SO_3 Mitigation Study for

Ghent 1, 3, & 4

Mill Creek 3 & 4

Trimble County 1

Sargent & Lundy LLC

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March 29, 2006

LG&E/KU

FINAL REPORT SL-008736 – Revision 2
SO_3 Mitigation Study
Ghent 1,3&4, Mill Creek 3&4,
and Trimble County 1

Pam Orlando, PE
Senior Mechanical Engineer II
Generation Services
Kentucky Utilities Company
One Quality Street
Lexington, Kentucky 40507

Dear Ms. Orlando:

Attached, for your use, is Sargent & Lundy's FINAL SO_3 Mitigation Study Report for Ghent – Units 1,3&4, Mill Creek – Units 3&4, and Trimble County – Unit 1, Rev. 2. We have revised the report to include an additional table per your comments. There were no revisions made to any of the report attachments, therefore I am not re-sending them.

Please contact me at (312) 269-6672 if you have any questions regarding this work. We appreciate this opportunity to provide our services to LG&E/KU.

Yours very truly,

Steve M. Katzberger

Steve M. Katzberger
Study Manager

SMK:ljr
Enclosures - All
Copies:
R. Presnak
W. DePriest
Project File
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SO_3 Mitigation Study – Ghent – Units 1, 3&4, Mill Creek – Units 3&4, and Trimble County – Unit 1

Prepared for:

Louisville Gas & Electric Company/Kentucky Utilities Company

Subsidiaries of:

REPORT SL-008736

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APPROVAL PAGE

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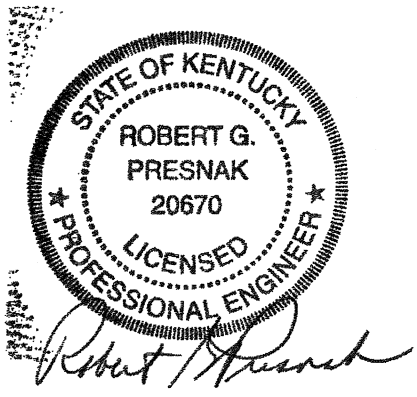

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1. INTRODUCTION

1.1 BACKGROUND

Louisville Gas & Electric/Kentucky Utilities (LG&E/KU) authorized Sargent & Lundy^{LLC} to prepare a study for the mitigation of sulfur trioxide (SO_3) at Ghent 1,3&4, Mill Creek 3&4, and Trimble County 1. Ghent Power Plant includes four pulverized coal units. Units 1,3&4 are each rated at 511 MW_{net}. An FGD system is currently being installed for Unit 3, with future FGD installations for Units 1&4 in the planning stages. The existing FGD system on Unit 1 will be switched to serve Unit 2. Units 1,3&4 each have SCR systems installed and operating. Ghent – Unit 2, which does not have an SCR or FGD system, was excluded from the study. Mill Creek Power Plant includes four pulverized coal units. Unit 3 is rated at 386 MW_{net}, while Unit 4 is rated at 490 MW_{net}. Both units currently have FGD systems and SCR systems installed and operating. Trimble County Power Plant includes one pulverized coal unit, with a future unit in the planning stages. Unit 1 is rated at 495 MW_{net} and currently has FGD and SCR systems installed. The FGD systems will allow these units to burn high sulfur coal, while still meeting sulfur dioxide (SO_2) emission limits. The high sulfur coal, combined with the recently installed Selective Catalytic Reduction (SCR) systems, will produce higher levels of sulfur trioxide. While the SCR systems are currently operated during the ozone season (May-November), they will be required to operate year round starting in 2009.

Ghent 3&4 are equipped with hot-side electrostatic precipitators (ESPs). The other units all have cold-side ESPs. The hot-side ESPs potentially limit the sorbent injection options for Ghent 3&4 to injection in the furnace or upstream of the ESP. However, there are emerging strategies, such as hydrated lime injection downstream of a hot-side ESP with collection of reaction products and excess sorbent in the FGD system. These methodologies are unproven and the results of testing are as yet unpublished.

The SO_3, combined with moisture in the flue gas, produces sub-micron size sulfuric acid (H_2SO_4) particles, which cause higher visible opacity. The sulfuric acid aerosol particles cause increased corrosion of the air preheater, electrostatic precipitator and the flue gas and combustion air ductwork downstream of the air preheater. They also produce a denser, more visible, more persistent plume which may have a blue color

(blue plume) or orange-brown color depending on sky conditions. The sulfuric acid particles may also increase the tendency of the plume to touch down near the plant.

For this study, S&L investigated currently available SO_3 control technologies and their potential application at each unit. Station staff provided plant conditions (flue gas flow rates, coal firing rates, SCR design parameters, ESP design parameters, flue gas temperatures, coal analyses, etc.). This study combines a review of the technical feasibility of each technology with estimated capital costs of the feasible alternatives to provide technical and cost data which LG&E/KU can use to evaluate life cycle cost and select the most cost-effective SO_3 mitigation technologies for each unit.

1.2 SO_3 FORMATION

The oxidation of SO_2 to SO_3 occurs in two phases: 1) homogeneous gas phase reaction with oxygen radicals in the furnace, and 2) heterogeneous reaction with oxygen aided by the SCR catalyst. Higher sulfur coals produce more SO_2 and consequently higher SO_3 than low-to-medium sulfur coals. During combustion, a small percentage (~1-1.4% for the LG&E/KU units) of the SO_2 produced during combustion reacts further with oxygen radicals to form SO_3 in the furnace. Additional SO_3 is produced when SO_2 is oxidized by the catalyst in the SCR. The rate of oxidation of SO_2 to SO_3 is guaranteed by the catalyst supplier. The total oxidation by the SCR catalyst increases as additional catalyst layers are added. LG&E/KU's SCR catalysts have relatively high oxidation rates.

Virtually all of the sulfur trioxide gas combines with available water vapor in the flue gas to create both vapor-phase and condensed sulfuric acid (H_2SO_4) as the flue gas is cooled in the air preheater. At high SO_3 levels in the flue gas, significant amounts of H_2SO_4 can condense in the air preheater. The quantity of visible sulfuric acid droplets, which increase opacity, is dependent on both the acid dew point temperature and the concentration of H_2SO_4 in the flue gas. Relatively high concentrations of sulfuric acid in the flue gas from the air preheater to the stack may also cause corrosion, fouling, and plugging, all of which may require changes in operation or additional equipment to reduce the sulfuric acid concentration to a tolerable level. The rapid quenching of flue gas temperature in the FGD system forms sub-micron aerosol H_2SO_4 particles that are difficult to capture in the FGD system. In addition to increased equipment degradation,

condensed sulfuric acid particles increase opacity and can create a visible blue or orange-brown plume upon leaving the stack.

2. DESIGN BASIS

2.1 DESIGN PARAMETERS

A design basis was established jointly between S&L, LG&E/KU and station personnel for the SO_3 mitigation study. Information provided by LG&E/KU indicated expected SO_3 concentrations leaving the existing air preheaters of 46-69 ppmdv and leaving the FGD systems (existing and planned) at 31-51 ppmdv. The target SO_3 concentration at the stack exit was set at 5 ppm, which is the recommended level for low stack opacity (no visible plume). Below 5 ppm SO_3, the existing cold-side ESPs may exhibit performance degradation. The study basis includes a 1% conversion of SO_2 to SO_3 in the furnace (1.39% for Trimble County – Unit 1) and another 1.2% (2 layers) to 2.1% (3 layers) conversion in the SCR catalyst. Approximately 30-40% reduction of SO_3 across the air preheater for units with cold-side ESPs, depending on the air heater exit temperature, and 10% for units with hot-side ESPs, 25% reduction of SO_3 in the FGD system and a 5 ppm reduction of SO_3 in the existing electrostatic precipitators. The sorbent injection technologies typically take credit for any SO_3 reduction occurring in the air preheater (for upstream injection) and the electrostatic precipitator. The study is based on year round operation of the SCR and the SO_3 mitigation technology. The design basis included ambient conditions, current and future coal and flyash analyses, heat balance information (heat rate, coal firing rate, heat input, etc.), design conditions (temperature and pressures), catalyst oxidation rates and other pertinent data as shown in Table 2.1. The majority of design basis data was obtained from the recent SCR program design data.

Table 2.1: Design Parameters

	Heat Input to Boiler, MBtu/hr	SO_2 Inlet, lb/MBtu
Ghent 1	5,132	6.25
Ghent 3	5,132	6.25
Ghent 4	5,132	6.25
Mill Creek 3	4,175	6.80
Mill Creek 4	4,857	6.80
Trimble County 1	5,172	5.55

SO_3 in-furnace conversion - %	1.00	All xc TC1
SO_3 in-furnace conversion - %	1.39	%, Trimble County 1
Catalyst SO_2 to SO_3 Oxidation, %	1.90	Ghent 1
Catalyst SO_2 to SO_3 Oxidation, %	1.50	Ghent 3
Catalyst SO_2 to SO_3 Oxidation, %	1.50	Ghent 4

Catalyst SO_2 to SO_3 Oxidation, %	1.40	Mill Creek 3
Catalyst SO_2 to SO_3 Oxidation, %	1.20	Mill Creek 4
Catalyst SO_2 to SO_3 Oxidation, %	2.10	Trimble County 1
ESP SO_3 reduction, ppm	5.00	All Units
Air Heater SO_3 reduction, %	30	Ghent 1 and Trimble County 1
Air Heater SO_3 reduction, %	10	Ghent 3&4
Air Heater SO_3 reduction, %	40	Mill Creek 3&4
FGD SO_3 reduction, %	25	All units

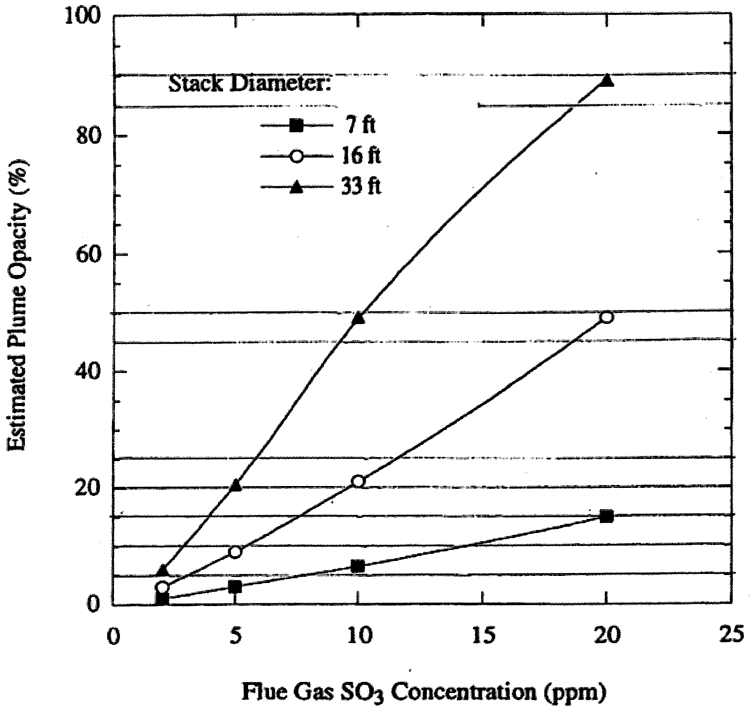
Table 2.1: Design Parameters (Continued)

	Units	Ghent 1	Ghent 3	Ghent 4	Mill Creek 3	Mill Creek 4	Trimble County 1
Unit Size	MW_{net}	511	511	511	386	490	495
Gas Flow							
Economizer Outlet	lb/hr (wet)	5,500,005	5,400,570	5,400,570	4,286,387	4,998,217	5,133,120
Air Heater Outlet	lb/hr	5,900,104	6,085,092	6,085,092	4,848,383	5,639,781	5,435,000
SO_2 to SO_3 Conv.							
Furnace	%	1.00	1.00	1.00	1.00	1.00	1.39
SCR Catalyst	%	1.90	1.50	1.50	1.40	1.20	2.10
SO_3 Concentration							
Economizer Outlet	lb/hr	401	401	401	355	413	499
	ppm	32.0	32.0	32.0	34.8	34.8	39.5
SCR Inlet	lb/hr	401	338	338	355	413	499
	ppm	32.0	27.0	27.0	34.8	34.8	39.5
SCR Outlet	lb/hr	1,163	940	940	852	908	1,252
	ppm	92.8	75.0	75.0	83.6	76.6	99.2
Air Heater Outlet	lb/hr	814	846	846	511	545	877
	ppm	65.0	67.5	67.5	50.1	46.0	69.4
FGD Inlet	lb/hr	751	846	846	460	486	813
	ppm	60.0	67.5	67.5	45.1	41.0	64.4
FGD Outlet	lb/hr	563	634	634	345	364	610
	ppm	45.0	50.6	50.6	33.9	30.7	48.3
Sorbent							
Ammonia							
Stoich. Ratio	1.25:1						
Feed rate	lb/hr	194	202	202	118	124	351
10-day Tank Size	ft (1:1.2)	11.3	11.5	11.5	9.6	9.7	13.8
Hydrated Lime							
Stoich. Ratio	10:1						
Feed rate	lb/hr	6,765	7,060	7,060	4,104	4,315	12,240
10-day Silo Size	ft (1:4)	15.8	16.1	16.1	13.4	13.6	19.3

	Units	Ghent 1	Ghent 3	Ghent 4	Mill Creek 3	Mill Creek 4	Trimble County 1
Mag. Hydroxide (Blr.)							
Stoich. Ratio	7:1						
Feed rate	lb/hr	3,726	3,888	3,888	2,260	2,377	6,741
10-day Tank Size	ft (1:1.2)	22.6	22.9	22.9	19.1	19.4	27.5
Sec. Containment.	ft. x ft.	41.4 x 5.5	42.3 x 5.5	42.3 x 5.5	32.3 x 5.5	33.1 x 5.5	43.1 x 5.5
Mag. Oxide							
Stoich. Ratio	7:1						
Feed rate	lb/hr	2,575	2,688	2,688	1,562	1,643	4,660
10-day Silo Size	ft (1:4)	9.9	10.1	10.1	8.4	8.5	12.1
Micronized Limestone							
Stoich. Ratio	7:1						
Feed rate	lb/hr	6,397	6,676	6,676	3,881	4,081	11,575
10-day Silo Size	ft (1:4)	15.0	15.2	15.2	12.7	12.9	18.3
Sodium Bisulfite							
Stoich. Ratio	2:1						
Feed rate	lb/hr	1,901	1,984	1,984	1,153	1,213	3,439
10-day Tank Size	ft (1:1.2)	20.1	20.4	20.4	17	17.3	24.5
Sec. Containment.	ft. x ft.	29.6 x 5.5	30.2 x 5.5	30.2 x 5.5	23.0 x 5.5	23.6 x 5.5	30.8 x 5.5
Trona							
Stoich. Ratio	3:1						
Feed rate	lb/hr	6,190	6,460	6,460	3,755	3,949	11,200
10-day Silo Size	ft (1:4)	16.0	16.3	16.3	13.6	13.8	19.6
Soda Ash							
Stoich. Ratio	1:1						
Feed rate	lb/hr	968	1,010	1,010	587	617	1,751
10-day Tank Size	ft (1:1.2)	15.2	15.4	15.4	12.8	13.1	18.5
Sec. Containment.	ft. x ft.	21.1 x 5.5	21.6 x 5.5	21.6 x 5.5	16.4 x 5.5	16.9 x 5.5	22.0 x 5.5

Secondary containment is required for all tanks; dimensions shown are length of the side of a square by the depth of the liquid. Wall heights are six (6) inches greater than the specified depth.

For the purposes of this study, the SO_3/H_2SO_4 in the flue gas will need to be reduced to 5 ppm or less to mitigate the "blue" plume phenomenon. Although limited data exists on the relationship between SO_3/H_2SO_4 concentration and plume visibility, a level of 5 ppm was selected, as it would eliminate the visible plume under most atmospheric conditions. Additional published data indicates that below 5 ppm H_2SO_4 in the flue gas, cold-side ESP performance may degrade. EPRI published a technical report, which includes a graph of the H_2SO_4 concentration in flue gas versus predicted opacity. The graph is reproduced here:



Source: EPRI SO_3 Mitigation Guide (TR-104424)

3. TECHNICAL DESCRIPTIONS

3.1 INTRODUCTION

The following are technical descriptions of the SO_3 mitigation technologies studied for use at Ghent – Units 1,3&4, Mill Creek – Units 3&4 and Trimble County – Unit 1. Four types of SO_3 mitigation technology options were considered:

- Alkaline additives on the coal belt
- Wet or dry sorbent injection
- Wet electrostatic precipitators (ESP)
- Switching to a low SO_2-to-SO_3 conversion SCR catalyst

The basic premise of the alkaline additive and sorbent injection options is to either condense the SO_3/H_2SO_4 on to the sorbent particles and flyash and collect it in the existing dry ESP or convert the SO_3/H_2SO_4 into a salt and collect the salts in the dry ESP. A wet ESP placed after the existing or proposed wet flue gas desulfurization (FGD) system collects acid mist and much of the remaining solid particles. A replacement low conversion rate catalyst used in the SCR will convert a smaller percentage of the SO_2 to SO_3 with the goal of staying under the visible plume threshold. Some SO_3 is normally condensed in the air preheater, on the fly ash in the precipitator and in the wet FGD system

3.2 ALKALINE ADDITIVES ON THE COAL BELT

Low sulfur coals with alkaline ash neutralize more SO_3 than coals with acidic ash. The SO_3 reacts with the alkaline components in the fly ash forming sulfates, which are then captured in the electrostatic precipitator (ESP). The use of alkaline additives on the coal belt introduces additional alkaline material in the furnace that then reacts with SO_3. Various alkaline materials including lime, limestone, dolomite, magnesium carbonate and proprietary products such as OmniClear™ from Omni Materials, Inc., may be added on the coal belt as it goes to the coal silos. OmniClear™ was tested at Cinergy's Gibson station.

The calcium-based materials are more likely to form hard deposits and have a negative impact on ESP performance. Calcium compounds have a co-benefit in tying up vapor-phase arsenic, which is a known catalyst poison. Magnesium-based materials are generally more effective at capturing SO_3 and form more friable, water-soluble deposits. Sodium and potassium compounds are catalyst poisons, so they are not used upstream of the catalyst.

The calcium- and magnesium-based alkaline materials are either added on the coal belt or pneumatically injected into the furnace through idle burners. The stoichiometries required can be as high as 30 to 40:1. Adding alkaline materials to the coal belt is a low capital cost option, which uses the coal mills to grind the sorbent to a fine powder. All of these materials mainly capture furnace-generated SO_3 and are not effective at capturing SCR-generated SO_3. In addition, alkaline additives may also modify the slagging and fouling tendencies of the coal ash and in some cases have produced unacceptable increases in slagging, increased LOI (burner injection) and increased furnace exit gas temperature. Higher furnace exit gas temperature increases the SCR catalyst activity, which increases the SO_2 to SO_3 conversion rate. For the above reasons, coal belt additives will not be considered in this study.

3.3 SORBENT INJECTION

Another method of SO_3 mitigation is sorbent injection. There are a variety of sorbents that can be added at various points in the flue gas path to remove SO_3 and reduce or eliminate the visible plume from the stack. The following sorbent injection technologies were considered in the study:

- Ammonia
- Humidification Water
- Hydrated Lime
- Magnesium Hydroxide
- Magnesium Oxide
- Micronized Limestone
- Sodium Bisulfite (SBS)

- Soda Ash
- Trona

All sorbent injection technologies, except furnace-injected Magnesium Hydroxide will be limited at Ghent Units 3&4 due to the existing hot-side ESPs, which are located upstream of the SCR. Injection of sorbents downstream of the ESPs adds particulate to the flue gas with only the wet FGD system remaining to capture the dust. As such, the quantity of sorbent which can be injected is limited by the FGD system's ability to collect particulate and remain in compliance with the particulate emission limit.

3.3.1 Ammonia

Ammonia injection into the flue gas upstream of the ESP will reduce SO_3, forming ammonia salts, mainly ammonium sulfate $[(NH_4)_2SO_4]$ and ammonium bisulfate $[NH_4HSO_4]$, depending on the reagent stoichiometric ratio applied. If the stoichiometric ratio of NH_3 to SO_3 is below one, the salts formed will generally be NH_4HSO_4, which is a sticky material known to cause air preheater and ESP fouling and plugging. The SCR systems can also cause this type of fouling, which is controlled by limiting ammonia slip to less than 2 ppm. Ammonia injection for SO_3 mitigation at stoichiometric ratios of between one and two tend to form predominantly $(NH_4)_2SO_4$ particles, which are not sticky and are collected in the ESP. Ammonia injection (at higher stoichiometries) upstream of the air preheater has a co-benefit of reducing air preheater fouling and the frequency and duration of air preheater washing.

The ammonia would be injected as an air/ammonia vapor mixture through a grid of nozzles in the ductwork entering or exiting the air preheater. Ammonia injection rates at NH_3:SO_3 molar ratios of 1.5:1 to 2.0:1 can theoretically achieve SO_3 reduction of 90% to 95%. The primary drawback of this technology is that if ammonia in the flyash or gypsum exceeds threshold values, neither may meet salability/reusability quality requirements. In addition, off-gassing of ammonia from the flyash can become a nuisance in the ash handling and disposal operations as the human nose can detect ammonia at levels as low as 5 ppm. If the levels of SO_3/H_2SO_4 being removed are too large ($\geq$30 ppmv), then additional treatment may be required to reduce ammonia and decrease pH in the holding ponds where the flyash is disposed. Short term use of ammonia injection at plants with wet ash ponds could be investigated. The detrimental effects on the ash

pond depend on the rate and duration of ammonia feed, the volume of the ash pond and the starting chemistry of the ash pond. Acid addition could be used to control pH in the ash pond. This type of evaluation is beyond the scope of the present study.

