead Estimator: Ericke																							
Type: Wet FGD										Checked By:																							
Currency: USD										Seismic Zone: 1		Proposal Number: 53770701		Partner(s):																			
												Configuration: LIMESTONE UNLOADING STUDY - Rev 1																					
User		User		PBS		Acct		Mat		Description		Quantity		U/M		Material		Labor		Crew		Crew		Rate		Material		Labor		Total		Manhours	
1		Island		2		Code		Code		Stat								Unit		Unit						Cost		Cost		Cost		Cost	

Option 1 (Truck)

720 SORBENT HANDLING EQUIPMENT & BOP

56900 LIMESTONE HANDLING SYSTEM

pt1	410	720	B04	56900	2010	35	Pre-engineered bldg, Limestone Storage/Unloading, with (1) unloading bay, ventilation system, hoist / rail system, wash room, electrical control room, and (2) electr. Oper. Roll up doors. Approx. 35' w x 55' l. (I/H cost based on FMC quote)	1.00	LS	200,200.00	0.000	S07AS	113.42	0	200,200	0.0
pt1	410	720	M01	56900	2010	35	Unloading Hopper, Limestone, 50 T cap. - w/ grizzlies, liners, supports (I/H cost based on FMC quote)	1.00	EA	90,100.00	350.000	M02AS	76.87	26,905	117,005	350.0
pt1	410	720	M01	56900	2010	35	Cut Off Gate, Rack and Pinion, Manual (I/H cost based on FMC quote)	1.00	EA	30,000.00	160.000	M02AS	76.87	12,299	42,299	160.0
pt1	410	720	4H01	56900	2010	35	L1 - Limestone Unloading Belt Feeder, 400 ton/hr, 15 hp - 42" w. belt x 11' l (I/H cost based on FMC quote)	1.00	EA	24,500.00	270.000	M02AS	76.87	20,755	45,255	270.0
pt1	410	720	M01	56900	2010	35	Lot of Disch. Chute work - Hopper to Belt Feeder L1 (I/H cost based on FMC quote)	1.00	EA	30,100.00	320.000	M02AS	76.87	24,598	54,698	320.0
pt1	410	720	M01	56900	2010	35	Lot of Disch. Chute work - Conveyor Feeder L2 (I/H cost based on FMC quote)	1.00	EA	30,100.00	360.000	M02AS	76.87	27,673	57,773	360.0
pt1	410	720	4H01	56900	2010	35	Ventilation, Unloading Pit / Tunnel (I/H cost based on FMC quote)	1.00	LS	30,100.00	400.000	M02AS	76.87	30,748	60,848	400.0
pt1	410	720	4H01	56900	2010	35	L2 - Limestone Unloading Conveyor, 400 ton/hr, 75 hp - 30" w. belt x 390' l (I/H cost based on FMC quote)	1.00	EA	481,800.00	2,730.000	M02AS	76.87	209,855	691,655	2,730.0
pt1	410	720	M01	56900	2010	35	Disch. Head Chute - Conveyor L2 (I/H cost based on FMC quote)	1.00	EA	30,100.00	320.000	M02AS	76.87	24,598	54,698	320.0
pt1	410	720	4H01	56900	2010	35	Telescoping Chute, Limestone, Conv. L2, 5 l	1.00	EA	60,100.00	400.000	M02AS	76.87	30,748	90,848	400.0
pt1	410	720	4H01	56900	2010	35	Dust Collection System, insertable, head chute Conv. L2 (I/H cost based on FMC quote)	1.00	LS	50,100.00	400.000	M02AS	76.87	30,748	80,848	400.0
pt1	410	720	4H01	56900	2010	35	Pile Discharger, Limestone, 2 hp, (I/H cost based on FMC quote)	1.00	EA	75,100.00	400.000	M02AS	76.87	30,748	105,848	400.0
pt1	410	720	M01	56900	2010	35	Cut Off Gate, Rack and Pinion, Manual - L3 (I/H cost based on FMC quote)	1.00	EA	30,000.00	160.000	M02AS	76.87	12,299	42,299	160.0
pt1	410	720	M01	56900	2010	35	Lot of Disch. Chute work - Pile Disch. To Feeder L3 (I/H cost based on FMC quote)	1.00	EA	75,100.00	320.000	M02AS	76.87	24,598	99,698	320.0

PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power Project Name: Big Sandy Unit 2 - Limestone Unloading Study Location: Louisa, KY Capacity: 1 @ 800 MW Type: Wet FGD															Present Day: 7/15/2005 Revision Number: 1 Estimate Coordinator: Lead Estimator: Ericke Checked By:															1-06																																																																																																																																																																																																		
Parsons Energy and Chemicals Inc. (Power Sector) Estimate Report: Unit x Island x PBS - Data																																																																																																																																																																																																																																
Proposal Number: 53770701 Configuration: LIMESTONE UNLOADING STUDY - Rev 1															Partner(s):																																																																																																																																																																																																																	
Currency: USD Seismic Zone: 1																																																																																																																																																																																																																																
User 1 Island															User PBS 2 Code															Acct Stat															Mat															Description															Quantity															U/M															Material Unit															Labor Unit															Crew															Crew Rate															Material Cost															Labor Cost															Total Cost															Manhours														

Proposal Number: 53770701
 Configuration: LIMESTONE UNLOADING STUDY - Rev 1
 Partner(s):

Option 1 (Truck)

720 SORBENT HANDLING EQUIPMENT & BOP

56900 LIMESTONE HANDLING SYSTEM

pt1	410	720	4H01	56900	2010	35	L3 - Limestone Reclaim Belt Feeder, 240 ton/hr, 10 hp - 36" w. belt x 10' l (I/H cost based on FMC quote)	1.00	EA	21,000.00	270.000	M02AS	76.87	21,000	20,755	41,755	270.0
pt1	410	720	M01	56900	2010	35	Lot of Disch. Chute work - Conveyor L4 (I/H cost based on FMC quote)	1.00	EA	40,100.00	360.000	M02AS	76.87	40,100	27,673	67,773	360.0
pt1	410	720	4H01	56900	2010	35	L4 - Limestone Reclaim Conveyor, 240 ton/60 hp - 24" w. belt x 500' l (I/H cost based on FMC quote)	1.00	EA	494,100.00	4,100.000	M02AS	76.87	494,100	315,167	809,267	4,100.0
pt1	410	720	4H01	56900	2010	35	Ventilation, Reclaim Pit / Tunnel (I/H cost based on FMC quote)	1.00	LS	30,100.00	400.000	M02AS	76.87	30,100	30,748	60,848	400.0
pt1	410	720	4H01	56900	2010	35	Hoist, Unloading Building, 3 Ton (3 HP) w/ trolley (I/H cost based on FMC quote)	1.00	EA	20,000.00	60.000	M02AS	76.87	20,000	4,612	24,612	60.0
pt1	410	720	M01	56900	2010	35	Belt Scale, T Capacity, (Conv. L4), (I/H cost based on FMC quote)	1.00	EA	25,000.00	220.000	M02AS	76.87	25,000	16,911	41,911	220.0
pt1	410	720	M01	56900	2010	35	Magnetic Separator, cross belt type (Conv. L4), (I/H cost based on FMC quote)	1.00	EA	30,100.00	210.000	M02AS	76.87	30,100	16,143	46,243	210.0
pt1	410	720	M01	56900	2010	35	Rectifier, Magnetic Separator - included (Conv. L4), (I/H cost based on FMC quote)	1.00	EA	0.00	0.000	M02AS	76.87	0	0	0	0.0
pt1	410	720	4H01	56900	2010	35	Dust Collection System, insertable, head chute Conv. L4 (I/H cost based on FMC quote)	1.00	LS	50,100.00	400.000	M02AS	76.87	50,100	30,748	80,848	400.0
pt1	410	720	M01	56900	2010	35	Disch. Head Chute - Conveyor L4 (I/H cost based on FMC quote)	1.00	EA	30,100.00	320.000	M02AS	76.87	30,100	24,598	54,698	320.0
pt1	410	720	4H01	56900	2010	35	Unloading Hopper, Limestone, 50 T capacity w/ grizzly, liners, supports. (I/H cost based on FMC quote)	1.00	LS	90,100.00	350.000	M02AS	76.87	90,100	26,905	117,005	350.0
pt1	410	720	4H01	56900	2010	35	Jib Crane w/ Hoist, Ton (5 HP) - (Conv L4) (I/H cost based on FMC quote)	1.00	EA	25,000.00	220.000	M02AS	76.87	25,000	16,911	41,911	220.0
pt1	410	720	4H01	56900	2010	35	Diverter Gate, at L4 & L5, Limestone, 1 hp (I/H cost based on FMC quote)	1.00	EA	34,900.00	200.000	M02AS	76.87	34,900	15,374	50,274	200.0
pt1	410	720	4H01	56900	2010	35	Support Structure for Diverter Gate, at L4, Limestone (I/H cost based on FMC quote)	1.00	EA	43,600.00	320.000	M02AS	76.87	43,600	24,598	68,198	320.0
pt1	410	720	4H01	56900	2010	35	L5 - Limestone Transfer Conveyor, 240 ton/10 hp - 24" w. belt x 50' l (I/H cost based on FMC quote)	1.00	EA	56,400.00	900.000	M02AS	76.87	56,400	69,183	125,583	900.0
pt1	410	720	4H01	56900	2010	35	Support Platform for Conveyor L5, Limestone (I/H cost based on FMC quote)	1.00	EA	47,800.00	320.000	M02AS	76.87	47,800	24,598	72,398	320.0

PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power
 Project Name: Big Sandy Unit 2 - Limestone Unloading Study
 Location: Louisa, KY
 Capacity: 1 @ 800 MW
 Type: Wet FGD
 Currency: USD
 Seismic Zone: 1
 User 1 Island 2
 User PBS Acct Mat
 Code Code Stat
 Description
 Quantity U/M
 Material Unit
 Labor Unit
 Crew Crew Rate
 Material Cost
 Labor Cost
 Total Cost
 Manhours
 Present Day: 7/15/2005
 Revision Number: 1
 Estimate Coordinator:
 Lead Estimator: Ericke
 Checked By:
 Proposal Number: 53770701
 Partner(s):
 Configuration: LIMESTONE UNLOADING STUDY - Rev 1

I-06

Option 1 (Truck)

720 SORBENT HANDLING EQUIPMENT & BOP

56900 LIMESTONE HANDLING SYSTEM

pt1	410	720	M01	56900	2010	35	CC TV System, w/ (1) Monitor and (4) cameras (1/H cost based on FMC quote)	1.00	EA	40,100.00	260,000 M02AS	76.87	40,100	19,986	60,086	260.0
pt1	410	720	M01	56900	2060	35	Metal Detector, (Conv. L4), (1/H cost based on FMC quote)	1.00	EA	40,000.00	300,000 M02AS	76.87	40,000	23,061	63,061	300.0
pt1	410	720	M	56900	4210	35	Piping/Fittings, HDPE, 6 in, Class 125, SDR 7.3, U/G, Reagent piping to JBR	250.00	LF	14.98	1.258 M02AS	76.87	3,745	24,176	27,921	314.5
pt1	410	720	M	56900	4210	35	Piping/Fittings, HDPE, 6 in, Class 125, SDR 7.3, U/G, Reclaim water piping	250.00	LF	14.98	1.258 M02AS	76.87	3,745	24,176	27,921	314.5

Subtotal For PBS56900LIMESTONE HANDLING SYSTEM

2,773,490 1,389,733 4,163,223 18,079.0

57700 POTABLE WATER SYSTEM

pt1	410	720	M	57700	4210	35	Piping/Fittings, HDPE, 3 in, Class 125, SDR 7.3, U/G, Potable Water	250.00	LF	4.99	0.470 M02AS	76.87	1,248	9,032	10,280	117.5
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Subtotal For PBS57700POTABLE WATER SYSTEM

1,248 9,032 10,280 117.5

57801 SANITARY SEWER SYSTEMS

pt1	410	720	M	57801	4209	35	Piping/Fittings, HDPE, 3 in, Class 125, SDR 7.3, U/G, Sanitary piping	250.00	LF	4.99	0.470 P02AS	78.50	1,248	9,224	10,471	117.5
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Subtotal For PBS57801SANITARY SEWER SYSTEMS

1,248 9,224 10,471 117.5

57902 SANITARY SEWERAGE SYSTEM

pt1	410	720	M01	57902	0758	35	Lift Station, Sewerage, 2 x 100 duplex station	1.00	EA	50,000.00	40,000 M02AS	76.87	50,000	3,075	53,075	40.0
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Subtotal For PBS57902SANITARY SEWERAGE SYSTEM