This particular SO_3 mitigation technique is most practical where an existing SCR is in operation (NH_3 is already on-site), where the SO_3 concentration reduction required is under 30 ppmv, and the flyash is not sold, but rather is collected dry and landfilled. Ammonia alone may not be able to reduce the SO_3 concentration to the desired level at the stack exit without causing a nuisance for the plant ash handling and disposal operations. Ammonia injection is currently being used at AEP Cardinal - Units 1&2, but the units are currently burning a lower sulfur coal with no FGD. Ammonia alone is not a viable technology for reducing SO_3 from the levels estimated for the LG&E/KU sites to 5 ppmdv, or less, at the stack exit due to the attendant side effects. At typical injection stoichiometries of 1.25:1, ammonia is capable of reducing 70% of SO_3 emissions at the stack, which is insufficient for the cases investigated in this study. The ammonia injection option will not be developed further in this study.

3.3.2 Humidification Water

Humidifying the flue gas upstream of the SCR or upstream of the air preheater with water injection can reduce SO_3 as follows: 1) injection upstream of the SCR reduces flue gas temperature entering the SCR and lowers the oxidation rate of the catalyst, or 2) injection upstream of the air preheater can lower the flue gas temperature below the acid dew point. This causes the sulfuric acid to condense on the sorbent particles (if used with sorbent injection) and flyash particles that can then be collected in the ESP or further downstream in the FGD system. The sorbent and flyash particles present in the flue gas provide surface area on which the sulfuric acid condenses. The sub-five micron sized particles provide a large surface area for sulfuric acid condensation.

Water injection upstream of the SCR may cause flyash to drop out in the ductwork or plug the catalyst and if not carefully controlled, at low loads, liquid water may damage the catalyst. Humidification upstream of the air preheater can cause corrosion or plugging of the air preheater and the downstream equipment due to

increased condensed sulfuric acid. Water injection upstream of the catalyst was tested at AEP Gavin Station, but discontinued due to flyash dropout in the ductwork. Humidification upstream of the electrostatic precipitator was tested by EPRI at the ECTC, but no results were reported. To date, no stations are using humidification water for SO_3 mitigation. Water injection alone will not reduce the SO_3 concentration enough to meet the desired SO_3 levels at the stack exit, with an expected maximum SO_3 reduction capability of 30%. Humidification was not considered in this study.

3.3.3 Hydrated Lime

Hydrated lime ($Ca(OH)_2$), injected pneumatically as a dry powder into the flue gas ductwork upstream of the existing cold-side, dry ESP, will react with SO_3 vapor and condensed sulfuric acid to form calcium sulfate salts that can be removed by the ESP. Injection rates vary between 1 lb/hr per 1,000 acfm with humidification to 2 lb/hr per 1,000 acfm without humidification to achieve 80%-85% reduction and as much as 5.6 lb/hr per 1,000 acfm for 95% reduction. This study used a sorbent injection molar ratio of 10:1 for 90% SO_3 reduction using a typical hydrated lime. Specially prepared hydrated limes having increased porosity may have lower stoichiometries. This option has certain drawbacks as the by-products increase fly ash resistivity, it requires a high stoichiometric ratio, and it needs long duct runs for reagent mixing. This option was used at AEP Gavin, but the maximum lime injection quantities (~2.5 tph) were limited by ESP performance.

Hydrated lime has high surface area per unit volume for better reaction with SO_3. However, hydrated limes vary greatly in surface area based on the characteristics of the limestone used to make the lime and the methods used to pressure hydrate the lime. Chemical Lime Company is now offering a specially prepared hydrated lime, called Sorbacal H™, which has very high surface area and excellent reactivity with SO_3. The cost of this product is also higher than a typical hydrated lime.

The use of a typical hydrated lime also exhibits some of the highest stoichiometric ratios required to achieve the desired removal, relative to other sorbents. Finally, because hydrated lime injection occurs after the air preheater, none of the potential air preheater corrosion issues would be eliminated. However, this would eliminate possible plugging of the air preheater caused by sulfate salts. Barring ESP limitations,

hydrated lime, alone, should be capable of reducing SO_3 to acceptable levels at the Mill Creek and Trimble County stations as well as Ghent Unit 1.

Injection of hydrated lime upstream of the wet FGD system at units with hot-side ESPs, such as Ghent 3&4, depends on capture of the added dust and reaction products in the wet FGD. This is reported to be used at Cinergy's East Bend – Unit 2. A wet FGD system has a limited capability for collection of particulate so the amount of hydrated lime injected would also be limited to avoid exceeding the particulate emission limit.

3.3.4 Magnesium Hydroxide

Magnesium hydroxide ($Mg(OH)_2$) is a magnesium compound injected as a slurry into the upper furnace for SO_3 control. $Mg(OH)_2$ loses its water of hydration in the furnace to become MgO that reacts with SO_3 to form magnesium sulfate which is collected by the dry ESP. This is a proven technology for SO_3 mitigation on oil-fired units, with the first full-scale installation over 30 years ago. Due to the injection location in the furnace, $Mg(OH)_2$ is most effective at reducing furnace-generated SO_3. It is less effective at reducing SO_3 emissions resulting from SCR oxidation. Alkali addition in the furnace also limits the amount of corrosion and other negative effects associated with having higher quantities of SO_3/H_2SO_4 in the system. $Mg(OH)_2$ is injected at $Mg:SO_3$ molar ratios of 4.5:1 based on the furnace outlet SO_3 concentration to achieve 90% reduction of furnace-generated SO_3. High ash resistivity may be a problem at high injection rates. Typically, this method of SO_3 removal is effective up to the range of 40% - 80% overall. A stoichiometry of 7:1 would be required to achieve 90% overall reduction of both furnace and SCR generated SO_3. The SO_3 mitigation efficiency is sensitive to the location and elevation of the injection into the boiler. Magnesium Hydroxide has been used at Bruce Mansfield 3, Gavin 1 and at Zimmer. Due to the high SO_2 concentration in the flue gas and the guaranteed conversion rate of the catalyst, it is unlikely that magnesium hydroxide injection into the furnace, alone, will reduce SO_3 to the desired concentrations at the stack outlet. Magnesium hydroxide may be a viable choice for Ghent – Units 3&4, the units equipped with hot-side ESPs.

3.3.5 Magnesium Oxide

Magnesium oxide (MgO) is pneumatically injected as a dry powder upstream of the air preheater, reacting with the SO_3/H_2SO_4 to create magnesium sulfate salts that are then collected by the cold-side ESP. Magnesium oxide has been tested at only a few power plants, although one supplier does cite examples of up to 80% removal at approximately a 7:1 stoichiometric ratio. High ash resistivity could be a problem for these salts, as this same problem is seen with the $Mg(OH)_2$ injection in the boiler when attempting high SO_3/H_2SO_4 removal efficiencies. The use of MgO injection alone for SO_3 mitigation may be limited by resistivity impacts on the ESP. MgO was not considered further in this study.

3.3.6 Micronized Limestone

Marsulex markets a technology called CleanStack™, which uses micronized limestone. The micronized limestone particles injected upstream of the air preheater, serve the dual purpose of reacting with the SO_3/H_2SO_4 to form calcium salts and providing additional surface area on which the acid mist can condense. This option would require modifications to the air preheater to lower the flue gas outlet temperature below the sulfuric acid dew point. The reacted and condensed upon particles are collected by the dry ESP and removed from the system. The major benefit of using micronized limestone is the lower sorbent cost of limestone compared to lime, magnesium compounds or sodium compounds. A co-benefit of lowering the air preheater exit temperature is an improvement in unit heat rate. Micronized limestone has resistivity limitations similar to that of lime as both produce calcium sulfate reaction products which will increase flyash resistivity. Micronized limestone depends on small particle size to create surface area where hydrated lime has high porosity as well as small particle size.

There is no field experience with micronized limestone for SO_3 mitigation. A demonstration system is being installed at Dominion Energy's Chesterfield – Unit 5 for start-up in the first quarter of 2006. This technology was modeled based on measured SO_3 data from a 315 MW unit. In addition to lowering the exit temperature of the air preheater to below the acid dewpoint, additional proprietary modifications to the air preheater must be performed including the installation of Alstom's ClearFlow™ heat transfer elements. This includes converting the cold-end and intermediate layers of the air preheater to a combined cold-end

layer, changing the profile of the cold-end elements, using enamel coated elements and removing some element support grids. Due to the absence of a full scale demonstration of micronized limestone, it is unknown whether this technology, used alone, or in conjunction with humidification water, will reduce SO_3 concentrations to the desired levels. Expected SO_3 removal efficiencies for this technology are 70% based upon injection stoichiometric ratios of 7:1. This option was not considered further in this study.

3.3.7 Sodium Bisulfite

Sodium Bisulfite (SBS) can be injected into the flue gas stream upstream or downstream of the air preheater, or upstream of an FGD system as a 10 wt% solution using dual fluid atomizers. The SBS reacts with the SO_3 present in the flue gas to form sodium salts, which are then collected by the existing dry ESP or in the FGD system. SBS has been used at three commercial installations, First Energy's Bruce Mansfield Station, Tennessee Valley Authority's (TVA) Widows Creek Unit 7, and Cinergy's Gibson Station as well as in full-scale testing at Vectren Corporation's A. B. Brown Station and in one duct at AEP's Gavin Unit 1.

The full-scale testing indicates SO_3/H_2SO_4 removal capability down to approximately 2 ppm to 10 ppm with reagent stoichiometry of 1.5:1 to 2.0:1. For this study, a sorbent injection molar ratio of 2.0 was used. Air preheater fouling and dust dropout in the ductwork have been reported by the operating facilities. Weekly cleaning of the dual fluid atomizers is required. The SBS is a byproduct of the double alkali scrubber at Vectren's A. B. Brown Station. The SBS process is patented by URS/Codan Associates. An annual licensing payment of $200/MW/year has been included in the O&M costs associated with this option. The byproduct SBS currently comes from a single source of supply although commercial sodium sulfite or soda ash can be used in its place. Sodium sulfite is a more costly sorbent than SBS.

The sodium-based sorbents have no detrimental impact on cold-side ESPs. The lower stoichiometries of sodium-based sorbents result in less total dust added than the calcium or magnesium sorbents and sodium is an ESP conditioning agent.

SBS could be injected upstream of the FGD systems at Ghent – Units 3&4 with the reaction products being collected in the scrubber. Because SBS has a lower stoichiometry than calcium and magnesium sorbents, the total dust load to the FGD would be smaller. Testing would be needed at Ghent to demonstrate the effectiveness of SBS injection upstream of the FGD before being permanently installed.

3.3.8 Soda Ash

URS/Codan recently developed another means of producing SBS in-situ by injecting soda ash (Na_2CO_3) solution into the ductwork through dual fluid atomizers. Within the flue gas ductwork, the soda ash combines with SO_2 to produce SBS and sodium sulfite. Both of these products react with SO_3 molecules present to form sodium bisulfate. The dual sorbent process is installed at Cinergy's Gibson Units 1-5. Tests at the Gibson Station indicate 40%+ removal, with the SCR in service, at stoichiometric ratios of 1.5:1. This system has also been installed at Pennsylvania Power & Light's Montour Station, Units 1&2. Because either SBS or soda ash can be injected in this system, while still meeting desired outlet concentrations, this system is more flexible than many of the other sorbent injection systems. This process would also include an annual licensing fee of $200/MW/year.

3.3.9 Trona

Sodium sesquicarbonate ($Na_2CO_3 \cdot NaHCO_3 \cdot 2H_2O$) or "Trona" is a naturally occurring mineral which is commercially known as Solvair Select 200 (minus 200 mesh particle size) and is supplied as a powder that is pneumatically injected into the ductwork upstream of the air preheater through a grid of injection nozzles (Section 7.2.3). The Trona reacts with the SO_3/H_2SO_4 and creates sodium salts that are collected in the existing dry ESP. SO_3 reduction of up to 90% is achievable at molar ratios of 3.0:1. Trona is being used at AEP's Gavin Unit 1 and has been tested at AEP Zimmer with promising results. Trona has had no detrimental effects and may even have had a slight beneficial effect on the performance of the existing ESPs. Some drop out and accumulation of solids in the ductwork has occurred at Gavin. The solids deposits are friable, so soot blowers or acoustic horns may be needed to break up and re-entrain these deposits. Trona is mined in the Green River, Wyoming area and would be shipped by rail to the site or to a central point in the Louisville area where the Trona could be transferred from rail to truck for delivery to

the sites. Trimble County has no rail capability. A shortage of locomotives was reported to be a problem in obtaining shipments of Trona to the Zimmer site. While there are several companies mining Trona from the Green River area to produce soda ash, only one (Solvay Chemicals) currently produces Trona with the required particle size needed for SO_3 capture.

If Trona is selected for use at multiple LG&E/KU sites, a central rail delivery point could be considered for long term storage with truck distribution to each site. The study did not include the cost of a central storage and transfer facility. AEP has applied for a patent on this process, so a licensing fee may also be required.

Preliminary testing has been conducted at Mirant's Potomac River Station to test the effectiveness of Trona injected upstream of the hot-side precipitator. These tests, whose results were published in January 2006, were done to test the removal of SO_2 and did not include measures to test SO_3 removal. Additionally, the Potomac River Station does not currently have an SCR installed and is running a dry stack. Future testing is planned and will include testing for SO_3 removal.

3.4 WET ELECTROSTATIC PRECIPTATOR (ESP)

A wet ESP is typically installed between the FGD absorber and the stack, removing most of the remaining flyash as well as the condensed sulfuric acid. The wet ESP may be supported independently from grade for horizontal gas flow or mounted on the top of the absorber for vertical gas flow. The deciding factor on whether to use a horizontal or vertical flow lies in the tradeoff between the extra ductwork and footprint needed to install the wet ESP supported from grade and the structural and foundation alterations necessary to put the wet ESP on top of the FGD absorber. In either arrangement the wet ESP can very effectively capture sulfuric acid aerosols (90+%). Wet ESPs have been used for many years in the metallurgical and other non-utility industries, at the AES Deepwater cogeneration plant in Houston since 1986 and at Xcel Energy's Sherbourne County Station. A wet ESP was installed on top of an FGD absorber at New Brunswick Power's Coleson Cove and Dalhousie plants, started up in 2004, and Wisconsin Energy recently selected wet ESPs for their new plant, the 1,000 MW Elm Road project.

Wet ESPs operate in a three-step process that includes charging the entering particles, collection of the particles on oppositely charged plates, and cleaning the collection surfaces. While a dry ESP uses mechanical cleaning (rapping) of the collecting plates, a wet ESP uses either an intermittent or continuous water wash. The advantages of a wet ESP include an increased power level (2 W/acfm as opposed to 0.1 to 0.5 W/acfm with a dry ESP) and reduced particle re-entrainment because a wet ESP does not need rapping of the collecting plates. In addition to the auxiliary power used, the wet ESP uses clean water for washing the plates and may use MgO to neutralize the wash water for reuse or consume some of the FGD reagent (limestone) if drained to the FGD system. The wet ESP also has potential co-benefits in the collection of fine fly ash particles and particulate mercury. Wet ESPs require the use of costly acid-resistant materials of construction for ductwork and ESP internals. The vertical flow wet ESPs typically require more corrosion resistant materials than horizontal flow wet ESPs because they are washed intermittently rather than continuously. Ghent – Units 3&4 are good candidates for wet ESPs based on the limited applicability of sorbent injection alternatives since these units have existing hot-side ESPs.

3.4.1 Horizontal Flow - Wet ESP Supported from Grade

The horizontal flow wet ESP would be supported from grade between the FGD absorber and the stack. Additional ductwork is necessary between the FGD absorber and the wet ESP and again between the wet ESP and the stack. The horizontal flow wet ESP can be elevated above access roads, for example, to alleviate the larger footprint required, but the cost of support steel, foundations and piles would be higher. In the horizontal flow wet ESP, a conventional plate and wire configuration is used. The wastewater from the wet ESP can be added to an existing wastewater treatment system, treated with MgO and recycled or sent to the ash pond or added to the FGD reaction tank. The horizontal flow wet ESP takes considerable footprint area on site, which is limited at Ghent and Mill Creek. The horizontal flow wet ESP for each unit is 90% efficient, with 230,000 sq. ft. of collecting area, three fields in series, 12 transformers, horizontal inlet and horizontal outlet in a double deck arrangement. Ductwork from the top of the absorber is included. The ESP casing, roof, and sidewalls, inlet and outlet nozzles, collecting plate assemblies and water wash collection pans are constructed of A2205 stainless steel. External stiffeners and support steel are constructed of A572 grade 50 steel. Water spray nozzles are polypropylene plastic. Mill Creek – Units

3&4 and Trimble County – Unit 1 are good candidates for a horizontal flow wet ESP. These units each have multiple FGD absorbers, so they are not easily equipped with vertical flow wet ESPs. Arrangement drawings are attached in Appendix 8. The layouts shown for Ghent – Units 1&4 horizontal wet ESPs included moving the location of the chimneys to make room for the wet ESP between the FGD and the chimney. Because the FGDs and chimneys have not been purchased yet, no costs were added for moving the chimneys.

3.4.2 Vertical Flow - Wet ESP on Absorber Tower

The vertical flow wet ESP would be built directly on top of the FGD absorber. It can be supported by the absorber structure (future Ghent – Units 1&4 FGD) or supported from a separate steel structure above the absorber (Ghent – Unit 3). In a vertical flow design, bundles of tubes would serve as the collection area while a wire running down the center of each tube would provide the necessary electrical discharge. The use of water in the wet ESP reduces particle re-entrainment and solves the limitation present in the dry ESP. Due to the rapid cooling and humidification of the flue gas in the FGD system, the remaining sub-micron H_2SO_4 mist in the flue gas not captured by the FGD system is collected in the wet ESP. In addition to the sulfuric acid mist, the wet ESP can remove much of the flyash remaining in the flue gas as well as any scrubber carryover. One drawback to the system is that the liquid waste will be drained through collection troughs and piping to the FGD reaction tank, adding a small amount of acid that would require neutralization as well as a small quantity of trace metals and flyash, which may alter process chemistry.

Due to the extra weight of the system, the foundation and structural steel for the scrubber would have to be designed to carry this load as well as that of the scrubber. Also, the chimney would have to include a breeching opening at a higher elevation to accept the outlet duct from the wet ESP. The chimney liner would be about 60 feet shorter due to the higher breeching opening. However, this design also greatly reduces the quantity of ductwork required, as opposed to the horizontal flow design wet ESP. This process is simplified for Ghent Units 1&4 in that the FGD towers are not yet designed or constructed, so the wet ESP can be planned and engineered for from the beginning. For Ghent - Unit 3, the foundation for the absorber has been designed to support the load of a future WESP, but would require significant structural

steel as the FGD tower was not designed to support the load. The cost of independent structural steel support, foundations and piles were included, as applicable. Arrangement drawings are attached in Appendix 8.

The vertical wet ESP for each unit is 90% efficient, with four chambers (each field is divided into four quadrants of the circular cross section casing) and three collection fields in series. Because the vertical wet ESP is washed intermittently rather than continuously like the horizontal wet ESP, the collecting electrodes will be constructed of C-276 for all fields. The discharge electrode frames, top suspension frames, lower alignment frames and wash water piping will be constructed of C-276 for the first field and 6% moly stainless steel for the remaining fields. The insulator compartments will be 304 stainless steel. The vertical wet ESP will be equipped with 12 transformer/rectifier sets each rated at 110kV peak and 1,250 mA. The cost of the vertical flow wet ESP is higher due to the use of C-276 for all three fields. If lesser alloys are used for fields two and three, the cost could be reduced.

3.5 LOW CONVERSION CATALYST

Another option for reducing the levels of SO_3 in the flue gas leaving the SCR is to change to a catalyst with a lower conversion (oxidation) rate of SO_2 to SO_3. The catalyst could be replaced all at once or one layer at a time as part of the current catalyst management system. SO_2 oxidation increases with the Vanadium content of the catalyst and the operating temperature of the catalyst. Haldor-Topsoe, a catalyst supplier, also reports that the presence of iron in the fly ash increases the oxidation of SO_2 to SO_3. In addition, other impurities in the catalyst can increase oxidation. The LG&E/KU SCRs have relatively high conversion rate catalysts, ranging from 1.2% to 2.1% with all catalyst layers installed.

The catalyst manufacturers have been developing low conversion rate catalysts. One supplier quoted rates as low as 0.2% with zero dust, but the conversion rate is highly temperature dependent. Haldor-Topsoe reports low conversion rates for their catalyst at Harrison (<0.3%), Cayuga (<0.5%) and at Elmer Smith (<0.3%).

The use of low conversion rate catalyst at Ghent – Units 3&4 is an option that must be considered because the hot-side ESPs preclude injecting large quantities of sorbent after the ESP. If $Mg(OH)_2$ were injected in the furnace to remove 90% of the furnace generated SO_3 and a 0.6% or less conversion rate catalyst was installed, SO_3 could be reduced to 5.6 to 8.5 ppm at the stack.

The low conversion catalyst is also a less active catalyst for NO_X reduction. This means that more catalyst volume (~15%) may be needed, or the catalyst life may be shorter and a cost would be incurred for both the initial purchase and more frequent replacement cost. The low conversion catalyst is also not able to achieve the required outlet SO_3 concentration by itself since some SO_3 is generated in the boiler prior to the SCR. So, a sorbent injection system would be needed anyway. A low conversion catalyst used in conjunction with a sorbent injection technology may be the lowest cost option. The study did not estimate the cost of catalyst replacement because LG&E/KU has recent pricing for replacement catalyst.

3.6 COMBINATIONS OF SORBENT INJECTION TECHNOLOGIES

Several of the sorbent injection technologies have limitations such as fly ash resistivity which prevent a single approach to achieving the goal of reducing SO_3 from estimated levels to 5 ppm or less. As such, combinations of technologies should be considered to achieve the desired SO_3 reduction. For example, $Mg(OH)_2$ injection in the furnace combined with hydrated lime or Trona injection ahead of the cold-side ESP may also be considered. However, the use of combinations of technologies increases the capital costs for multiple storage and injection systems. In addition, on-site space limitations may preclude multiple storage and injection systems. A combination of $Mg(OH)_2$ injection in the furnace and replacement of the SCR catalyst with a low SO_2 to SO_3 conversion catalyst and SBS injection upstream of the FGD system could also be considered for Ghent – Units 3&4. A table is included below summarizing the technology combinations which are likely to reduce SO_3 emissions at the stack outlet to the desired levels.

Table 3.1 Summary of SO_3 Mitigation Technology Efficiencies

Mitigation Technology (Stoich. Ratio)		Expected SO_3 Reduction Percentage
Ammonia	1.25:1	70%
Humidification Water	---	27%
Hydrated Lime	10:1	90%

Mitigation Technology (Stoich. Ratio)		**Expected SO_3 Reduction Percentage**
Magnesium Hydroxide (Blr.)	7:1	90% (Boiler-generated SO_3)/40-60% overall
Magnesium Oxide	7:1	80%
Micronized Limestone	7:1	70%
Sodium Bisulfite	2:1	90%
Soda Ash	1:1	90%
Trona	3:1	90%
Wet ESP	---	90%
Low Conversion Catalyst	---	28-43% for LG&E/KU Sites
Combinations of Technologies		
Sorb. Inj. (US of AH) + Low Conv. Catalyst		95%
Mag. Hydroxide + Sorb. Inj. (US of AH)		95%
Wet ESP + Sorb. Inj. (US of AH)		95%
Wet ESP + Mag. Hydroxide		95%
Wet ESP + Low Conversion Catalyst		95%

Unit	Required SO_3 Removal (%)
Ghent 1	90%
Ghent 3	90%
Ghent 4	90%
Mill Creek 3	87%
Mill Creek 4	85%
Trimble County 1	90%

4. RISK ASSESSMENT

The science and technology of SO_3 mitigation for power plants burning high sulfur coal equipped with SCR and wet FGD systems is currently evolving. Each of the technology options considered in this study has varying degrees of risk associated with it. The sorbent injection technologies can produce deposits in the ductwork, air preheater, and on turning vanes and internal struts and bracing. The dry sorbents typically produce dry deposits that should be controllable by soot blowers or acoustic horns. The wet sorbent technologies like SBS can produce harder deposits in both the air preheater and ductwork. Injection nozzles require regular inspection and cleaning. This adds a risk of increased maintenance, unplanned outages for cleaning and increased fan power. The low SO_2-to-SO_3 conversion rate catalyst option includes the risk of shorter catalyst life and increased long term catalyst replacement costs.

The process scale-up risk applies mainly to the sorbent injection technologies. The key parameters that must be demonstrated in a full-scale application include: the ability to adequately distribute and mix the sorbent in the furnace or ductwork for contact with the SO_3; the molar ratio of sorbent to SO_3 versus percent removal; undesireable side effects such as: dust dropout, buildup, air preheater plugging, ESP performance degradation, contamination of byproducts, increased furnace slagging and fouling, and regular maintenance of the injection nozzles; and the capital and O&M costs of the process at full scale. Some of the technologies have been demonstrated at full scale; others have not.

4.1 IMPACT ON ESP PERFORMANCE

A review of the existing ESPs and the original design parameters indicates that the concerns of increased fly ash resistivity and ESP performance degradation resulting from sorbent injection must be considered. The relative amount of sorbent added compared to the fly ash in the coal is very small. The existing ESPs were designed for much higher inlet grain loading than would result from any of the sorbent injection options. There will be adequate SO_3 in the flue gas to the ESPs to condition the ash and lower resistivity. SO_3 is a commonly used conditioning agent. There is a moderate risk associated with calcium-based sorbents, a lower risk with magnesium-based sorbents and very low risk with sodium-based sorbents. The

greatest risk of ESP performance degradation is for those ESPs with the smallest specific collecting areas (SCA). Only Trimble County – Unit 1 has a relatively large SCA.

4.2 IMPACTS OF SORBENTS ON FLY ASH SALABILITY

The calcium- and magnesium-based sorbents will have no significant impact on fly ash chemistry and its marketability. Sodium-based sorbents add water soluble sodium compounds to the fly ash, but not enough to affect its salability. Ammonia will definitely affect salability of the fly ash due to the ammonia odor imparted.

4.3 IMPACTS ON GYPSUM SALABILITY

The calcium-based sorbents are compatible with a commercial grade gypsum product. The gypsum buyers have established limits on the minimum $CaSO_4$ content and maximum $CaCO_3$ and $MgCO_3$ in the product. Very large quantities of limestone or magnesium compounds could dilute the gypsum purity or exceed the limits set on $CaCO_3$ or $MgCO_3$, but most of the sorbent will be captured by the existing ESP. Sodium and magnesium-based compounds are water soluble and will be washed out of the gypsum. Ammonia will be collected in the wet FGD system and appear in the gypsum. Some of the ammonia will be washed out of the gypsum, but if more than 5 ppm remains, salability will be negatively affected.

4.4 SUMMARY OF POTENTIAL RISKS FOR EACH TECHNOLOGY

Ammonia: The potential revenue loss due to fly ash and gypsum salability, ammonium salt formation, byproduct reuse and disposal, landfill disposal, odor nuisance, and fly ash pond treatment costs are the major drawbacks of this technology. In addition to these drawbacks, this technology will only meet the target SO_3 reduction rate at very high injection rates.

Humidification: Humidification upstream of the SCR can produce ash deposits in the ductwork and could plug or damage the catalyst. There is a risk of increased maintenance cost and the cost of premature catalyst replacement. In addition, humidification alone will reduce SO_3 emissions by about 27%, which does not meet the target SO_3 reduction.

Hydrated Lime: The data presented in the literature for this technology is old, and full scale results from any utility are not documented to serve as the basis for performance estimates. The dry sorbent storage and delivery system is subject to moisture, plugging and erosion problems. The effectiveness of the hydrated lime sorbent depends on high surface area, which varies between lime sources. Fly ash resistivity increases may result in ESP performance degradation.

Magnesium Hydroxide: The sorbent is available as a commercial product and as a byproduct from the Thiosorbic™ Lime FGD system operation. The cost of the commercial product is significantly more than the byproduct material. There is currently a limited supply of the byproduct $Mg(OH)_2$. The data presented in the literature for this technology is recent, and the full scale results from several plants are documented to serve as the basis for performance estimates. The furnace sorbent injection of $Mg(OH)_2$ could cause increased furnace and convection pass fouling. Fly ash resistivity increases may result in ESP performance degradation.

Magnesium Oxide: Since MgO is produced by a limited number of suppliers, the cost will be dependent on the delivery cost based on the transportation distance to the plant. The dry sorbent storage and delivery is subject to moisture, plugging and erosion problems. Magnesium oxide alone cannot achieve 90% SO_3 removal.

Micronized Limestone: This technology has not been pilot tested at any power plant, but the supplier is willing to share the cost with any utility who will allow them to install a slip stream pilot plant. There is a risk of fouling, scaling of byproduct in the ductwork, air preheater, and resistivity problems in the electrostatic precipitator. The cost of technology development and demonstrating the stoichiometry are added risks.

Sodium Bisulfite: In addition to the proprietary technology, single source of supply, the yearly licensing fee, and the reagent (sodium bisulfite powder) delivered cost, the major drawback of this technology is O&M cost. The cost of the project installed at Gibson Station increased significantly from start to finish. While byproduct SBS is a less costly sorbent, Vectren may not continue to produce the material.

Soda Ash: In addition to the proprietary technology, this sorbent injection technology requires longer duct residence time due to the multiple reactions which need to take place and does not have the experience level of SBS. Injection of soda ash upstream of the air preheater is not feasible for the LG&E/KU plants due to residence time requirements.

Trona (Sodium sesquicarbonate): Trona is an expensive reagent with a long shipping distance from Green River, Wyoming and has been limited by transportation availability at Zimmer Station. Typically shipped by rail, the Trona would have to be transferred to trucks at a centrally located storage and transfer facility. In addition, there is currently only one source of supply. AEP has applied for a patent for this technology, so a licensing fee may apply.

Transportation and Fuel Cost Risks: All of the sorbents are subject to risks associated with transporting material over varying distances as well as the risk of fuel cost increases. Some sorbents, such as Trona, may be affected by natural gas price volatility.

Wet ESP: It is a mature, proven, well-demonstrated technology to reduce SO_3 emissions in industrial plants, but there is little data available from any power plant firing high sulfur coal, with SCR in service, and limestone forced oxidation FGD installed downstream of the dry ESP. Wet ESPs are installed in Europe and Japan. In North America, five power plants installed Wet ESPs, AES Deepwater, Xcel Energy's Sherco Station, New Brunswick Power's Dalhousie and Coleson Cove stations, and Dakota Gasification Co. The wet ESP options require a large capital investment in equipment which is subject to a very corrosive environment. The costs of the corrosion-resistant alloys needed for wet ESPs are currently very volatile so there is a cost escalation risk. The corrosive environment also presents a risk of periodic repair and/or replacement cost. Additionally, the wet ESP typically increases the pressure drop across the system by 3-5 in W.G., depending on the arrangement. Fan curves provided by LG&E/KU indicate that Ghent – Unit 1 and Mill Creek – Unit 3 may be at or near test block conditions with three complete layers of catalyst and may not have sufficient margin for the additional pressure drop associated with a wet ESP.

Purchasing the Ghent – Units 1&4 FGD and wet ESP from the same supplier would eliminate some of the commercial risk and place performance guarantee responsibility with one Contractor. For the vertical wet ESP it would also allow an integrated absorber – wet ESP design. Purchasing the wet ESP separately introduces an interface between the vendors, both a physical interface and a process interface which affects performance guarantees. However, the wet ESP can be purchased separately through competitive bidding with good definition of the process requirements to minimize commercial and performance guarantee risks.

Low Conversion Catalyst: Low conversion catalyst is a proven commodity in reducing SO_3 emissions at the stack outlet. Low conversion catalysts area available with typical guaranteed SO_2 to SO_3 conversion percentages between 0.6-0.8% for three layers of catalyst. This also comes at a cost as the NOx reduction capability of the catalyst is also reduced, thereby requiring more catalyst volume and more frequent catalyst replacement to replicate the NOx reduction efficiency of the existing catalyst. The use of the low conversion catalyst does have limitations, however, as this technology only reduces SCR generated SO_3. This can have profound effects, for example, by completely switching to three layers of low conversion catalyst, Trimble County – Unit 1 SO_3 emissions can be reduced 43%, but this is still considerably higher than the target 5 ppm stack outlet concentration (90% SO_3 reduction).

Based on the capital costs, reagent costs, performance, reliability and operational impacts, the following risk ranking has been assigned for each technology.

Table 4-1: Risk Assessment Summary

Technology	Capital Cost	O&M Cost	Performance	Reliability	Overall
Alkaline Additives on Coal Belt	Low	Low	High	Low	High
Ammonia	Low	Low	High	Low	High
Humidification	Low	Low	High	Medium	High
Hydrated Lime	Low	Medium	Medium	Medium	Medium
Magnesium Hydroxide	Medium	Medium	Medium	Medium	Medium
Magnesium Oxide	Medium	Medium	High	Medium	High
Micronized Limestone	High	Medium	High	Medium	High
Sodium Bisulfite (SBS)	Low	Medium	Low	Medium	Low to Medium
Soda Ash	Low	Medium	Low	Medium	Low to Medium
Trona	Low	High	Low	Medium	Low to Medium
Vertical Wet ESP	High	Medium	Low	Medium	High
Horizontal Wet ESP	High	Medium	Low	Medium	High
Low Conversion Catalyst	Low	Low	Low	Low	Low

5. COST ANALYSES

5.1 INTRODUCTION

The alternatives considered for SO_3 mitigation at the LG&E/KU sites included several sorbent injection technologies, two options for wet electrostatic precipitators and replacement of the SCR catalyst with a low SO_2 to SO_3 conversion rate type of catalyst. The wet electrostatic precipitator options are high capital cost/low operating cost options. The sorbent injection technologies are low-to-medium capital cost/medium-to-high operating cost options (depending on the chemical chosen and its delivered cost). The low conversion rate SCR catalyst is a high cost option if a complete replacement of catalyst is made before the existing catalyst activity is exhausted. SCR catalyst replacement occurs periodically as a part of an overall catalyst management plan. If catalyst is only replaced on the schedule of the catalyst management plan, then the cost of low conversion rate catalyst would be an incremental cost premium above that of the original catalyst. The cost per cubic meter of low conversion rate catalyst is about the same as high conversion rate catalyst, but as much as 15% more low conversion catalyst volume is required to achieve the same NOx reduction efficiency.

5.2 ECONOMIC PARAMETERS

LG&E/KU will use the capital costs, sorbent costs, and operating parameters to evaluate the life cycle costs of the various alternatives. Below is a table summarizing the economic basis.

Table 5.1: Economic Basis

Cost Item		
Auxiliary Power [5]	$/MW-h	LG&E/KU
Estimated Outage Penalty [2]	$/day	LG&E/KU
Estimated Outage Penalty	$/MW-h	LG&E/KU
Anhydrous Ammonia – Delivered	$/ton	$300.00
Dry Hydrated Lime – Delivered	$/ton	$109.00
Dry Sorbacal H™ - Delivered	$/ton	$120.00[7]
Magnesium Hydroxide Slurry - Delivered	$/ton	$210.00
Dry Magnesium Oxide - Delivered	$/ton	$450.00
Dry Micronized Limestone - Delivered	$/ton	$30.00
30wt% Sodium Bisulfite - Delivered	$/ton	$300.00
Dry Trona – Delivered[6]	$/ton	$205.00
Dry Soda Ash – Delivered	$/ton	$220.00
Dry Sodium Sulfite – Delivered	$/ton	$350.00

Cost Item		
SBS or Soda Ash Licensing Fee	$/MW/year	$200.00
Low Conversion Catalyst	$/m^3	LG&E/KU
Softened Water	$/kgal	$0.06
O&M Personnel	$/man-hour	LG&E/KU
Estimated Gypsum Byproduct (Sale)[1]	$/ton	$2.00
Estimated Gypsum Disposal (Landfill) [1, 4]	$/ton	
Labor Escalation Rate	%/yr	
Discount Rate	%/yr	
Economic Life	years	25
Estimated Capacity Factor [3, 4]	% full load	LG&E/KU
Estimated Make-up Water Cost	$/1,000 gal	LG&E/KU
Estimated FGD Purge Treatment Cost	$/1,000 gal	LG&E/KU
Equipment and Material Escalation Rates		
2006	%/yr	2.45%
2007	%/yr	2.33%
2008 and after	%/yr	2.32%

Notes:

1 - Assumes local landfill. Cost to load, haul, and place only.
2 - Assumes typical spring or fall day.
3 - Assumes emissions control equipment is installed and operating.
4 - Assumes the unit capacity factor is constant for the entire 25-yr life cycle.
5 - For the cost impact of lost generation, add together the auxiliary power cost ($/MW-h) and the outage penalty cost ($/MW-h). This would be the cost for year one of the analysis.
6 - Rail delivery of Trona is $160/ton with $40/ton added for transferring from rail to truck for delivery to each site.
7 - Chemical Lime Company plans to build a hydrator in the Louisville area and projects the cost of Sorbacal H™ to be $95-100/ton delivered.

5.3 ESTIMATED COST BASES

5.3.1 Structural Basis

Foundations sizes were determined based on estimated equipment sizes and representative soil data available for the Ghent and Mill Creek stations. For the purposes of this estimate, the soil conditions at Trimble County are assumed to be similar to those at Mill Creek.

Major structures and silos are assumed to be pile supported. Lighter structures are assumed to be supported on either mat foundations or on spread footings. Where pile foundations are used, the estimates assume the use of 18" diameter augered cast in place (ACIP) piles drilled to a depth of 50 feet at Ghent and 16" diameter ACIP piles drilled to a depth of 100 feet at the Mill Creek and Trimble County stations.

Structural steel quantities are based on the proposed arrangements of the wet precipitator and ductwork. The estimates are for new structural framing and do not include demolition or modifications to existing structures.

Concrete walls were included for containment around all liquid sorbent storage tanks based on a six foot wall height and a square area to provide a volume equal to the 10-day storage tank volume. Concrete lining of the containment area was also included.

5.3.2 Electrical Basis

5.3.2.1 Mill Creek Unit 3

Sorbent injection:

Expected loading will be approximately 800KVA total, This loading could be supplied for a single 4kV/480V Transformer feed from the 4kV Swgr 3B1. The other option would be to split the load between two new MCCs which are supplied from the 480V Power Centers (one for the A bus and the other from the B bus).

Wet ESP:

With the expected loading for the Wet ESP of 1800KVA/bus or 3600kVA total, there would be a 480V double-ended switchgear located at the new ESP. This bus would be supplied power from the 4kV Bus 3A1 and 3B2.

5.3.2.2 Mill Creek Unit 4

Unit 4 would be similar to Unit 3 in its requirements.

Sorbent injection:

Expected Loading will be approximately 800KVA total, This loading could be supplied for a single 4kV/480V Transformer feed from the 4kV Swgr 4B1. The other option would be to split the load between two new MCCs which are supplied from the 480V Power Centers (one for the A bus and the other from the B bus).

Wet ESP:

With the expected loading for the Wet ESP of 1800KVA/bus or 3600kVA total, there would be a 480V double-ended switchgear located at the new ESP. This bus would be supplied power from the 4kV Bus 4A1 and 4B2.

5.3.2.3 Ghent Unit 1

Sorbent injection:

Expected Loading will be approximately 800KVA total, This loading could be supplied for a single 4kV/480V Transformer feed from the Medium Voltage Swgr 1A or 1B. The other option would be to split the load between two new MCCs which are supplied from the 480V Power Centers (one for the A bus and the other from the B bus).

Wet ESP:

With the expected loading for the Wet ESP of 1800KVA/bus or 3600kVA total, there would be a 480V double-ended switchgear located at the new ESP. This bus would be supplied power from the new FGD Medium Voltage Switchgear that would be supplied as part of the new FGD installation.

5.3.2.4 Ghent Unit 3

Sorbent injection:

Expected Loading will be approximately 800KVA total, This loading could be supplied for a single 4kV/480V Transformer feed from the Medium Voltage Swgr 3A or 3B. The other option would be to split the load between two new MCCs which are supplied from the 480V Power Centers (one for the A bus and the other from the B bus).

Wet ESP:

With the expected loading for the Wet ESP of 1800KVA/bus or 3600kVA total, there would be a 480V double-ended switchgear located at the new ESP. This bus would be supplied power from the new FGD Medium Voltage Switchgear that would be supplied as part of the new FGD installation.

5.3.2.5 Ghent Unit 4

Sorbent injection:

Expected Loading will be approximately 800KVA total, This loading could be supplied for a single 4kV/480V Transformer feed from the Medium Voltage Swgr 4A or 4B. The other option would be to split the load between two new MCCs which are supplied from the 480V Power Centers (one for the A bus and the other from the B bus).

Wet ESP:

With the expected loading for the Wet ESP of 1800KVA/bus or 3600kVA total, there would be a 480V double-ended switchgear located at the new ESP. This bus would be supplied power from the new FGD Medium Voltage Switchgear that would be supplied as part of the new FGD installation.

5.3.2.6 Trimble County Unit 1

Sorbent injection:

Expected Loading will be approximately 800KVA total, This loading could be supplied for a single 7kV/480V Transformer feed from the SDRS 7kV Swgr 1A1 or 1B1. The other option would be to split the load between two new MCCs which are supplied from the 480V Precipitator Power Centers (one for the A bus and the other from the B bus).

Wet ESP:

With the expected loading for the Wet ESP of 1800KVA/bus or 3600kVA total, there would be a 480V double-ended switchgear located at the new ESP. This bus would be supplied power from the SDRS 7kV Swgr 1A1 or 1B1.

5.3.3 Mechanical Basis

Based on the attached flow diagrams (Exhibit 7.2) and equipment layout drawings (Section 9.0), an equipment list (Exhibit 7.1) was derived for each of the SO_3 mitigation options. Silo and tank sizing is based on the known density of the reagent material/slurry and the required storage time. The horsepower and related power requirements for the mechanical equipment (blowers, compressors, pumps, feed drives,

and jet mills) were based on both available vendor information and calculations based on the required flow rates of reagent. Air preheater basket replacement with enamel-coated baskets was included for the micronized limestone alternative.

Using the design basis table in section 4.2, the economic parameters discussed in section 4.1 and the estimated cost bases discussed in section 4.3, total levelized costs can be estimated by LG&E/KU for all SO_3 mitigation options. This will include a calculation of the estimated reagent cost, purchase and erection of the necessary equipment, as well as estimated costs for water usage and power loss. Below is a summary table of the capital costs for each SO_3 mitigation option. The complete cost estimates are attached in Section 8. For cost estimation purposes, Ghent – Units 3&4 and Mill Creek – Units 3&4 include long-term storage silos and mixing tanks that serve two units. Half of the cost of the two-unit equipment is included in the estimate to calculate the cost of a single unit.