50,000 3,075 53,075 40.0

Subtotal For Island 720 SORBENT HANDLING EQUIPMENT & BOP

3,479,213 2,988,798 6,468,011 37,693.5

820 YARD WATER SYSTEMS

18100 CIVIL BULK MATERIALS

pt1	410	820	C05	18100	4022	35	Trench spoils, all piping	718.00	CY	0.00	0.032 C01CS	90.02	0	2,068	2,068	23.0
pt1	410	820	C03	18100	4050	35	Trench backfill & compact, all piping	1,617.00	CY	0.00	0.150 C01BS	86.23	0	20,915	20,915	242.6
pt1	410	820	C03	18100	4054	35	Trench excavate, all piping (1750 LF)	2,335.00	CY	0.00	0.150 C01BS	86.23	0	30,202	30,202	350.3
pt1	410	820	C03	18100	4057	35	Sand bedding, all piping	718.00	CY	10.00	0.400 C01BS	86.23	7,180	24,765	31,945	287.2

Subtotal For PBS18100CIVIL BULK MATERIALS

7,180 77,951 85,131 903.0

Subtotal For Island 820 YARD WATER SYSTEMS

7,180 77,951 85,131 903.0

825 YARD FIRE PROTECTION

18100 CIVIL BULK MATERIALS

PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power Project Name: Big Sandy Unit 2 - Limestone Unloading Study Location: Louisa, KY Capacity: 1 @ 800 MW Type: Wet FGD										Present Day: 7/15/2005 Revision Number: 1 Estimate Coordinator: Lead Estimator: Ericke Checked By:										I-06	
Parsons Energy and Chemicals Inc. (Power Sector) Estimate Report: Unit x Island x PBS - Deta																					
Proposal Number: 53770701 Configuration: LIMESTONE UNLOADING STUDY - Rev 1										Partner(s):											
Currency: USD Seismic Zone: 1										Quantity U/M											
User 1										User PBS Acct Mat Island 2 Code Code Stat											
Description										Material Unit Labor Unit Crew Rate Material Cost Labor Cost Total Cost Manhours											

Option 1 (Truck)

825 YARD FIRE PROTECTION

18100 CIVIL BULK MATERIALS

pt1 410	825	C05	18100	4022	35	Trench spoils, fire wtr piping	32.00	CY	0.00	0.032	C01CS	90.02	0	92	92	1.0
pt1 410	825	C03	18100	4050	35	Trench backfill & compact, fire wtr piping	108.00	CY	0.00	0.150	C01BS	86.23	0	1,397	1,397	16.2
pt1 410	825	C03	18100	4054	35	Trench excavate, fire wtr piping (500 LF)	139.00	CY	0.00	0.150	C01BS	86.23	0	1,798	1,798	20.9
pt1 410	825	C03	18100	4057	35	Sand bedding, fire wtr piping	24.00	CY	10.00	0.400	C01BS	86.23	240	828	1,068	9.6

Subtotal For PBS18100 CIVIL BULK MATERIALS

													240	4,115	4,355	47.7
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57200 PLANT FIRE PROTECTION SYSTEM

pt1 410	825	M	57200	4209	35	Piping/Fittings, HDPE, 12 in, FM Class 200, U/G, Fire Water piping	50.26	LF	50.26	1.840	P02AS	78.50	25,130	72,220	97,350	920.0
pt1 410	825	M	57200	4211	35	Piping/Fittings, Firewater, small bore runs, including nozzles, controls, and misc. hardware (Allowance)	1.00	LS	120,000.00	700.000	M02AS	76.87	120,000	53,809	173,809	700.0

Subtotal For PBS57200 PLANT FIRE PROTECTION SYSTEM

													145,130	126,029	271,159	1,620.0
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Subtotal For Island 825 YARD FIRE PROTECTION

													145,370	130,144	275,514	1,667.7
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872 OTHER ELECTRICAL

63107 POWER CABLE, 600V

pt1 4G2	872	E01	63107	4626	35	600V Cable wire, 3/C #12 w/ G	1,020.00	LF	0.40	0.018	E02AS	83.55	408	1,534	1,942	18.4
pt1 4G2	872	E01	63107	4626	35	600V Cable wire, 3/C #4 w/ G	1,580.00	LF	1.56	0.030	E02AS	83.55	2,465	3,960	6,425	47.4
pt1 4G2	872	E01	63107	4626	35	600V Cable wire, 3/C #1 w/ G	340.00	LF	2.76	0.050	E02AS	83.55	938	1,420	2,359	17.0
pt1 4G2	872	E01	63107	4626	35	600V Cable wire, 3/C #350 w/ G	680.00	LF	9.59	0.091	E02AS	83.55	6,521	5,170	11,691	61.9