Table 5.2: Total Installed Capital Cost

		Ghent 1	Ghent 3[1]	Ghent 4[1]	Mill Creek 3	Mill Creek 4	Trimble County 1
Option 1 – Hydrated Lime Injection	Total Installed Capital Cost ($)	$5,326,070	$5,343,160	$5,343,160	$5,030,150	$5,343,160	$4,941,540
	Cost ($)/kW	$10.42	$10.46	$10.46	$13.03	$10.90	$9.98
Option 2 – Mag. Hydroxide Injection	Total Installed Capital Cost ($)	$8,286,000	$8,343,500	$8,115,300	$8,125,400	$8,308,500	$8,438,600
	Cost ($)/kW	$16.22	$16.33	$15.88	$21.05	$16.96	$17.05
Option 3 – Soda Ash Injection[2]	Total Installed Capital Cost ($)	$5,948,600	$6,630,900	$6,716,700	$6,060,800	$6,249,600	$5,926,000
	Cost ($)/kW	$11.64	$12.98	$13.14	$15.70	$12.75	$11.97
Option 4 – SBS Injection[2]	Total Installed Capital Cost ($)	$7,699,200	$6,621,400	$6,798,000	$7,565,600	$7,921,800	$7,843,800
	Cost ($)/kW	$15.07	$12.96	$13.30	$19.60	$16.17	$15.85
Option 5 – Trona Injection	Total Installed Capital Cost ($)	$5,267,900	$4,932,800	$5,194,700	$5,353,600	$4,745,800	$4,617,400
	Cost ($)/kW	$10.31	$9.65	$10.17	$13.87	$9.69	$9.33
Option 6 – Vertical WESP	Total Installed Capital Cost ($)	$56,060,000	$53,453,500	$53,453,500	N/A	N/A	N/A
	Cost ($)/kW	$109.71	$104.61	$104.61	N/A	N/A	N/A

		Ghent 1	Ghent 3[1]	Ghent 4[1]	Mill Creek 3	Mill Creek 4	Trimble County 1
Option 7 – Horizontal WESP	Total Installed Capital Cost ($)	$70,013,100	$69,859,600	$71,281,600	$71,460,000	$71,281,600	$69,854,700
	Cost ($)/kW	$137.01	$136.71	$139.49	$185.13	$145.47	$141.12

Notes:

1 - This cost is for one unit, with a long-term, two-unit storage silo for dry sorbents, or a two-unit storage tank for wet sorbents, where applicable.

2 - Sodium bisulfite or soda ash injection capital cost does not include the annual licensing fee of $200/MW/year.

5.4 ESTIMATED FIRST YEAR O&M COSTS

In addition to the equipment procurement and erection costs shown above, there are also the operating costs that are expected. These include the cost of sorbent; auxiliary power requirements; softened water for dilution of magnesium hydroxide, SBS, or soda ash; and O&M labor required for maintenance of the mitigation technologies. The delivered cost of each sorbent is detailed above. Auxiliary power requirements have been estimated based upon the equipment required for each mitigation strategy. Labor required for O&M of the mitigation technology is based upon the experiences from the Cinergy Gibson Station, which indicates expected labor required for maintenance of these sorbent injection systems. This primarily consists of weekly cleaning of the injection nozzles, which requires 8-16 man-hours per week, depending on the injection strategy. Softened water is required to dilute the magnesium hydroxide from 60% by weight to the desired 15% by weight desired for injection or to dilute the SBS or soda ash to 10% by weight. The softened water system requires salt and resin, which are itemized in the O&M cost tables included as Section 8.2. The salt must be added daily, while the resin requires replacement once every seven years, regardless of the softened water demand. A summary table indicating expected fist-year O&M costs is included below.

Table 5.3: First Year Operating Costs

Subtotal Cost	Ammonia	Humid. Water	Hydrated Lime	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium Bisulfite[1]	Trona	Soda Ash[1]	Wet ESP
Ghent 1	$224,412	$2,625,930	$2,625,930	$2,805,281	$4,070,384	$755,580	$1,765,502	$4,534,163	$898,534	$908,716
Ghent 3	$233,342	$2,739,076	$2,739,076	$2,924,756	$4,246,892	$784,998	$1,836,147	$4,728,868	$931,220	$944,195
Ghent 4	$233,342	$2,739,076	$2,739,076	$2,924,756	$4,246,892	$784,998	$1,836,147	$4,728,868	$931,220	$944,195
Mill Creek 3	$144,160	$1,609,161	$1,609,161	$1,731,633	$2,484,219	$491,219	$1,105,652	$2,784,472	$579,806	$788,198
Mill Creek 4	$150,551	$1,690,140	$1,690,140	$1,817,143	$2,610,548	$512,274	$1,177,014	$2,923,825	$624,000	$804,672
Trimble County 1	$241,813	$2,846,389	$2,846,389	$3,038,072	$4,414,301	$812,899	$1,899,951	$4,913,536	$959,021	$933,490

Notes:

1 - The cost of the licensing fee for SBS and soda ash has been included in the first-year operating costs shown above.

6. CONCLUSIONS AND RECOMMENDATIONS

LG&E/KU's choice of an SO_3 mitigation action plan for each of the LG&E/KU units should not be made on capital cost alone. LG&E/KU has agreed to prepare a life cycle cost analysis based on the data presented in this report. The least cost approach may be ammonia injection, but it will not reduce SO_3 sufficiently without detrimental effects on fly ash and gypsum sales and ash handling and disposal operations. The calcium-based sorbents are limited by resistivity impacts on the precipitators. Magnesium hydroxide injected in the furnace and the sodium-based sorbents, SBS and Trona, are more effective at mitigating SO_3, at a higher operating cost than the calcium-based sorbents. The wet ESP technology has a long track record in other industries and good experience to date in the power industry, and also has co-benefits in reduction of fine particulates and mercury. However, the initial capital investment for the wet ESP is very high.

The combination of magnesium hydroxide injection in the furnace with hydrated lime or Trona injection downstream of the air preheater is a lower capital cost option with a good probability of success. The combination of a low SO_2 to SO_3 conversion catalyst and sodium bisulfite injection downstream of the air preheater is also promising. Either of these two sorbent injection options, combined with SO_3 reduction across existing (or planned future) equipment, will reduce the level at the stack exit to 5 ppm for Mill Creek – Units 3&4 or Ghent – Unit 1.

Due to the high SO_2 to SO_3 oxidation rate on the surface of the catalyst at Trimble County – Unit 1, a complete change-out of the current catalyst and replacement with low-conversion catalyst is recommended. This will alleviate much of the existing SO_3 emission concerns and the target emissions can be met through the use of sorbent injection upstream of the ESP. By changing out the catalyst completely, it can be assured that the plant will meet the target SO_3 emissions during periods when the fired coal is closer to the maximum indicated sulfur concentration (8.90lb/MBtu) without requiring additional mitigation technologies.

Units 3&4 at Ghent have existing hot-side ESPs, which limit the use of sorbent injection downstream of the air preheater. The FGD system particulate collection capability may allow some sorbent injection. As such, Ghent – Units 3&4 will likely require a wet ESP to reduce stack SO_3 emissions to 5 ppm or a combination

of $Mg(OH)_2$ injection in the furnace, replacement of all catalyst with low conversion catalyst and some sorbent injection such as SBS or hydrated lime upstream of the FGD system.

Shown below is a table summarizing the applicability of each technology investigated for SO_3 mitigation at each of the LG&E/KU sites. This table reflects published results of recent testing only.

Table 6-1: Summary of Technology Applicability

	Ghent 1	Ghent 3	Ghent 4	Mill Creek 3	Mill Creek 4	Trimble County 1
Ammonia Injection	No	No	No	No	No	No
Flue Gas Humidification	No	No	No	No	No	No
Hydrated Lime Injection	Yes	Yes[1]	Yes[1]	Yes	Yes	Yes
Mag. Hydroxide Injection	No	Yes	Yes	No	No	Yes
Magnesium Oxide Injection	No	No	No	No	No	No
Micronized Limestone Injection	No	No	No	No	No	No
OmniClear System	No	No	No	No	No	No
Soda Ash Injection	Yes	Yes[1]	Yes[1]	Yes	Yes	Yes
SBS Injection	Yes	Yes[1]	Yes[1]	Yes	Yes	Yes
Trona Injection	Yes	Yes[1]	Yes[1]	Yes	Yes	Yes
Vertical WESP	Yes	Yes	Yes	No	No	No
Horizontal WESP	No	No	No	Yes	Yes	Yes
Low Conversion Catalyst	Yes	Yes	Yes	Yes	Yes	Yes

Note: 1. The quantity of sorbent injected downstream of the hot-side ESP is limited by the ability of the Wet FGD system to collect particulate matter. One of these technologies could be combined with Low Conversion Catalyst and/or Magnesium Hydroxide injection in the furnace. Testing of Trona injection upstream of the ESP and hydrated lime injection upstream of the wet FGD is planned for Ghent – Unit 1.

7. EXHIBITS

7.1 EQUIPMENT LIST

7.2 FLOW DIAGRAMS

7.3 ESP DESIGN DATA

8. APPENDICES

8.1 CAPITAL COST ESTIMATES

8.2 FIRST YEAR O&M COSTS

9. DRAWINGS

7.1: Equipment List

Exhibit 7.1: Equipment List

	Ghent 1	Ghent 3	Ghent 4
	Hydrated Lime		
Equipment	Description	Description	Description
Air Blowers (5 Qty)	150 HP each (Moving ~7,605 lb/hr of Solid Material to the Injection Manifold)	150 HP each (Moving ~8,397 lb/hr of Solid Material to the Injection Manifold)	150 HP each (Moving ~8,397 lb/hr of Solid Material to the Injection Manifold)
VFD Rotary Feeder (3 Qty)	3 HP - Stainless Steel	3 HP - Stainless Steel	3 HP - Stainless Steel
Long-Term Storage Silo (10 Days)	1,623,700 lb full - 12,467 ft^3 - D=15.8' - H=63.3' - CS Silo - SS Hopper	1,694,400 lb full - 13,011 ft^3 - D=16.1' - H=64.2' - CS Silo - SS Hopper	1,694,400 lb full - 13,011 ft^3 - D=16.1' - H=64.2' - CS Silo - SS Hopper
Long-Term Storage Silo (10 Days) (Common Tanks)		3,388,800 lb full - 26,021 ft3 - D=20.2' - H=80.9' - CS Silo - SS Hopper	
Short-Term Storage Silo (24 Hours)	162,400 lb full - 1,247 ft^3 - D=7.3' - H=29.4' - CS Silo - SS Hopper	169,500 lb full - 1301 ft^3 - D=7.5' - H=30.0' - CS Silo - SS Hopper	169,500 lb full - 1301 ft^3 - D=7.5' - H=30.0' - CS Silo - SS Hopper
Short-Term Storage Silo (24 Hours) (Common Tanks)		338,900 lb full - 2,602 ft3 - D=9.4' - H=37.6' - CS Silo - SS Hopper	
Injection Manifold (2 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Injection Nozzles (50 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping	L=450' - D=8" - CS	L=450' - D=8" - CS	L=450' - D=8" - CS
	Magnesium Hydroxide		
Equipment	Description	Description	Description
VFD Rotary Feeder (1 Qty)	3 HP - Stainless Steel	3 HP - Stainless Steel	3 HP - Stainless Steel
Storage Tank (10 days)	894,200 lb full - 10,842 ft^3 - D=22.6' - H=27.1' - CS Silo - SS Hopper	933,160 lb full - 11,314 ft^3 - D=22.9' - H=27.5' - CS Silo - SS Hopper	933,160 lb full - 11,314 ft3 - D=22.9' - H=27.5' - CS Silo - SS Hopper
Storage Tank (10 days) (Common Tank)		1,866,320 lb full - 22,630 ft3 - D=28.8' - H=34.6' - CS Silo - SS Hopper	
Air Compressors (2 Qty)	2 x 100% - 75 HP	2 x 100% - 75 HP	2 x 100% - 75 HP
Mixing Tank (24 Hours)	89,420 lb full - 8,249 ft^3 - D=17.4' - H=20.9' - CS	93,160 lb full - 8,608 ft^3 - D=20.9' - H=25.1' - CS	93,160 lb full - 8,608 ft3 - D=20.9' - H=25.1' - CS
Mixing Tank (24 Hours) (Common Tank)		186,700 lb full -17,219 ft3 - D=26.3' - H=31.6' - CS Silo - SS Hopper	
Mixing Tank Agitator (1 Qty)	CS Shaft - 20 HP	CS Shaft - 20 HP	CS Shaft - 20 HP
Slurry/Water Pumps (6 Qty)	CS - 5.0 HP (possibly positive displacement or turbine pumps)	CS - 5.0 HP (possibly positive displacement or turbine pumps)	CS - 5.0 HP (possibly positive displacement or turbine pumps)
3	Stainless Steel	Stainless Steel	Stainless Steel
Dual Fluid Injection Nozzles (20 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping (Insulation and Lagging)	L=50' - D=6" - CS / L=300' - D=2" - CS	L=50' - D=6" - CS / L=300' - D=2" - CS	L=50' - D=6" - CS / L=300' - D=2" - CS

Exhibit 7.1: Equipment List

	Ghent 1	Ghent 3	Ghent 4
	Sodium Bisulfite (SBS)		
Equipment	Description	Description	Description
Pumps (6 Qty)	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP
SBS Solution Tank (10 Days)	456,195 lb full - 7,643 ft^3 - D=20.1' - H=24.1' - SS	476,070 lb full - 7,664 ft^3 - D=20.4' - H=24.5' - SS	476,070 lb full - 7,664 ft3 - D=20.4' - H=24.5' - SS
SBS Solution Tank (10 Days) (Common Tank)		952,140 lb full - 15,952 ft3 - D=25.7' - H=30.8' - SS	
Agitator (1 Qty)	SS Shaft - 20 HP	SS Shaft - 20 HP	SS Shaft - 20 HP
Air Compressors (2 Qty)	2 x 100% - 50 HP	2 x 100% - 50 HP	2 x 100% - 50 HP
Injection Manifold (2 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping (Insulation, Lagging, and Heat Tracing)	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS
	Soda Ash		
Equipment	Description	Description	Description
Pumps (6 Qty)	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP
Soda Ash Solution Tank (10 Days)	232,260 lb full - 3,293 ft^3 - D=15.2' - H=18.2' - SS	242,380 lb full - 3,436 ft^3 - D=15.4' - H=18.5' - SS	242,380 lb full - 3,436 ft3 - D=15.4' - H=18.5' - SS
Soda Ash Solution Tank (10 Days) (Common Tank)		484,760 lb full - 6,872 ft3 - D=19.4' - H=23.3' - SS	
Agitator (1 Qty)	SS Shaft - 20 HP	SS Shaft - 20 HP	SS Shaft - 20 HP
Air Compressors (2 Qty)	2 x 100% - 50 HP	2 x 100% - 50 HP	2 x 100% - 50 HP
Injection Manifold (2 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping (Insulation, Lagging, and Heat Tracing)	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS
	Trona		
Equipment	Description	Description	Description
Air Blowers (6 Qty)	150 HP each (Moving ~6,958 lb/hr of Solid Material to the Injection Manifold)	150 HP each (Moving ~7,683 lb/hr of Solid Material to the Injection Manifold)	150 HP each (Moving ~7,683 lb/hr of Solid Material to the Injection Manifold)
VFD Rotary Feeder (3 Qty)	3 HP - Stainless Steel	3 HP - Stainless Steel	3 HP - Stainless Steel
Long-Term Storage Silo (10 Days)	1,485,585 lb full - 12,976 ft^3 - D=16.0' - H=64.2' - CS Silo - SS Hopper	1,550,313 lb full - 13,541 ft^3 - D=16.3' - H=65.1' - CS Silo - SS Hopper	1,550,313 lb full - 13,541 ft3 - D=16.3' - H=65.1' - CS Silo - SS Hopper
Long-Term Storage Silo (10 Days) (Common Tanks)		3,100,625 lb full - 27,082 ft3 - D=20.5' - H=82.0' - CS Silo - SS Hopper	
Short-Term Storage Silo (24 Hours)	148,558 lb full - 1,300 ft^3 - D=7.4' - H=29.8' - CS Silo - SS Hopper	155,031 lb full - 1,354 ft^3 - D=7.6' - H=30.2' - CS Silo - SS Hopper	155,031 lb full - 1,354 ft3 - D=7.6' - H=30.2' - CS Silo - SS Hopper
Short-Term Storage Silo (24 Hours) (Common Tanks)		310,065 lb full - 2,708 ft3 - D=9.5' - H=38.1' - CS Silo - SS Hopper	
Injection Manifold (2 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Injection Nozzles (50 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping	L=450' - D=8" - CS	L=450' - D=8" - CS	L=450' - D=8" - CS
	Valving, instrumentation, controls, auxiliary power equipment, DCS, and foundation requirements are not included. All equipment is on a per unit basis except for the long-term storage silos/tanks.		

Exhibit 7.1: Equipment List

	Mill Creek 3	Mill Creek 4	Trimble County 1
	Hydrated Lime		
Equipment	Description	Description	Description
Air Blowers (5 Qty)	150 HP each (Moving ~4,104 lb/hr of Solid Material to the Injection Manifold)	150 HP each (Moving ~4,315 lb/hr of Solid Material to the Injection Manifold)	150 HP each (Moving ~12,240 lb/hr of Solid Material to the Injection Manifold)
VFD Rotary Feeder (3 Qty)	3 HP - Stainless Steel	3 HP - Stainless Steel	3 HP - Stainless Steel
Long-Term Storage Silo (10 Days)	985,000 lb full - 7,563 ft^3 - D=13.4' - H=53.6' - CS Silo - SS Hopper	1,035,800 lb full - 7,953 ft^3 - D=13.6' - H=54.5' - CS Silo - SS Hopper	1,761,500 lb full - 13,526 ft^3 - D=16.3' - H=65.1' - CS Silo - SS Hopper
Long-Term Storage Silo (10 Days) (Common Tanks)	2,020,600 lb full - 15,516 ft3 - D=17.0' - H=68.1' - CS Silo - SS Hopper		
Short-Term Storage Silo (24 Hours)	98,500 lb full - 756 ft^3 - D=6.2' - H=24.9' - CS Silo - SS Hopper	103,580 lb full - 795 ft^3 - D=6.3' - H=25.3' - CS Silo - SS Hopper	176,150 lb full - 1353 ft^3 - D=7.6' - H=30.2' - CS Silo - SS Hopper
Short-Term Storage Silo (24 Hours) (Common Tanks)	202,060 lb full - 1,552 ft3 - D=7.9' - H=31.6' - CS Silo - SS Hopper		
Injection Manifold (2 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Injection Nozzles (50 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping	L=450' - D=8" - CS	L=450' - D=8" - CS	L=450' - D=8" - CS
	Magnesium Hydroxide		
Equipment	Description	Description	Description
VFD Rotary Feeder (1 Qty)	3 HP - Stainless Steel	3 HP - Stainless Steel	3 HP - Stainless Steel
Storage Tank (10 days)	542,448 lb full - 6,577 ft^3 - D=19.1' - H=22.9' - CS Silo - SS Hopper	570,405 lb full - 6,916 ft^3 - D=19.4' - H=23.3' - CS Silo - SS Hopper	970,120 lb full - 11,762 ft^3 - D=23.2' - H=27.8' - CS Silo - SS Hopper
Storage Tank (10 days) (Common Tank)	1,112,852 lb full - 13,493 ft3 - D=24.3' - H=29.1' - CS Silo - SS Hopper		
Air Compressors (2 Qty)	2 x 100% - 75 HP	2 x 100% - 75 HP	2 x 100% - 75 HP
Mixing Tank (24 Hours)	54,245 lb full - 5,004 ft^3 - D=17.4' - H=20.9' - CS	57,041 lb full - 5,262 ft^3 - D=17.7' - H=21.3' - CS	97,012 lb full - 8,950 ft^3 - D=21.2' - H=25.4' - CS
Mixing Tank (24 Hours) (Common Tank)	111,285 lb full - 10,266 ft3 - D=22.2' - H=26.6' - CS Silo - SS Hopper		
Mixing Tank Agitator (1 Qty)	CS Shaft - 20 HP	CS Shaft - 20 HP	CS Shaft - 20 HP
Slurry/Water Pumps (6 Qty)	CS - 5.0 HP (possibly positive displacement or turbine pumps)	CS - 5.0 HP (possibly positive displacement or turbine pumps)	CS - 5.0 HP (possibly positive displacement or turbine pumps)
3	Stainless Steel	Stainless Steel	Stainless Steel
Dual Fluid Injection Nozzles (20 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping (Insulation and Lagging)	L=50' - D=6" - CS / L=300' - D=2" - CS	L=50' - D=6" - CS / L=300' - D=2" - CS	L=50' - D=6" - CS / L=300' - D=2" - CS

Exhibit 7.1: Equipment List

	Mill Creek 3	Mill Creek 4	Trimble County 1
	Sodium Bisulfite (SBS)		
Equipment	Description	Description	Description
Pumps (6 Qty)	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP
SBS Solution Tank (10 Days)	276,740 lb full - 4,637 ft^3 - D=17.0' - H=20.4' - SS	291,003 lb full - 4,876 ft^3 - D=17.3' - H=20.8' - SS	494,925 lb full - 8,292 ft^3 - D=20.6' - H=24.8' - SS
SBS Solution Tank (10 Days) (Common Tank)	567,743 lb full - 9,512 ft3 - D=21.6' - H=25.9' - SS		
Agitator (1 Qty)	SS Shaft - 20 HP	SS Shaft - 20 HP	SS Shaft - 20 HP
Air Compressors (2 Qty)	2 x 100% - 50 HP	2 x 100% - 50 HP	2 x 100% - 50 HP
Injection Manifold (2 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping (Insulation, Lagging, and Heat Tracing)	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS
	Soda Ash		
Equipment	Description	Description	Description
Pumps (6 Qty)	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	2 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP
Soda Ash Solution Tank (10 Days)	140,896 lb full - 1,997 ft^3 - D=12.8' - H=15.4' - SS	148,157 lb full - 2,100 ft^3 - D=13.1' - H=15.7' - SS	2251,980 lb full - 3,572 ft^3 - D=15.6' - H=18.7' - SS
Soda Ash Solution Tank (10 Days) (Common Tank)	289,053 lb full - 4,100 ft3 - D=16.3' - H=19.6' - SS		
Agitator (1 Qty)	SS Shaft - 20 HP	SS Shaft - 20 HP	SS Shaft - 20 HP
Air Compressors (2 Qty)	2 x 100% - 50 HP	2 x 100% - 50 HP	2 x 100% - 50 HP
Injection Manifold (2 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping (Insulation, Lagging, and Heat Tracing)	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS	L=250' - D=6" - SS / L=50' - D=6" - CS / L=50' - D=4" - SS
	Trona		
Equipment	Description	Description	Description
Air Blowers (6 Qty)	150 HP each (Moving ~3,755 lb/hr of Solid Material to the Injection Manifold)	150 HP each (Moving ~3,949 lb/hr of Solid Material to the Injection Manifold)	150 HP each (Moving ~11,200 lb/hr of Solid Material to the Injection Manifold)
VFD Rotary Feeder (3 Qty)	3 HP - Stainless Steel	3 HP - Stainless Steel	3 HP - Stainless Steel
Long-Term Storage Silo (10 Days)	901,199 lb full - 7,871 ft^3 - D=13.6' - H=54.3' - CS Silo - SS Hopper	947,646 lb full - 8,277 ft^3 - D=13.8' - H=55.2' - CS Silo - SS Hopper	1,611,715 lb full - 14,077 ft^3 - D=16.5' - H=65.9' - CS Silo - SS Hopper
Long-Term Storage Silo (10 Days) (Common Tanks)	1,848,845 lb full - 16,150 ft3 - D=17.3' - H=69.0' - CS Silo - SS Hopper		
Short-Term Storage Silo (24 Hours)	90,120 lb full - 787 ft^3 - D=6.3' - H=25.2' - CS Silo - SS Hopper	94,765 lb full - 828 ft^3 - D=6.4' - H=25.6' - CS Silo - SS Hopper	161,172 lb full - 1,410 ft^3 - D=7.7' - H=30.6' - CS Silo - SS Hopper
Short-Term Storage Silo (24 Hours) (Common Tanks)	184,885 lb full - 1,615 ft3 - D=8.0' - H=32.0' - CS Silo - SS Hopper		
Injection Manifold (2 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Injection Nozzles (50 Qty)	Stainless Steel	Stainless Steel	Stainless Steel
Piping	L=450' - D=8" - CS	L=450' - D=8" - CS	L=450' - D=8" - CS
	Valving, instrumentation, controls, auxiliary power equipment, DCS, and foundation requirements are not included. All equipment is on a per unit basis except for the long-term storage silos/tanks.		

7.2: Flow Diagrams

Exhibit 7.2: Mitigation Technology Entry Points

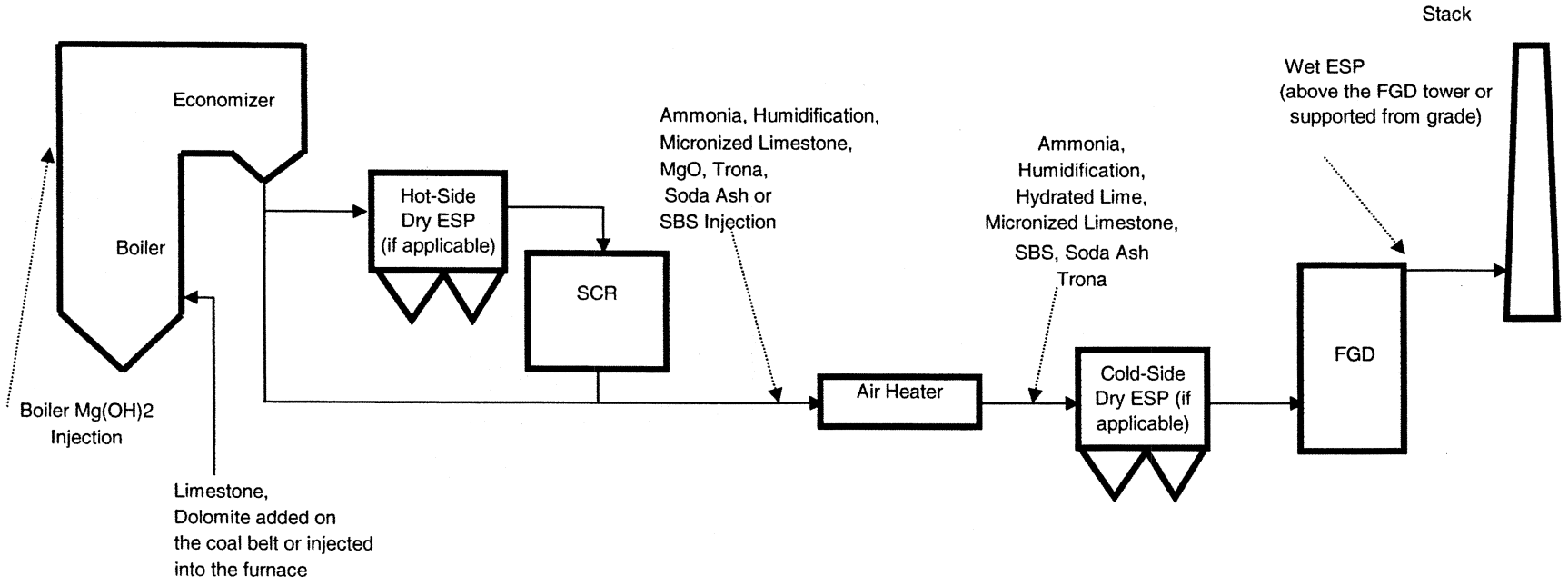


Exhibit 7.2.1: Ammonia Injection

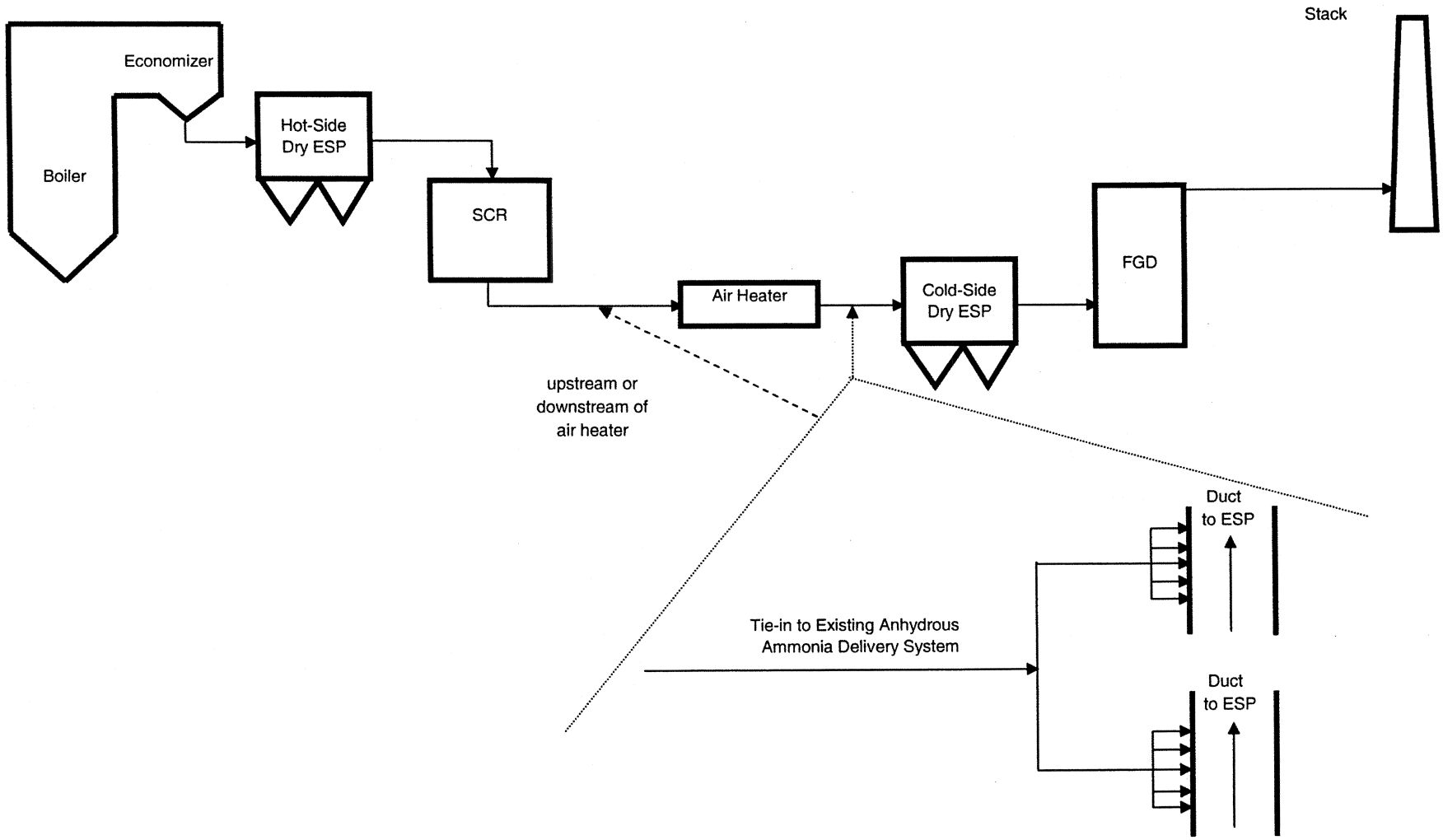


Exhibit 7.2.2: Flue Gas Humidification

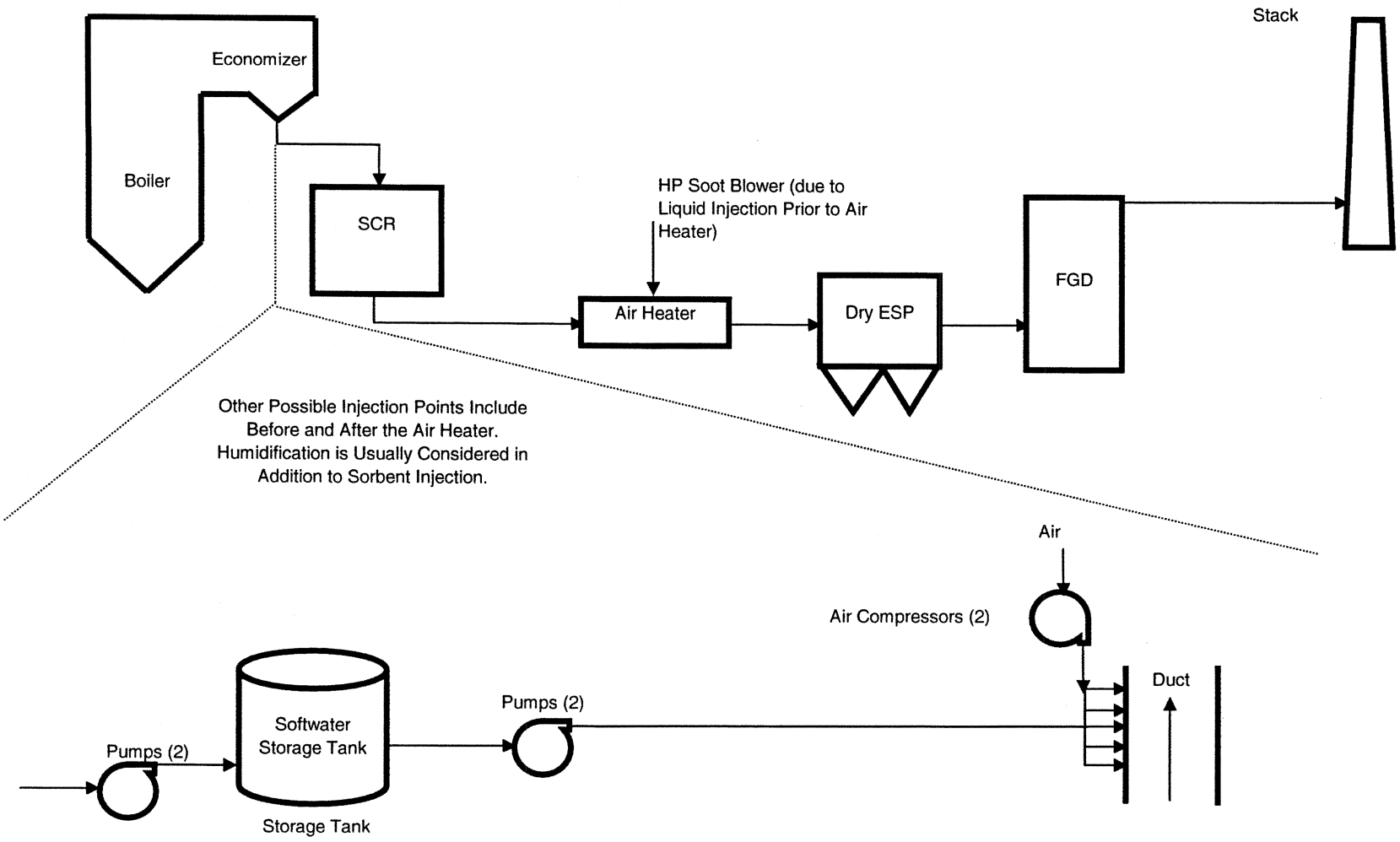
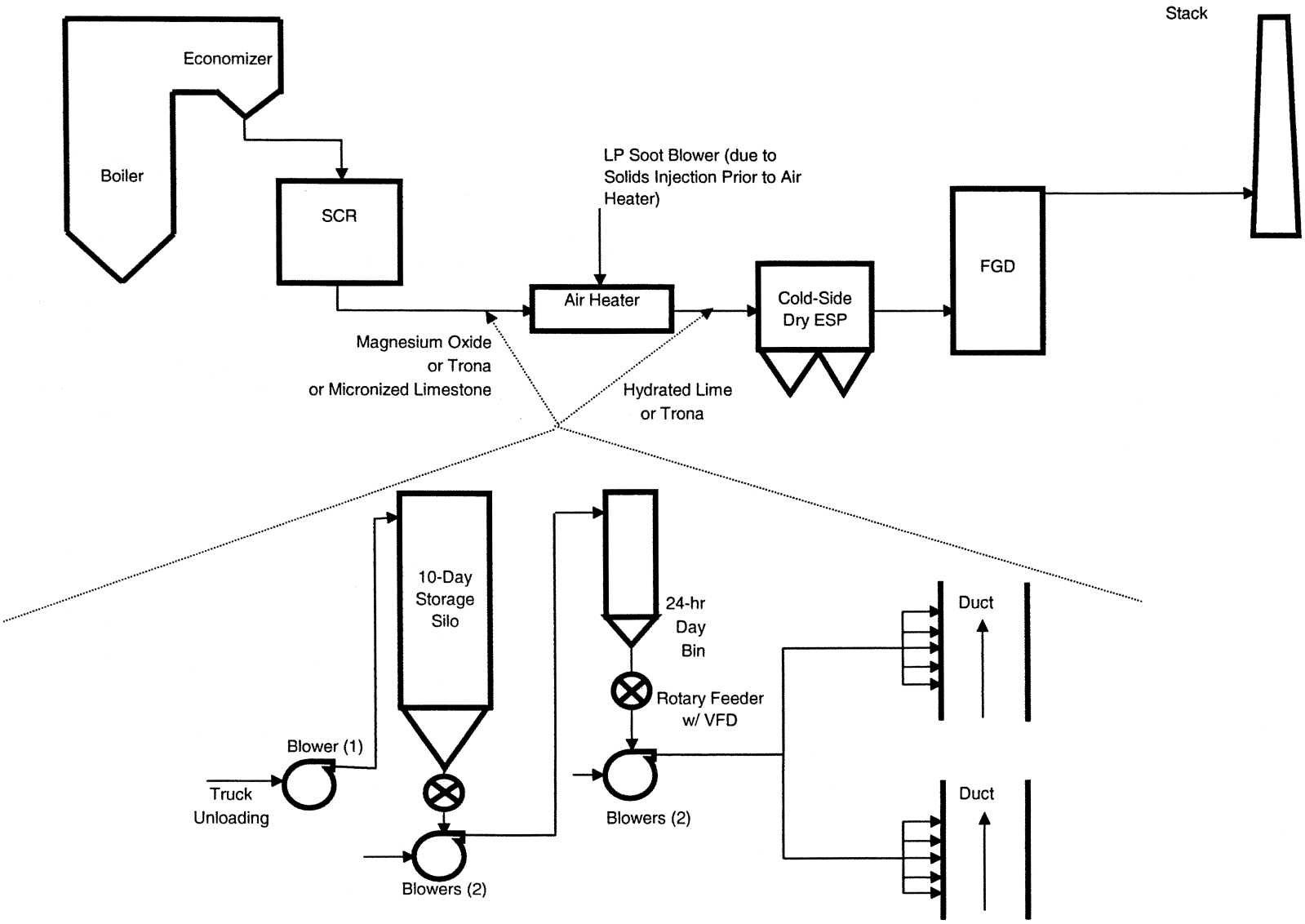


Exhibit 7.2.3: Dry Sorbent Injection (Cold-Side ESP)

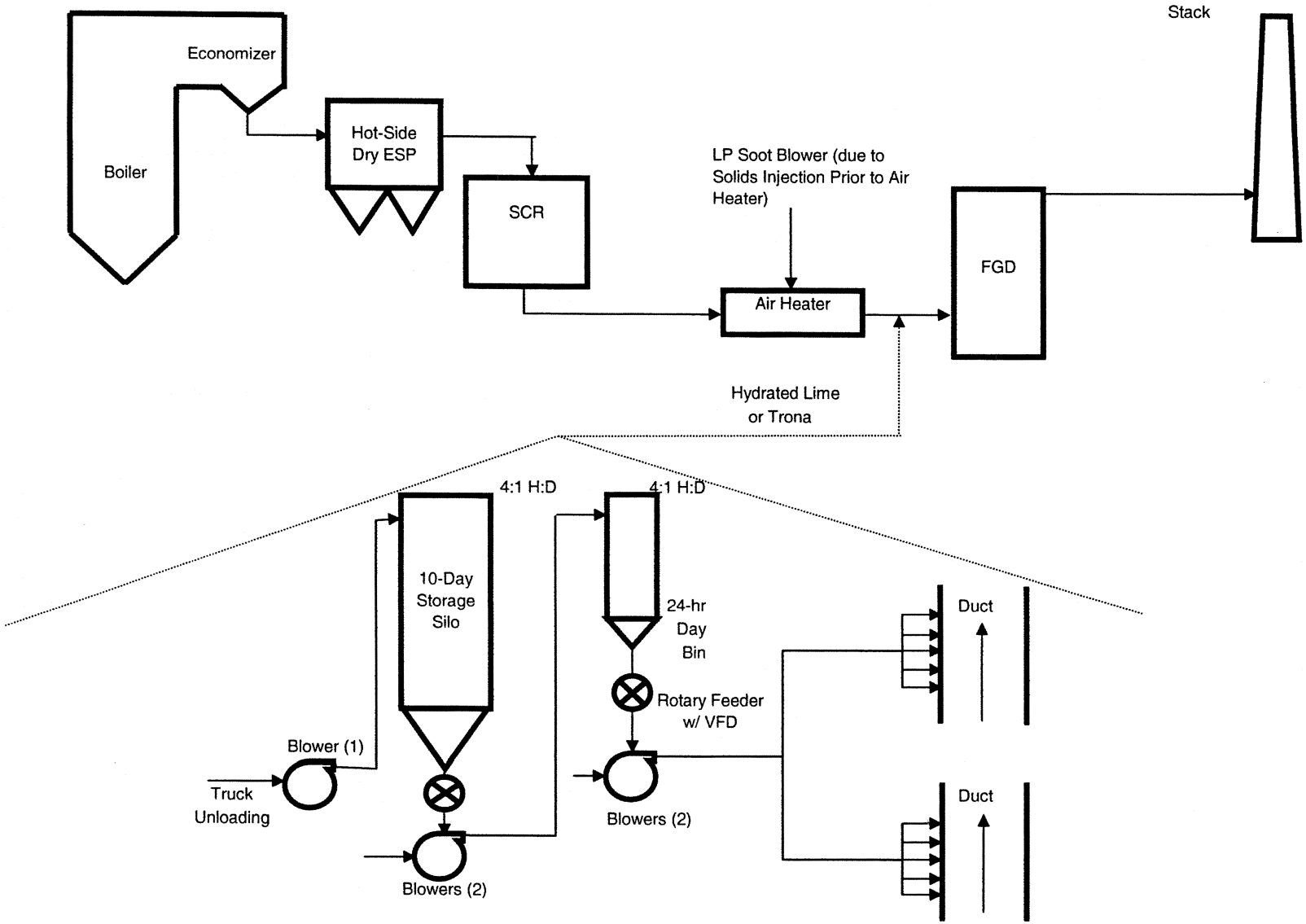
(Hydrated Lime, Magnesium Oxide, Micronized Limestone, Trona)



Micronized limestone will also include a 'jet mill' prior to duct injection, but it is not shown above.

Exhibit 7.2.3: Dry Sorbent Injection (Hot-Side ESP)

(Hydrated Lime, Trona)



Micronized limestone will also include a 'jet mill' prior to duct injection, but it is not shown above.