Subtotal For PBS63107 POWER CABLE, 600V

													10,332	12,085	22,417	144.6
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63108 CONTROL CABLE, 600V

pt1 4G2	872	E01	63108	4626	35	600V Cable wire, 5/C #14, Control	2,040.00	LF	0.42	0.018	E02AS	83.55	857	3,068	3,925	36.7
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Subtotal For PBS63108 CONTROL CABLE, 600V

													857	3,068	3,925	36.7
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63109 POWER CABLE TERMINATIONS, 600V

pt1 4G2	872	E01	63109	4631	35	600V terminations #12	48.00	EA	0.50	0.274	E02AS	83.55	24	1,099	1,123	13.2
pt1 4G2	872	E01	63109	4631	35	600V terminations #4	38.00	EA	1.60	0.400	E02AS	83.55	61	1,270	1,331	15.2
pt1 4G2	872	E01	63109	4631	35	600V terminations #1	16.00	EA	3.25	0.675	E02AS	83.55	52	902	954	10.8
pt1 4G2	872	E01	63109	4631	35	600V terminations #350	32.00	EA	9.00	1.580	E02AS	83.55	288	4,224	4,512	50.6

Subtotal For PBS63109 POWER CABLE TERMINATIONS, 600V

													425	7,495	7,920	89.7
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63110 CONTROL CABLE TERMINATIONS

PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power Project Name: Big Sandy Unit 2 - Limestone Unloading Study Location: Louisa, KY Capacity: 1 @ 800 MW Type: Wet FGD									
Currency: USD Seismic Zone: 1 User: 1 Island: 2 Code: Mat: Stat: Description: Quantity: U/M: Material Unit: Labor Unit: Crew: Rate: Material Cost: Labor Cost: Total Cost: Manhours:									
Proposal Number: 53770701 Partner(s): Configuration: LIMESTONE UNLOADING STUDY - Rev 1									
Present Day: 7/15/2005 Revision Number: 1 Estimate Coordinator: Lead Estimator: Ericke Checked By:									
Parson Energy and Chemicals Inc. (Power Sector) Estimate Report: Unit x Island x PBS - Deta									
I-06									

Option 1 (Truck)

872 OTHER ELECTRICAL

63110 CONTROL CABLE TERMINATIONS

ptl 4G2	872	E01	63110	4631	35	600V terminations #14, Control	120.00	EA	0.50	0.274	E02AS	83.55	60	2,747	2,807	32.9
Subtotal For PBS63110 CONTROL CABLE TERMINATIONS										60	2,747	2,807	32.9			

68201 EXPOSED CONDUITS

ptl 4G2	872	E01	68201	4611	35	Conduit, 3/4" RGS	2,400.00	LF	3.75	0.218	E02AS	83.55	9,000	43,713	52,713	523.2
ptl 4G2	872	E01	68201	4611	35	Conduit, 1"	600.00	LF	5.39	0.251	E02AS	83.55	3,234	12,583	15,817	150.6
ptl 4G2	872	E01	68201	4611	35	Conduit, 1-1/4" RGS	300.00	LF	6.95	0.290	E02AS	83.55	2,085	7,269	9,354	87.0
ptl 4G2	872	E01	68201	4611	35	Conduit, 3" RGS	600.00	LF	27.85	0.738	E02AS	83.55	16,734	36,996	53,730	442.8
Subtotal For PBS68201 EXPOSED CONDUITS										31,053	100,561	131,614	1,203.6			

Subtotal For Island 872 OTHER ELECTRICAL

Subtotal For: Option 1 (Truck)										3,833,490	3,339,200	7,172,691	41,947.5			
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PARSONS E&C PROPRIETARY INFORMATION

Client: American Electric Power Project Name: Big Sandy Unit 2 - Limestone Unloading Study Location: Louisa, KY Capacity: 1 @ 800 MW Type: Wet FGD		Currency: USD Seismic Zone: 1		Proposal Number: 53770701 Configuration: LIMESTONE UNLOADING STUDY - Rev 1		Partner(s): Lead Estimator: Ericke Checked By:		Present Day: 7/15/2005 Revision Number: 1 Estimate Coordinator:		1-06			
User 1 Island 2	User PBS Code	Acct Code	Mat Stat	Description	Quantity	U/M	Material Unit	Labor Unit	Crew Rate	Material Cost	Labor Cost	Total Cost	Manhours
Grand Total										3,833,490	3,339,200	7,172,691	41,947.7