Exhibit 7.2.4: Magnesium Hydroxide Injection

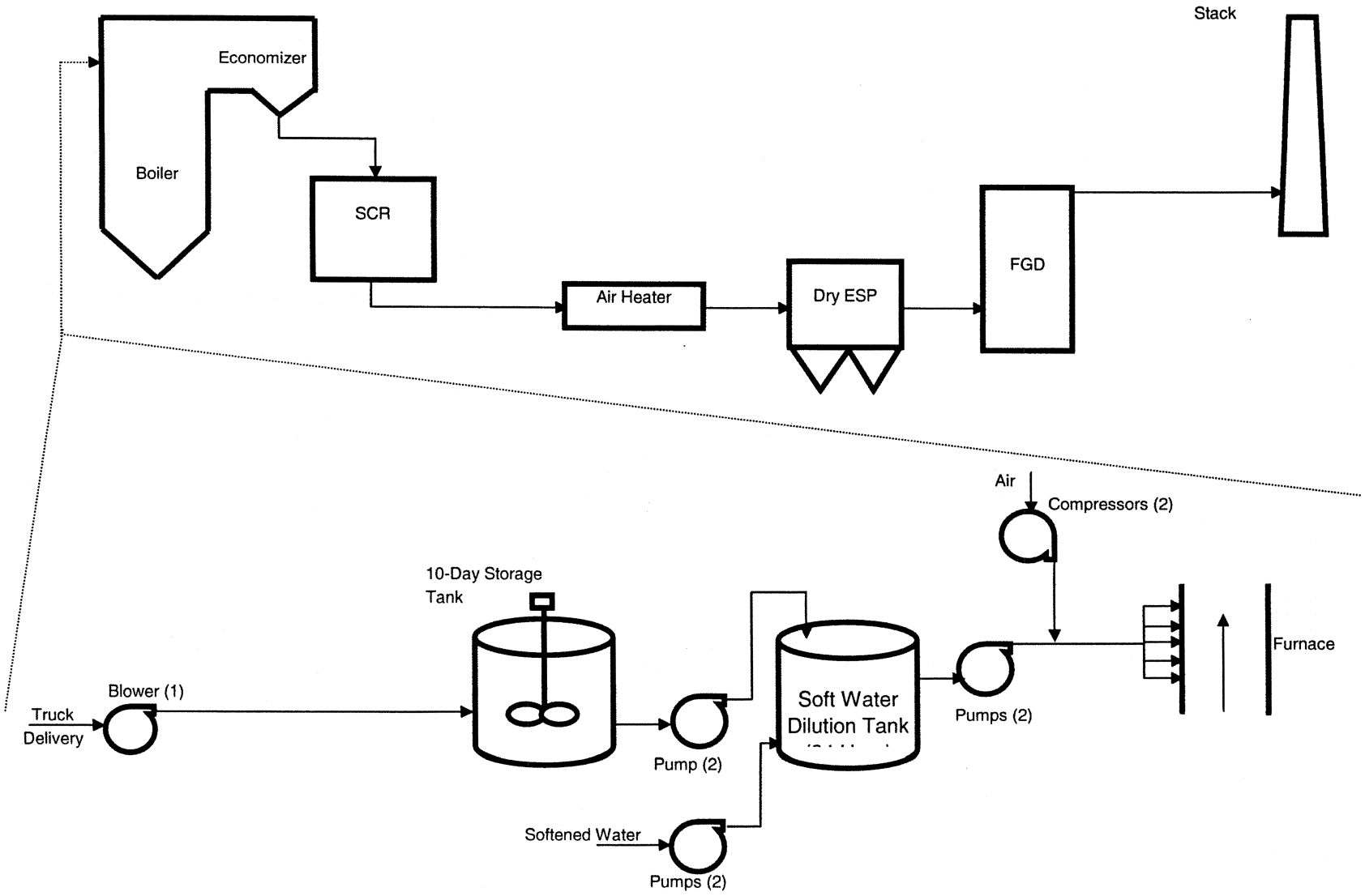


Exhibit 7.2.5: Sodium BiSulfite (SBS) or Soda Ash

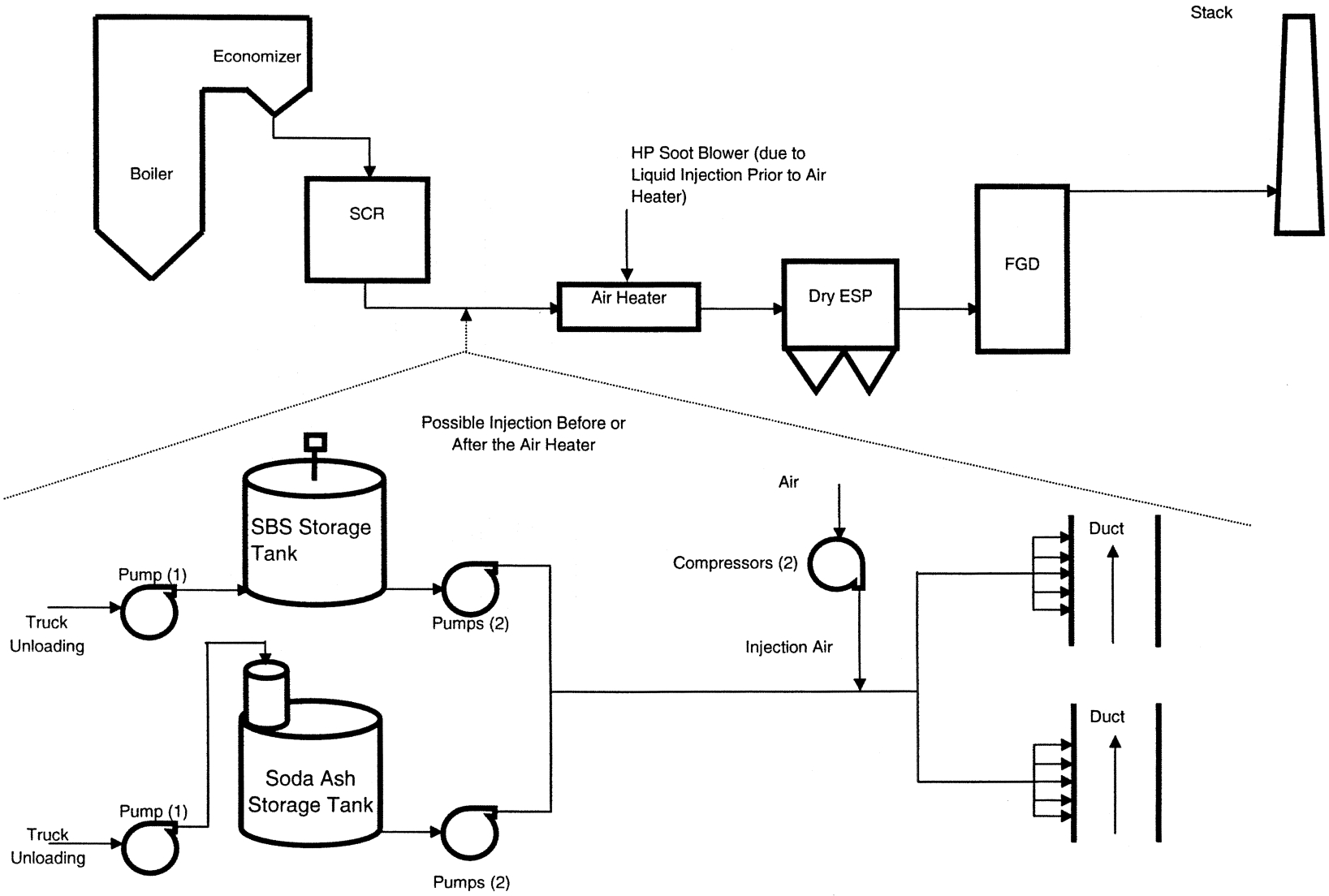


Exhibit 7.2.6: Stand-Alone Wet ESP - Horizontal Flow

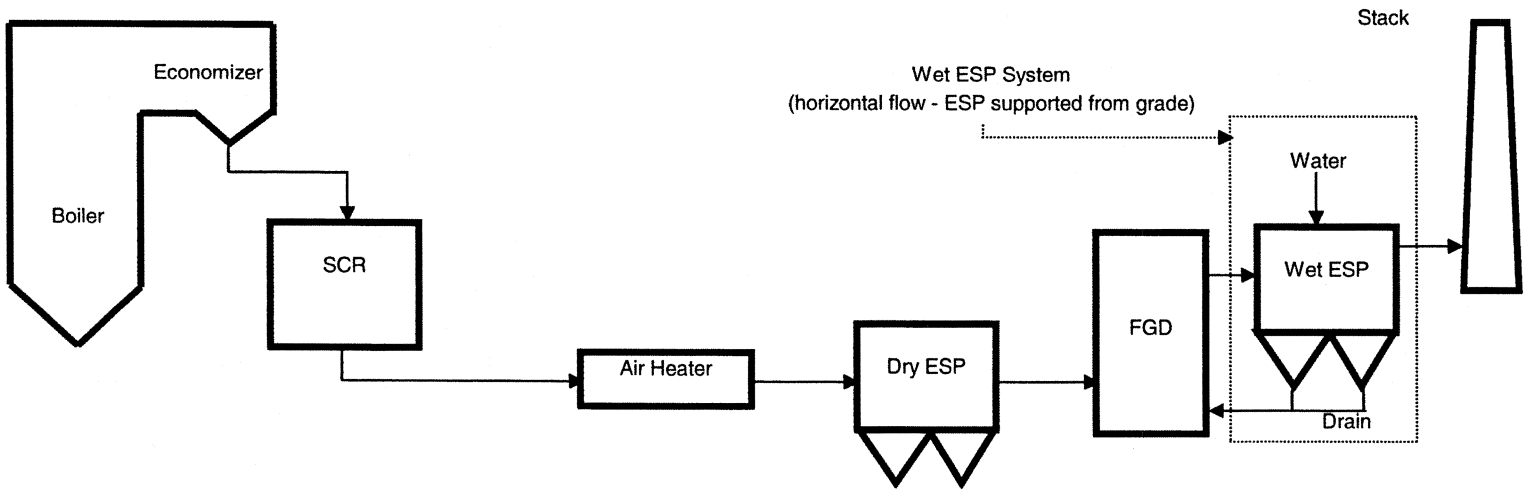


Exhibit 7.2.7: Absorber-Mounted Wet ESP - Vertical Flow

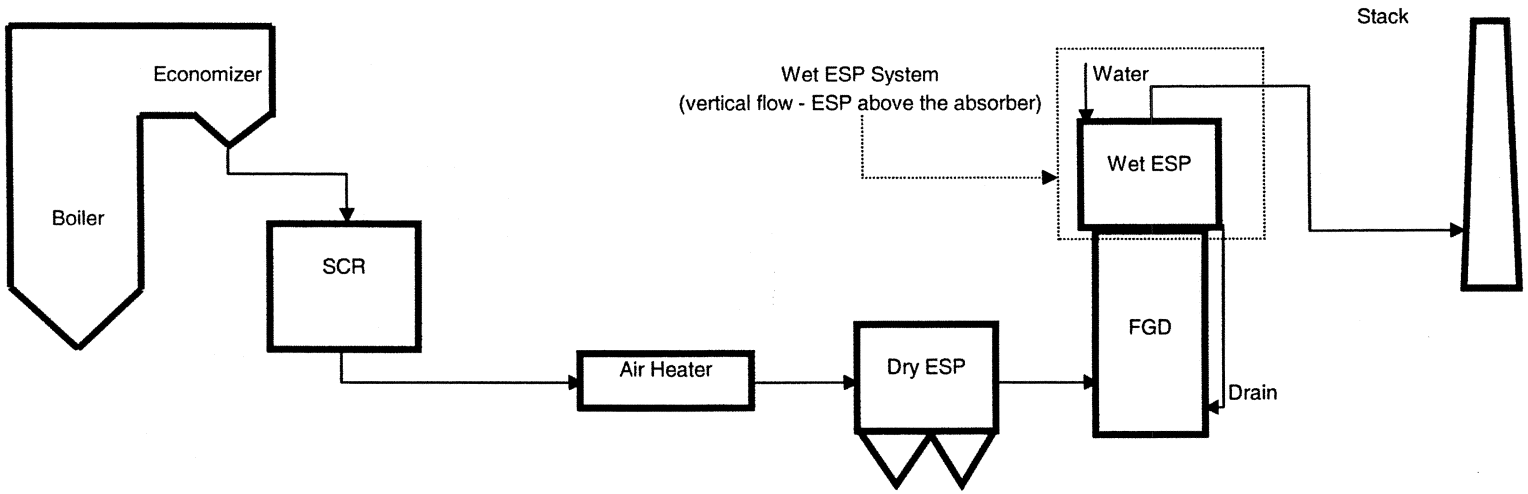
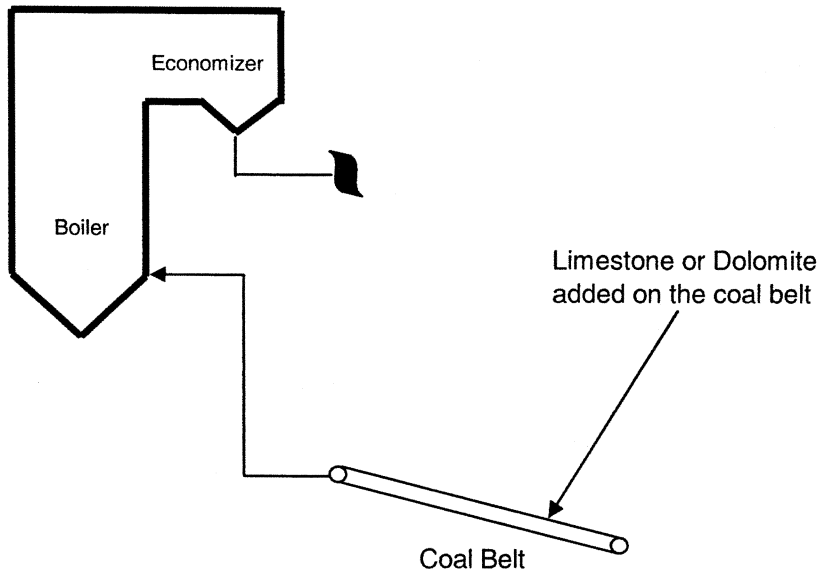


Exhibit 7.2.8: Alkaline Additives to the Coal Belt



7.3: ESP Design Data

EXHIBIT 7.3

LOUISVILLE GAS & ELECTRIC, VARIOUS UNITS

ELECTROSTATIC PRECIPITATOR DESIGN DATA (2005)

LINE NO.		DESCRIPTION	MILL CREEK # 3	MILL CREEK # 4	GHENT # 1	GHENT # 3	GHENT # 4	TRIMBLE COUNTY # 1
1		UNIT RATING, MW_{net}	386	490	511	511	511	495
2		PLATE HEIGHT	33	35	30	36	36	49
3		NUMBER OF MECHANICAL FIELDS	4	4	4	4	4	4
4		NUMBER OF ELECTRICAL FIELDS	4	4	4	4	4	5
5		LENGTH OF FIRST ELECTRICAL FIELD, (FT)	8.23	9.88	6.75	3.00	3.00	11.20
6		LENGTH OF SECOND ELECTRICAL FIELD, (FT)	8.23	9.88	6.75	3.00	3.00	11.20
7		LENGTH OF THIRD ELECTRICAL FIELD, (FT)	8.23	8.23	6.75	3.00	3.00	11.20
8		LENGTH OF FOURTH ELECTRICAL FIELD, (FT)	8.23	8.23	6.75	3.00	3.00	11.20
9		LENGTH OF FIFTH ELECTRICAL FIELD, (FT)	0.00	0.00	0.00	3.00	3.00	11.20
10		TOTAL PLATE LENGTH	32.92	36.21	27.00	42.00	42.00	55.99
11		NUMBER OF PRECIPITATOR BOXES	2	2	2	2	2	2
12		NO. OF CELLS IN WIDTH	2	4	6	6	6	4
13		PLATE LENGTH EACH ELECTRICAL FIELD	8.23	9.05	6.75	10.50	10.50	11.20
13		PLATE SPACING (INCH)	12	12	12	9	9	12
14		NUMBER OF GAS PASSAGES (EACH BOX)	72	96	84	192	192	92
15		TOTAL NUMBER OF PLATES (ALL BOXES)	584	776	680	1,544	1,544	744
16		EFFECTIVE PRECIPITATOR WIDTH (ALL Boxes)	144	192	168	288	288	184
17		PLATE AREA (BOTH SIDES)	543	634	405	756	756	1,097
18		PRECIPITATOR WIDTH CASING TO CASING	168.5	168.5	168.5	168.5	168.5	168.5
19		TOTAL PLATE AREA, ALL CHAMBERS	312,840	486,640	272,160	1,161,216	1,161,216	1,009,604
20		TOTAL NO. OF T/R SETS	16	16	16	16	16	40
21		PLATE AREA EACH T/R SET	19,553	30,415	17,010	72,576	72,576	25,240
22		TOTAL FLUE GAS VOLUME (acfm)	1,670,000	2,100,000	1,900,000	3,395,652	3,395,652	2,275,000
23		GAS TEMPERATURE	300	320	325	750	750	320
24		GAS VELOCITY, FT/SEC	5.86	5.21	6.28	5.46	5.46	4.21
25		RESIDENCE TIME, SEC	5.62	6.95	4.30	7.69	7.69	13.31
26		SPECIFIC COLLECTION AREA @ 12" SPACING (SCA)	**187**	**232**	**143**	256	256	**444**
27		SPECIFIC COLLECTION AREA @ 9" SPACING (SCA)	250	309	191	**342**	**342**	592

EXHIBIT 7.3

LOUISVILLE GAS & ELECTRIC, VARIOUS UNITS

ELECTROSTATIC PRECIPITATOR DESIGN DATA (2005)

LINE NO.		DESCRIPTION	MILL CREEK # 3	MILL CREEK # 4	GHENT # 1	GHENT # 3	GHENT # 4	TRIMBLE COUNTY # 1
27		HEAT INPUT TO BOILER (BTU/HR)	4.18E+09	4.86E+09	5.13E+09	5.13E+09	5.13E+09	5.17E+09
28		COAL HHV (BTU/LB)	10,906	10,906	11,749	11,749	11,749	10,640
29		ASH IN COAL (%)	12.60	12.60	11.70	11.70	11.70	14.00
30		COAL FEED RATE (TONS/HR)	191	223	218	218	218	243
31		FLY ASH CARRY OVER (%)	85	85	85	85	85	85
32		FLY ASH INLET GRAIN LOADING (GR/ ACF)	2.86	2.65	2.67	1.49	1.49	2.97
33		SORBENT GRAIN LOADING (GR/ ACF)	0.004	0.003	0.007	0.004	0.004	0.01
34		TOTAL INLET GRAIN LOADING (GR/ ACF)	2.87	2.65	2.67	1.50	1.50	2.98
35		FLY ASH INLET LOADING (LB/MMBTU)	9.82	9.82	8.46	8.46	8.46	11.18
		NOTES:						
		1) The estimated plate area for Ghent 3 and 4 Electrostatic Precipitators requires confirmation, will be revised after confirmation from LG&E.						
		2) The sorbent grain loading is based on worst case scenario of using Hydrated lime injection (Option 1).						

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21998B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	5	EA	55,125.00	275,625		105.00	525	525	PUMP	65.83	34,561				310,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - 1 Unit (10 Days)	2,937,600 lb full - 19,615 ft³ - D=15.1' - H=82.0' - CS Silo - SS Hopper	Est	1	EA	797,000.00	797,000		2545.52	2,546	2,546	TANK	65.78	167,444				964,400
	Short-Term Storage Silo - (24 Hours)	293,760 lb full - 1,920 ft³ - D=8.5' - H=38.0' - CS Silo - SS Hopper	Est	1	EA	200,000.00	200,000		764.00	764	764	TANK	65.78	50,256				250,300
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	161	161	SPNG	70.4	11,334				17,800
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	50	CY	157.50	7,875		7.00	350	350	CONP	52.91	18,519				26,400
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-4	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-5	**IS SYSTEM SUBTOTAL**						**1,418,593**				**6,704**			**464,542**				**1,883,000**
	MATERIAL UNLOADING SYSTEM																	
	TRUCK DELIVERY	INCLUDED IN SILO	Est	0	Set	315,000.00	0		1753.67	0	0	SPNG	70.4	0				0
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 6900V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	300	LF	6.25	1,874		0.35	106	106	ECND	49.67	5,245				7,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**871,538**				**3,370**			**188,413**				**1,060,000**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21998B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	0	LS	7,350.00	0		300.00	0	0	YDRN	51.97	0				0
MISC-4	OTHER																	
	BLOWER HOUSE																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG. 15'X20'		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
-6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**75,088**				**1,835**			**116,653**				**191,800**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							150,000				150,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**150,000**				**150,000**
	SUBTOTAL						**2,391,574**			0	**12,238**			**944,258**				**3,335,900**
																		0
	Craft Support During Startup	At 3% of Total Manhours									367	MECH	66.86	24,548				24,500
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																166,800
	Erection Contractor's Profit	At 8% of Material and Labor Costs																266,900
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																12,000
	Freight To Site	At 4.5% of Equipment/Material Cost																107,600
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included

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SO3 Mitigation System
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	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	12,606			968,806				3,913,700
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								391,370
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								871,000
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								5,326,070

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21999B
Project No.: 10584-022
Date: 12/20/2005
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	6" THICK INSULATION	Est	200	SF	21.00	4,200		0.27	54	54	DINS	59.32	3,203				7,400
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-6	BOILER MODS																	
	WALL AND TUBE MODS		Est	2	TN	2,625.00	5,250		35.00	70	70	FLDU	89.66	6,276				11,500
DW-7	**DUCTWORK SUBTOTAL**						**34,125**				**399**			**30,926**				**65,100**
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Air Blowers	Not required	Est	3	EA	21,000.00	63,000		40.00	120	120	MECH	66.86	8,023				71,000
	VFD Rotary Feeder	Not required	Est	1	EA	10,500.00	10,500		30.00	30	30	MECH	66.86	2,006				12,500
	Long-Term Storage Tank - 1 Unit (10 Days)	1,617,900 lb full - 17,060 ft3 - D=26.3' - H=31.6' - CS Silo - SS Hopper	Est	1	EA	151,000.00	151,000		580.00	580	580	TANK	65.78	38,152				189,200
	Short-Term Storage Silo - (24 Hours)	Not required	Est	0	EA	0.00	0		60.00	0	0	TANK	65.78	0				0
	Air Compressors (2 Qty)	50 hp - 2 X 100%	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Mixing Tank - 1 Unit - (24 Hours)	808,320 lb full - 8,520 ft3 - D=20.8' - H=25.0' - CS Silo - SS Hopper	Est	1	EA	76,500.00	76,500		880.00	880	880	TANK	65.78	57,886				134,400
	Mixing Tank Agitator (1 Qty)	20 hp - CS Shaft	Est	2	EA	21,000.00	42,000		30.00	60	60	MECH	66.86	4,012				46,000
	Water Storage Tank - 1 Unit (24 Hrs)	125,000 lb full - 2,000 ft3 - D=13.7' - H=13.7' - CS	Est	1	EA	115,500.00	115,500		880.00	880	880	TANK	65.78	57,886				173,400
	Slurry/Water Pumps (6 Qty)	2 hp - CS	Est	6	EA	5,250.00	31,500		20.00	120	120	PUMP	65.83	7,900				39,400
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (20 Qty)	Stainless Steel	Est	1	LT	42,000.00	42,000		96.00	96	96	MECH	66.86	6,419				48,400
	System Piping																	
	1" - CS	Includes fitting allowance	Est	300	LF	2.27	680		0.16	49	49	SPNG	70.4	3,464				4,100
	4" - CS	Includes fitting allowance	Est	50	LF	9.28	464		0.33	17	17	SPNG	70.4	1,162				1,600
	Piping Insulation & Lagging		Est	350	LF	2.99	1,047		0.08	26	26	INSUL	53.39	1,402				2,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	200	LS	840.00	168,000		100.00	20,000	20,000	SPNG	70.4	1,408,000				1,576,000
	Air Supply	Allowance	Est	200	LS	525.00	105,000		80.00	16,000	16,000	SPNG	70.4	1,126,400				1,231,400
	Piping Supports	Allowance	Est	1	LS	2,100.00	2,100		40.00	40	40	SPNG	70.4	2,816				4,900
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	110	CY	157.50	17,325		7.00	770	770	CONP	52.91	40,741				58,100

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
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-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21999B
Project No.: 10584-022
Date: 12/20/2005
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Preparer:
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-4	AUGER CAST PILES (120 TON CAPACITY)	90 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-5	**IS SYSTEM SUBTOTAL**						**942,017**				**40,761**			**2,845,961**				**3,787,800**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA						63,000
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
											0							
AP-2	GROUNDING										0							
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE						
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE						
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	300	LF	0.76	227	Routed in 3/4" Conduit	0.05	16	16	WIRE	69.06	1,098				1,300
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE						
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE						
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	50	LF	3.58	179	Routed in 2" Conduit	0.35	18	18	WIRE	69.06	1,209				1,400
	Control Cables - Pumps	5/C #14, 600V	Est	300	LF	0.67	202	Routed in 3/4" Conduit	0.03	10	10	WIRE	69.06	663				900
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE						
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,500	LF	2.06	5,145		0.19	485	485	ECND						
	1-1/2" Conduit		Est	100	LF	4.67	467		0.28	28	28	ECND						
	2" Conduit		Est	50	LF	6.25	312		0.35	18	18	ECND						
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND						
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND						

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Ghent Unit 1
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
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Wage Rates Based on: Louisville, KY
Labor Productivity = 1

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											0							
											0							
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA						
											0							
											0							
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC						
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
											0							
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL						
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**689,199**				**2,615**			**80,761**				**709,200**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	5,250.00	5,250		1550.00	1,550	1,550	PNTR	55.58	86,149				91,400
MISC-2	ROADWORK	Not Required	Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	100,000.00	100,000		40.00	40	40	STST	86.46	3,458				103,500
MISC-6	TANK BERM		Est	1	LS	76,000.00	76,000		260.00	260	260	STST	86.46	22,480				98,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	34,000.00	34,000		60.00	60	60	STST	86.46	5,188				39,200
MISC-5	**MISC. SUBTOTAL**						**54,538**				**2,155**			**122,239**				**176,700**
	GENERAL SUPPORT																	
	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**2,034,879**			0	**47,544**			**3,299,294**				**5,273,300**
																		0

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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Craft Support During Startup	At 3% of Total Manhours									1,426	MECH	66.86	95,364				95,400
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																263,700
	Erection Contractor's Profit	At 8% of Material and Labor Costs																421,900
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																10,200
	Freight To Site	At 4.5% of Equipment/Material Cost																91,600
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	48,970			3,394,658				**6,156,100**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								615,600
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,364,300
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**8,286,000**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22000B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Process Technology Package (PTP) by URS		Est	1	EA	1,800,000.00	1,800,000		20.00	20	20	PUMP	65.83	1,317				1,801,300
	Pumps (6 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	0	EA	2,100.00	0		20.00	0	0	PUMP	65.83	0				0
	Soda Ash Solution Tank - 1 Unit (10 Days)	420,250 lb full - 5,180 ft^3 - D=17.6' - H=21.2' - SS	Est	1	EA	133,000.00	133,000		535.21	535	535	TANK	65.78	35,206				168,200
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	309,312 lb full - 4,957 ft^3 - D=18.48' - H=18.48' - CS	Est	1	EA	129,000.00	129,000		489.52	490	490	TANK	65.78	32,201				161,200
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Air Compressors (2 Qty)	2 x 100% - 50 HP	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Injection Manifold (2 Qty)	Stainless Steel	Est	0	EA	10,500.00	0		240.00	0	0	MECH	66.86	0				0
	Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Est	0	LT	21,000.00	0		480.00	0	0	MECH	66.86	0				0
	System Piping	L=250' - D=4" - SS / L=50' - D=4" - CS / L=50' - D=2" - SS																
	6" - SS	Includes fitting allowance	Est	250	LF	30.61	7,652		0.42	105	105	SPNG	70.4	7,392				15,000
	6" - CS	Includes fitting allowance	Est	50	LF	11.89	594		0.42	21	21	SPNG	70.4	1,478				2,100
	4" - SS	Includes fitting allowance	Est	50	LF	24.89	1,244		0.33	17	17	SPNG	70.4	1,162				2,400
	Piping Insulation & Lagging		Est	350	LF	9.14	3,197		0.17	60	60	INSUL	53.39	3,177				6,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	75	CY	157.50	11,813		7.00	525	525	CONP	52.91	27,778				39,600
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-3	ROYALTY FEE	0	Est	0	LF									0				0

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22000B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	**IS SYSTEM SUBTOTAL**						**2,207,675**				**2,730**			**181,509**				**2,389,100**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	0	LF	6.25	0		0.35	0	0	ECND	49.67	0				0
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22000B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**693,130**				**2,558**			**143,552**				**836,900**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	**MISC. SUBTOTAL**						**52,963**				**1,855**			**105,565**				**158,500**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**3,085,123**			0	**8,727**			**643,559**				**3,728,900**
																		0
	Craft Support During Startup	At 3% of Total Manhours									262	MECH	66.86	17,504				17,500
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																186,400
	Erection Contractor's Profit	At 8% of Material and Labor Costs																298,300
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22000B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																15,400
	Freight To Site	At 4.5% of Equipment/Material Cost																138,800
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	8,988			661,062				**4,385,300**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								438,500
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								974,800
	\T INTERNAL COST	Furnished by Owner								0								100,000
	\E PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**5,948,600**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22001B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Process Technology Package (URS). The cost shown here is on a single unit basis, multi-contract or economies of scale is not included.	P&ID, Control Logic, Injection and metering pump skids, Proprietory injection lances	Budget	1	EA	1,800,000.00	1,800,000		300.00	300	300	MISC	65.83	19,749				1,819,700
	Pumps (6 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	6	EA	2,100.00	12,600		20.00	120	120	PUMP	65.83	7,900				20,500
	SBS Solution Tank - 1 Unit (10 Days)	57,000 gallons - D=19.2' - H=28.0' - SS	Est	1	EA	167,000.00	167,000		1064.00	1,064	1,064	TANK	65.78	69,990				237,000
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	Included in Soft water supply system	Est	0	EA	0.00	0		489.52	0	0	TANK	65.78	0				0
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Air Compressors (2 operating, 1 standby, Cost is divided between units 1,2,3 &4)	3 x 100% - 100 HP	Est	3	EA	225,000.00	675,000		1046.96	3,141	3,141	MECH	66.86	210,000				885,000
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	System Piping	L=500' - D=6" - SS / L=150' - D=6" - CS / L=100' - D=4" - SS																
	6" - SS	Includes fitting allowance	Est	500	LF	30.61	15,304		0.42	210	210	SPNG	70.4	14,784				30,100
	6" - CS	Includes fitting allowance	Est	150	LF	11.89	1,783		0.42	63	63	SPNG	70.4	4,435				6,200
	4" - SS	Includes fitting allowance	Est	100	LF	24.89	2,489		0.33	33	33	SPNG	70.4	2,323				4,800
	Piping Insulation & Lagging		Est	500	LF	9.14	4,568		0.17	85	85	INSUL	53.39	4,538				9,100
	Heat Tracing		Est	500	LF	21.00	10,500		0.31	155	155	WIRE	69.06	10,704				21,200
	Valves	Allowance	Est	1	LS	7,560.00	7,560		48.00	48	48	SPNG	70.4	3,379				10,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
IS-	STRUCTURAL STEEL	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700

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Chicago

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22001B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	ROYALTY FEE	Not Included, $ per MW, to be negotiated with Vendor	Est	0	LF									0				0
IS-5	**IS SYSTEM SUBTOTAL**										**7,815**			**538,444**				**3,381,300**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	0	LF	6.25	0		0.35	0	0	ECND	49.67	0				0
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22001B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**693,130**				**2,558**			**143,552**				**836,900**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	PREFAB BLDG.			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-6	TANK BERM		Est	1	LS	72,000.00	72,000		260.00	260	260	STST	86.46	22,480				94,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	36,000.00	36,000		60.00	60	60	STST	86.46	5,188				41,200
MISC-8	**MISC. SUBTOTAL**						**160,963**				**2,215**			**136,691**				**297,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**3,808,730**			0	**14,471**			**1,051,368**				**4,860,300**
																		0
	Craft Support During Startup	At 3% of Total Manhours									434	MECH	66.86	29,026				29,000
	Allowance for Premium Time Labor																	Not Included

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22001B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																243,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs																388,800
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																19,000
	Freight To Site	At 4.5% of Equipment/Material Cost																171,400
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	14,905			1,080,394				5,711,500
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								571,200
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,266,500
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								7,699,200

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22002B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	6	EA	55,125.00	330,750		105.00	630	630	PUMP	65.83	41,473				372,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - 1 Unit (10 Days)	2,687,900 lb full - 11,610 ft^3 - D=20.7' - H=83.0' - CS Silo - SS Hopper	Est	1	EA	590,000.00	590,000		4200.00	4,200	4,200	TANK	65.78	276,276				866,300
	Short-Term Storage Silo - (24 Hours)	268,800 lb full - 1,160 ft^3 - D=8.7' - H=39.0' - CS Silo - SS Hopper	Est	1	EA	180,000.00	180,000		120.00	120	120	TANK	65.78	7,894				187,900
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	160	160	SPNG	70.4	11,236				17,700
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-4	**IS SYSTEM SUBTOTAL**						**1,253,018**				**8,098**			**552,639**				**1,805,500**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM	Included in silo	Est	0	Set	105,000.00	0		1254.00	0	0	SPNG	70.4	0				0
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**0**				**0**			**0**				**0**

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22002B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	580,000.00	580,000		500.00	500	500	EHEA	53.92	26,960				607,000
	New Breaker at Existing 4160V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 600kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	250	LF	8.40	2,100	Routed in 2" Conduit	0.35	88	88	WIRE	69.06	6,043				8,100
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	900	LF	10.50	9,450	Routed in 2" Conduit	0.69	621	621	WIRE	69.06	42,886				52,300
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2"	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	1,150	LF	6.25	7,185		0.35	405	405	ECND	49.67	20,106				27,300
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**890,012**				**4,163**			**237,359**				**1,127,400**

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22002B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
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	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	BLOWER HOUSE																	
	PREFAB BLDG (15' x 20')			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
MISC-6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**82,438**				**2,135**			**132,244**				**214,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**2,251,823**			0	**14,725**			**1,046,893**				**3,298,700**
																		0
	Craft Support During Startup	At 3% of Total Manhours									442	MECH	66.86	29,536				29,500
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																164,900
	Erection Contractor's Profit	At 8% of Material and Labor Costs																263,900
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.:	22002B
Project No.:	10584-022
Date:	12/20/2005
Rev Date	1/27/2006
Run Date:	1/27/2006
Preparer:	
Reviewer:	

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																11,300
	Freight To Site	At 4.5% of Equipment/Material Cost																101,300
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	**15,167**			**1,076,429**				**3,869,600**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								387,000
	PERMITTING, MODELING, ETC.									0								0
	STARTUP REAGENT TESTING (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								861,300
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								100,000
	E PARTS									0								Not Included
	LATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**5,267,900**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22003B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT FOR WESP AND TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	0	TN	2,500.00	0		35.00	0	0	FLDU	89.66	0				0
	INSULATION & LAGGING		Est	0	SF	8.00	0		0.27	0	0	DINS	59.32	0				0
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	0	TN	1,800.00	0		16.00	0	0	STST	86.46	0				0
	ACCESS & GALLERIES		Est	0	SF	30.00	0		0.40	0	0	GALL	71.2	0				0
DW-5	FOUNDATIONS																	
	FOUNDATIONS FOR DUCTWORK AND STRUCTURAL STEEL	INCLUDES EXCAVATION & BACKFILL	Est	0	CY	150.00	0		7.00	0	0	CONP	52.91	0				0
DW-6	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
	DUCTWORK SUBTOTAL						**0**				**0**			**0**				**0**
	WESP & ASSOCIATED EQUIP																	
WE-1	EQUIPMENT/COMPONENTS																	
WE-2	WESP (One ESP boxes, with three fields, 6 feet long, total 150 SCA. All internal 2205, with 2205 carbon steel clad alloy plate construction)	INCLUDES ALL ASSOCIATED DUCTWORK AND WASTE WATER EQUIPMENT.PIPING AND TANKS	Est	1	EA	19,450,000.00	19,450,000	BUDGETARY INPUT FROM VENDORS	196033	196,033	196,033	PREC	86.72	17,000,000				36,450,000
WE-3	Chimney Liner Adjustment	RETURN TO EXISTING CHIMNEY	Est	0	LF	0.00	0		-55	0	0	PREC	86.72	0				0
WE-4	Chimney Breaching Adjustment	NONE	Est	0	LS	0.00	0		0	0	0	PREC	86.72	0				0
WE-5	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	210	CY	157.50	33,075		7.00	1,470	1,470	CONP	52.91	77,778				110,900
WE-6	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
WE-7	FIBERGLASS DUCT			50	LF	7,200.00	360,000		50.00	2,500	2,500	DUCT	82.81	207,025				567,000
WE-8	**WE SYSTEM SUBTOTAL**						**19,865,075**				**201,147**			**17,379,537**				**37,244,600**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	2	EA	575,000.00	1,150,000		500.00	1,000	1,000	EHEA	53.92	53,920				1,203,900
	New Breaker at Existing 13.2kV Switchgear		Est	2	EA	63,000.00	126,000		100.00	200	200	EHEA	53.92	10,784				136,800
	MCC		Est	2	EA	52,500.00	105,000		240.00	480	480	EHEA	53.92	25,882				130,900

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22003B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Misc Electrical Equipment & Controls		Est	1	LS	86,100.00	86,100		504.00	504	504	EHEA	53.92	27,176				113,300
AP-2	GROUNDING																	0
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	0	LF	14.70	0	Routed in 3" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	1,000	LF	8.40	8,400	Routed in 2" Conduit	0.35	350	350	WIRE	69.06	24,171				32,600
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	3,600	LF	6.30	22,680	Routed in 1-1/2" Conduit	0.52	1,872	1,872	WIRE	69.06	129,280				152,000
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	0	LF	0.76	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	1,500	LF	1.58	2,363	Routed in 3/4" Conduit	0.05	80	80	WIRE	69.06	5,490				7,900
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	0	LF	2.67	0	Routed in 1-1/2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	1,500	LF	0.67	1,008	Routed in 3/4" Conduit	0.03	48	48	WIRE	69.06	3,315				4,300
	Control Cables - TR Sets	7/C #14, 600V	Est	3,600	LF	0.81	2,911	Routed in 1-1/2" Conduit	0.04	144	144	WIRE	69.06	9,945				12,900
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	4,750	LF	2.06	9,776		0.19	922	922	ECND	49.67	45,771				55,500
	1-1/2" Conduit		Est	3,600	LF	4.67	16,821		0.28	1,022	1,022	ECND	49.67	50,783				67,600
	2" Conduit		Est	1,000	LF	6.25	6,248		0.35	352	352	ECND	49.67	17,484				23,700
	3" Conduit		Est	0	LF	13.13	0		0.65	0	0	ECND	49.67	0				0
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**1,609,556**				**7,569**			**441,458**				**2,051,200**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	87150.00	87,150		3250.00	3,250	3,250	PNTR	55.58	180,635				267,800

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22003B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	1	LS	46000.00	46,000		380.00	380	380	PBIT	62.43	23,723				69,700
MISC-3	STORM DRAINAGE		Est	1	LS	7350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
MISC-5	**MISC. SUBTOTAL**						**140,500**				**3,930**			**219,949**				**360,400**
MISC-1	PAINTING	Touch-up and Field Finish	Est	0	LS		0		3250.00	0	0	PNTR	55.58	0				0
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	0	LS		0		475.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	0	LS		0		538.43	0	0	YDRN	51.97	0				0
MISC-4	OTHER																	
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-5	**MISC. SUBTOTAL**						**0**				**40**			**3,458**				**3,500**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	CRANE RENTAL	700 Ton - 4 months	Est	1	LT		0	Includes freight in and out						480,000				480,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**580,000**				**580,000**
	SUBTOTAL						**21,615,131**			0	**212,686**			**18,624,403**				**40,239,700**
																		0
	Craft Support During Startup	At 3% of Total Manhours									6,381	MECH	66.86	426,606				426,600
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs - WESP																1,039,500
	Erection Contractor's Profit	At 8% of Material and Labor Costs - WESP																1,663,200
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																108,100

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22003B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Freight To Site	At 4.5% of Equipment/Material Cost																972,700
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	219,067			19,051,009				**44,449,800**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								2,000,200
	PERMITTING, MODELING, ETC.									0								0
	STARTUP AND TESTING									0								100,000
	CONTINGENCY	At 20% of Total								0								9,310,000
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								200,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**56,060,000**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22004B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS	COSTS																
	WESP & ASSOCIATED EQUIP																	
WE-1	WESP (Two ESP boxes, with 29 feet three fields, 9 feet long 1st field at 9.75" spacing with 76 gas passages, and 11 feet long 2nd and 3rd fields at 11.75" spacing with 64 passages, total 170 SCA. All internal 2205, with 2205 carbon steel clad alloy plate construction)	INCLUDES ALL ASSOCIATED DUCTWORK AND WASTE WATER EQUIPMENT,PIPING AND TANKS	Est	1	EA	30,610,000.00	30,610,000	BUDGETARY INPUT FROM VENDOR	142817	142,817	142,817	PREC	86.72	12,385,047				42,995,000
WE-2	Chimney Liner Adjustment (WITH MODIFIED BREECHING AT WESP OUTLET ELEVATION)	RETURN TO EXISTING BREECHING	Est	0	LF	5,302.50	0		55	0	0	PREC	86.72	0				0
WE-3	Chimney Breaching Adjustment		Est	0	LS	21,000.00	0		220	0	0	PREC	86.72	0				0
	Electrical Building	20'x40'	Est	1	EA	21,000.00	21,000		100.00	100	100	STST	86.46	8,646				29,600
WE-5	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	810	CY	157.50	127,575		7.00	5,670	5,670	CONP	52.91	300,000				427,600
WE-6	STRUCTURAL STEEL		Est	170	TN	2,200.00	374,000		16.00	2,720	2,720	STST	86.46	235,171				609,200
WE-7	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,000	LF	10.00	20,000		0.52	1,040	1,040	PILE	82.81	86,122				106,100
WE-7	FIBER GLASS DUCT 23' DIA		Est	450	LF	7,200.00	3,240,000		50.00	22,500	22,500	DUCT	59.32	1,334,700				4,574,700
WE-8	**WE SYSTEM SUBTOTAL**						**34,392,575**				**174,847**			**14,349,686**				**48,742,200**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	52,500.00	105,000		240.00	480	480	EHEA	53.92	25,882				130,900
	Misc Electrical Equipment & Controls		Est	1	LS	86,100.00	86,100		324.00	324	324	EHEA	53.92	17,470				103,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	0	LF	14.70	0	Routed in 3" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	1,000	LF	8.40	8,400	Routed in 2" Conduit	0.35	350	350	WIRE	69.06	24,171				32,600
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	2,400	LF	6.30	15,120	Routed in 1-1/2" Conduit	0.52	1,248	1,248	WIRE	69.06	86,187				101,300
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	0	LF	0.76	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	1,500	LF	1.58	2,363	Routed in 3/4" Conduit	0.05	80	80	WIRE	69.06	5,490				7,900
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE	69.06	0				0

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22004B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	0	LF	2.67	0	Routed in 1-1/2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	1,500	LF	0.67	1,008	Routed in 3/4" Conduit	0.03	48	48	WIRE	69.06	3,315				4,300
	Control Cables - TR Sets	7/C #14, 600V	Est	2,400	LF	0.81	1,940	Routed in 1-1/2" Conduit	0.04	96	96	WIRE	69.06	6,630				8,600
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	4,750	LF	2.06	9,776		0.19	922	922	ECND	49.67	45,771				55,500
	1-1/2" Conduit		Est	2,400	LF	4.67	11,214		0.28	682	682	ECND	49.67	33,855				45,100
	2" Conduit		Est	1,000	LF	6.25	6,248		0.35	352	352	ECND	49.67	17,484				23,700
	3" Conduit		Est	0	LF	13.13	0		0.65	0	0	ECND	49.67	0				0
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**957,418**				**5,776**			**336,065**				**1,293,700**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	87,150.00	87,150		3250.00	3,250	3,250	PNTR	55.58	180,635				267,800
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	1	LS	45,937.50	45,938		380.00	380	380	PBIT	62.43	23,723				69,700
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
MISC-5	**MISC. SUBTOTAL**						**140,438**				**3,930**			**219,949**				**360,400**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 1
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22004B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
GS-2	CRANE RENTAL	700 Ton - 2 months	Est	1	LT		0	Includes freight in and out						310,000				310,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**410,000**				**410,000**
	SUBTOTAL						**35,490,431**			0	**184,553**			**15,315,700**				**50,806,300**
																		0
	Craft Support During Startup	At 3% of Total Manhours									5,537	MECH	66.86	370,176				370,200
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs - WESP																1,009,800
	Erection Contractor's Profit	At 8% of Material and Labor Costs - WESP																1,615,700
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																177,500
	Freight To Site	At 4.5% of Equipment/Material Cost																1,597,100
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	**190,089**			**15,685,876**				**55,576,600**
ENGINEERING / CONSTRUCTION MANAGEMENT		Furnished by Project Team								0								2,501,000
PERMITTING, MODELING, ETC.										0								0
STARTUP AND TESTING										0								100,000
CONTINGENCY		At 20% of Total								0								11,635,500
CLIENT INTERNAL COST		To Be Furnished by Owner								0								200,000
SPARE PARTS										0								Not Included
ESCALATION		Not Included																0
INTEREST DURING CONSTRUCTION (AFUDC)		Not Included																0
	PROJECT TOTAL :									0								**70,013,100**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22005B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	5	EA	55,125.00	275,625		105.00	525	525	PUMP	65.83	34,561				310,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	2,937,600 lb full - 19,615 ft³ - D=20.5' - H=82.0' - CS Silo - SS Hopper	Est	1	EA	808,000.00	808,000		2545.52	2,546	2,546	TANK	65.78	167,444				975,400
	Short-Term Storage Silo - (24 Hours)	293,760 lb full - 1,920 ft³ - D=8.5' - H=38.0' - CS Silo - SS Hopper	Est	1	EA	200,000.00	200,000		764.00	764	764	TANK	65.78	50,256				250,300
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	161	161	SPNG	70.4	11,334				17,800
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	50	CY	157.50	7,875		7.00	350	350	CONP	52.91	18,519				26,400
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-4	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-5	**IS SYSTEM SUBTOTAL**						**1,429,593**				**6,704**			**464,542**				**1,894,000**
	MATERIAL UNLOADING SYSTEM																	
1	TRUCK DELIVERY	INCLUDED IN SILO	Est	0	Set	315,000.00	0		1753.67	0	0	SPNG	70.4	0				0
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22005B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 6900V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	300	LF	6.25	1,874		0.35	106	106	ECND	49.67	5,245				7,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**871,538**				**3,370**			**188,413**				**1,060,000**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22005B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	0	LS	7,350.00	0		300.00	0	0	YDRN	51.97	0				0
MISC-4	OTHER																	
	BLOWER HOUSE																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG. 15'X20'		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
-6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**75,088**				**1,835**			**116,653**				**191,800**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							150,000				150,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**150,000**				**150,000**
	SUBTOTAL						**2,402,574**			0	**12,238**			**944,258**				**3,346,900**
																		0
	Craft Support During Startup	At 3% of Total Manhours									367	MECH	66.86	24,548				24,500
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																167,300
	Erection Contractor's Profit	At 8% of Material and Labor Costs																267,800
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																12,000
	Freight To Site	At 4.5% of Equipment/Material Cost																108,100
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.:	22005B
Project No.:	10584-022
Date:	12/20/2005
Rev Date	1/27/2006
Run Date:	1/27/2006
Preparer:	
Reviewer:	

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	12,606			968,806				3,926,600
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								392,660
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								873,900
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								5,343,160

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22006B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	DUCTWORK MODS		Est	200	SF	21.00	4,200		0.27	54	54	DINS	59.32	3,203				7,400
	INSULATION & LAGGING	6" THICK INSULATION																
DW-4	DUCTWORK SUPPORT STRUCTURES		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	STRUCTURAL STEEL		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
	ACCESS & GALLERIES																	
DW-6	BOILER MODS		Est	2	TN	2,625.00	5,250		35.00	70	70	FLDU	89.66	6,276				11,500
	WALL AND TUBE MODS																	
	DUCTWORK SUBTOTAL						**34,125**				**399**			**30,926**				**65,100**
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Air Blowers	Not required	Est	3	EA	21,000.00	63,000		40.00	120	120	MECH	66.86	8,023				71,000
	VFD Rotary Feeder	Not required	Est	1	EA	10,500.00	10,500		30.00	30	30	MECH	66.86	2,006				12,500
	Long-Term Storage Tank -	1,617,900 lb full - 17,060 ft3 - D=26.3' - H=31.6' -	Est	1	EA	239,000.00	239,000		580.00	580	580	TANK	65.78	38,152				277,200
	Short-Term Storage Silo - (24 Hours)	Not required	Est	0	EA	0.00	0		60.00	0	0	TANK	65.78	0				0
	Air Compressors (2 Qty)	50 hp - 2 X 100%	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Mixing Tank - 1 Unit - (24 Hours)	808,320 lb full - 8,520 ft3 - D=20.8' - H=25.0' - CS Silo - SS Hopper	Est	1	EA	115,000.00	115,000		880.00	880	880	TANK	65.78	57,886				172,900
	Mixing Tank Agitator (1 Qty)	20 hp - CS Shaft	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Water Storage Tank - 1 Unit (24 Hrs)	125,000 lb full - 2,000 ft3 - D=13.7' - H=13.7' - CS	Est	1	EA	48,000.00	48,000		880.00	880	880	TANK	65.78	57,886				105,900
	Slurry/Water Pumps (6 Qty)	2 hp - CS	Est	6	EA	5,250.00	31,500		20.00	120	120	PUMP	65.83	7,900				39,400
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (20 Qty)	Stainless Steel	Est	1	LT	42,000.00	42,000		96.00	96	96	MECH	66.86	6,419				48,400
	System Piping																	
	1" - CS	Includes fitting allowance	Est	300	LF	2.27	680		0.16	49	49	SPNG	70.4	3,464				4,100
	4" - CS	Includes fitting allowance	Est	50	LF	9.28	464		0.33	17	17	SPNG	70.4	1,162				1,600
	Piping Insulation & Lagging		Est	350	LF	2.99	1,047		0.08	26	26	INSUL	53.39	1,402				2,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	200	LS	840.00	168,000		100.00	20,000	20,000	SPNG	70.4	1,408,000				1,576,000
	Air Supply	Allowance	Est	200	LS	525.00	105,000		80.00	16,000	16,000	SPNG	70.4	1,126,400				1,231,400
	Piping Supports	Allowance	Est	1	LS	2,100.00	2,100		40.00	40	40	SPNG	70.4	2,816				4,900
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	110	CY	157.50	17,325		7.00	770	770	CONP	52.91	40,741				58,100
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800

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Ghent Unit 3
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
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-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22006B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
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Preparer:
Reviewer:

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IS-4	AUGER CAST PILES (120 TON CAPACITY)	90 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-5	**IS SYSTEM SUBTOTAL**						**980,017**				**40,731**			**2,843,955**				**3,823,800**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA						63,000
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
											0							
AP-2	GROUNDING										0							
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE						
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE						
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	300	LF	0.76	227	Routed in 3/4" Conduit	0.05	16	16	WIRE	69.06	1,098				1,300
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE						
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE						
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	50	LF	3.58	179	Routed in 2" Conduit	0.35	18	18	WIRE	69.06	1,209				1,400
	Control Cables - Pumps	5/C #14, 600V	Est	300	LF	0.67	202	Routed in 3/4" Conduit	0.03	10	10	WIRE	69.06	663				900
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE						
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,500	LF	2.06	5,145		0.19	485	485	ECND						
	1-1/2" Conduit		Est	100	LF	4.67	467		0.28	28	28	ECND						
	2" Conduit		Est	50	LF	6.25	312		0.35	18	18	ECND						
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND						
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND						
											0							

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AP-5	DCS SYSTEM ADDITIONS										0							
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA						
											0							
AP-8	DCS PROGRAMMING/INTERFACE										0							
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC						
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
											0							
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL						
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**689,199**				**2,615**			**80,761**				**709,200**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	5,250.00	5,250		1550.00	1,550	1,550	PNTR	55.58	86,149				91,400
MISC-2	ROADWORK	Not Required	Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	100,000.00	100,000		40.00	40	40	STST	86.46	3,458				103,500
MISC-6	TANK BERM		Est	1	LS	76,000.00	76,000		260.00	260	260	STST	86.46	22,480				98,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	35,000.00	35,000		60.00	60	60	STST	86.46	5,188				40,200
MISC-5	**MISC. SUBTOTAL**						**54,538**				**2,155**			**122,239**				**176,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
	GENERAL SUPPORT SUBTOTAL						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**2,073,879**			0	**47,514**			**3,297,288**				**5,310,300**
																		0
	Craft Support During Startup	At 3% of Total Manhours									1,425	MECH	66.86	95,303				95,300

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	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																265,500
	Erection Contractor's Profit	At 8% of Material and Labor Costs																424,800
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																10,400
	Freight To Site	At 4.5% of Equipment/Material Cost																93,300
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST								0		48,939			3,392,592				**6,199,600**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team							0									620,000
	PERMITTING, MODELING, ETC.								0									0
	STARTUP, TESTING AND REAGENT (15 DAYS)								0									50,000
	CONTINGENCY	At 20% of Total							0									1,373,900
	CLIENT INTERNAL COST	To Be Furnished by Owner							0									100,000
	SPARE PARTS								0									Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :								0									**8,343,500**

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Louisville Gas & Electric
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SO3 Mitigation System
Option 3 - Soda Ash
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Labor Productivity = 1

Estimate No.: 22007B
Project No.: 10584-022
Date: 12/20/2005
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	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Process Technology Package (PTP) by URS		Est	1	EA	1,800,000.00	1,800,000		20.00	20	20	PUMP	65.83	1,317				1,801,300
	Pumps (6 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	6	EA	2,100.00	12,600		20.00	120	120	PUMP	65.83	7,900				20,500
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	420,250 lb full - 5,180 ft^3 - D=17.6' - H=21.2' - SS	Est	1	EA	363,000.00	363,000		535.21	535	535	TANK	65.78	35,206				398,200
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	309,312 lb full - 4,957 ft^3 - D=18.48' - H=18.48' - CS	Est	1	EA	83,000.00	83,000		489.52	490	490	TANK	65.78	32,201				115,200
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Air Compressors (2 Qty)	2 x 100% - 50 HP	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Est	1	LT	21,000.00	21,000		480.00	480	480	MECH	66.86	32,093				53,100
	System Piping	L=250' - D=4" - SS / L=50' - D=4" - CS / L=50' - D=2" - SS																
	6" - SS	Includes fitting allowance	Est	250	LF	30.61	7,652		0.42	105	105	SPNG	70.4	7,392				15,000
	6" - CS	Includes fitting allowance	Est	50	LF	11.89	594		0.42	21	21	SPNG	70.4	1,478				2,100
	4" - SS	Includes fitting allowance	Est	50	LF	24.89	1,244		0.33	17	17	SPNG	70.4	1,162				2,400
	Piping Insulation & Lagging		Est	350	LF	9.14	3,197		0.17	60	60	INSUL	53.39	3,177				6,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	75	CY	157.50	11,813		7.00	525	525	CONP	52.91	27,778				39,600
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-3	ROYALTY FEE	0	Est	0	LF									0				0

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IS-4	**IS SYSTEM SUBTOTAL**						**2,446,275**				**3,810**			**253,595**				**2,699,800**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	0	LF	6.25	0		0.35	0	0	ECND	49.67	0				0
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22007B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**693,130**				**2,558**			**143,552**				**836,900**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
I 2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-6	TANK BERM		Est	1	LS	61,000.00	61,000		260.00	260	260	STST	86.46	22,480				83,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	37,000.00	37,000		60.00	60	60	STST	86.46	5,188				42,200
MISC-5	**MISC. SUBTOTAL**						**150,963**				**2,215**			**136,691**				**287,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**3,421,723**			0	**10,167**			**746,770**				**4,168,800**
																		0
	Craft Support During Startup	At 3% of Total Manhours									305	MECH	66.86	20,392				20,400
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 3 - Soda Ash
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-CONFIDENTIAL-

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Labor Productivity = 1

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Date: 12/20/2005
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																208,400
	Erection Contractor's Profit	At 8% of Material and Labor Costs																333,500
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																17,100
	Freight To Site	At 4.5% of Equipment/Material Cost																154,000
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	10,472			767,162				4,902,200
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								490,200
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,088,500
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								6,630,900

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22008B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/26/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Process Technology Package (PTP). The cost shown here is for a single skid shared by Unit 3 and 4.	P&ID, Control Logic, Injection and metering pump skids, Proprietory injection lances	Budget	1	EA	1,200,000.00	1,200,000		200.00	200	200	MISC	65.83	13,166				1,213,200
	Pumps (0 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP, included in PTP	Est	0	EA	0.00	0		20.00	0	0	PUMP	65.83	0				0
	SBS Solution Tank - 1 Unit (10 Days)	825,400 lb full - 12,100 ft^3 - D=23.4' - H=28.0' - SS	Est	1	EA	217,000.00	217,000		1064.00	1,064	1,064	TANK	65.78	69,990				287,000
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	309,312 lb full - 4,957 ft^3 - D=18.48' - H=18.48' - CS	Est	1	EA	45,000.00	45,000		820.92	821	821	TANK	65.78	54,000				99,000
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	10,000.00	10,000		30.00	30	30	MECH	66.86	2,006				12,000
	Air Compressors (2 operating, 1 standby for each Unit)	3 x 100% - 150 HP	Est	3	EA	225,000.00	675,000		120.00	360	360	MECH	66.86	24,070				699,100
	Injection Manifold (2 Qty)	Stainless Steel included in PTP	Est	2	EA	0.00	0		0.00	0	0	MECH	66.86	0				0
	System Piping	L=300' - D=6" - SS / L=200' - D=6" - CS / L=100' - D=4" - SS																
	6" - SS	Includes fitting allowance	Est	300	LF	30.61	9,182		0.42	126	126	SPNG	70.4	8,870				18,100
	6" - CS	Includes fitting allowance	Est	200	LF	11.89	2,377		0.42	84	84	SPNG	70.4	5,914				8,300
	4" - SS	Includes fitting allowance	Est	100	LF	24.89	2,489		0.33	33	33	SPNG	70.4	2,323				4,800
	Piping Insulation & Lagging		Est	500	LF	9.14	4,568		0.17	85	85	INSUL	53.39	4,538				9,100
	Heat Tracing		Est	500	LF	21.00	10,500		0.31	155	155	WIRE	69.06	10,704				21,200
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply piping	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply piping	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
IS-3	STRUCTURAL STEEL	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800

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Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22008B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/26/2006
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Preparer:
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-3	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-4	ROYALTY FEE	Not Included, $ per MW, to be negotiated with Vendor	Est	0	LF									0				0
IS-5	**IS SYSTEM SUBTOTAL**										**5,192**			**362,086**				**2,638,400**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	488,750.00	488,750		500.00	500	500	EHEA	53.92	26,960				515,700
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 150HP	3/C 250kcmil, 600V	Est	250	LF	3.58	895	Routed in 3" Conduit	0.35	88	88	WIRE	69.06	6,043				6,900
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	250	LF	6.25	1,562		0.35	88	88	ECND	49.67	4,371				5,900
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400

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Ghent Unit 3
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AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**731,530**				**2,916**			**164,329**				**895,900**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	PREFAB BLDG.			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD Model Study		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-6	Berm around Tanks	60,000 gallon tank, 12" concrete wall, 6" slab, sump, for 110% containment (40' x 40' x 6' high)	Est	1	LS	74,000.00	74,000		260.00	260	260	STST	86.46	22,480				96,500
MISC-7	Soft Water Supply System	36" x 60" regeration 1,845 gallon	Est	1	LS	23,000.00	23,000		60.00	60	60	STST	86.46	5,188				28,200
MISC-8	**MISC. SUBTOTAL**						**149,963**				**2,215**			**136,691**				**286,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22008B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/26/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	SUBTOTAL						**3,275,963**			**0**	**12,105**			**889,204**				**4,165,400**
																		0
	Craft Support During Startup	At 3% of Total Manhours									363	MECH	66.86	24,281				24,300
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																208,300
	Erection Contractor's Profit	At 8% of Material and Labor Costs																333,200
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																16,400
	Freight To Site	At 4.5% of Equipment/Material Cost																147,400
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									**0**	**12,469**			**913,485**				**4,895,000**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								489,500
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,086,900
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**6,621,400**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22009A
Project No.: 10584-022
Date: 12/20/2005
Rev Date:
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	6	EA	55,125.00	330,750		105.00	630	630	PUMP	65.83	41,473				372,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	2,687,900 lb full - 11,610 ft³ - D=20.7' - H=83.0' - CS Silo - SS Hopper	Est	1	EA	590,000.00	590,000		1624.00	1,624	1,624	TANK	65.78	106,827				696,800
	Short-Term Storage Silo - (24 Hours)	268,800 lb full - 1,160 ft³ - D=8.7' - H=39.0' - CS Silo - SS Hopper	Est	1	EA	180,000.00	180,000		120.00	120	120	TANK	65.78	7,894				187,900
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	160	160	SPNG	70.4	11,236				17,700
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-4	**IS SYSTEM SUBTOTAL**						**1,253,018**				**5,522**			**383,190**				**1,636,000**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM	Included in silo	Est	0	Set	105,000.00	0		1254.00	0	0	SPNG	70.4	0				0
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**0**				**0**			**0**				**0**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22009A
Project No.: 10584-022
Date: 12/20/2005
Rev Date:
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	580,000.00	580,000		500.00	500	500	EHEA	53.92	26,960				607,000
	New Breaker at Existing 4160V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 600kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	250	LF	8.40	2,100	Routed in 2" Conduit	0.35	88	88	WIRE	69.06	6,043				8,100
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2"	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	550	LF	6.25	3,436		0.35	194	194	ECND	49.67	9,616				13,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**879,964**				**3,538**			**198,278**				**1,078,300**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on:	Louisville, KY
Labor Productivity =	1

Estimate No.:	22009A
Project No.:	10584-022
Date:	12/20/2005
Rev Date	
Run Date:	1/27/2006
Preparer:	
Reviewer:	

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	BLOWER HOUSE																	
	PREFAB BLDG (15' x 20')			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
MISC-6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**82,438**				**2,135**			**132,244**				**214,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**2,241,774**			0	**11,524**			**838,362**				**3,080,100**
																		0
	Craft Support During Startup	At 3% of Total Manhours									346	MECH	66.86	23,115				23,100
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																154,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs																246,400
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22009A
Project No.: 10584-022
Date: 12/20/2005
Rev Date:
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																11,200
	Freight To Site	At 4.5% of Equipment/Material Cost																100,900
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	11,870			861,477				3,615,700
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								361,600
	PERMITTING, MODELING, ETC.									0								0
	STARTUP REAGENT TESTING (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								805,500
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								4,932,800

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22010A
Project No.: 10584-022
Date: 12/20/2005
Rev Date
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT FOR WESP AND TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	0	TN	2,500.00	0		35.00	0	0	FLDU	89.66	0				0
	INSULATION & LAGGING		Est	0	SF	8.00	0		0.27	0	0	DINS	59.32	0				0
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	0	TN	1,800.00	0		16.00	0	0	STST	86.46	0				0
	ACCESS & GALLERIES		Est	0	SF	30.00	0		0.40	0	0	GALL	71.2	0				0
DW-5	FOUNDATIONS																	
	FOUNDATIONS FOR DUCTWORK AND STRUCTURAL STEEL	INCLUDES EXCAVATION & BACKFILL	Est	0	CY	150.00	0		7.00	0	0	CONP	52.91	0				0
DW-6	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
DW-7	**DUCTWORK SUBTOTAL**						**0**				**0**			**0**				**0**
	WESP & ASSOCIATED EQUIP																	
WE-1	EQUIPMENT/COMPONENTS																	
WE-2	WESP (One ESP boxes, with three fields, 6 feet long, total 150 SCA. All internal 2205, with 2205 carbon steel clad alloy plate construction)	INCLUDES ALL ASSOCIATED DUCTWORK AND WASTE WATER EQUIPMENT.PIPING AND TANKS	Est	1	EA	28,945,000.00	28,945,000	BUDGETARY INPUT FROM VENDORS	76901	76,901	76,901	PREC	86.72	6,668,871				35,613,900
WE-3	Chimney Liner Adjustment	RETURN TO EXISTING CHIMNEY	Est	0	LF	-5302.50	0		-55	0	0	PREC	86.72	0				0
WE-4	Chimney Breaching Adjustment	NONE	Est	0	LS	0.00	0		0	0	0	PREC	86.72	0				0
WE-5	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	210	CY	157.50	33,075		7.00	1,470	1,470	CONP	52.91	77,778				110,900
WE-6	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
WE-7	FIBERGLASS DUCT			50	LF	7,200.00	360,000		50.00	2,500	2,500	DUCT	82.81	207,025				567,000
WE-8	**WE SYSTEM SUBTOTAL**						**29,338,075**				**80,871**			**6,953,674**				**36,291,800**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	2	EA	575,000.00	1,150,000		500.00	1,000	1,000	EHEA	53.92	53,920				1,203,900
	New Breaker at Existing 13.2kV Switchgear		Est	2	EA	63,000.00	126,000		100.00	200	200	EHEA	53.92	10,784				136,800
	MCC		Est	2	EA	52,500.00	105,000		240.00	480	480	EHEA	53.92	25,882				130,900

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22010A
Project No.: 10584-022
Date: 12/20/2005
Rev Date
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Misc Electrical Equipment & Controls		Est	1	LS	86,100.00	86,100		504.00	504	504	EHEA	53.92	27,176				113,300
AP-2	GROUNDING																	0
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	0	LF	14.70	0	Routed in 3" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	1,000	LF	8.40	8,400	Routed in 2" Conduit	0.35	350	350	WIRE	69.06	24,171				32,600
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	3,600	LF	6.30	22,680	Routed in 1-1/2" Conduit	0.52	1,872	1,872	WIRE	69.06	129,280				152,000
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	0	LF	0.76	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	1,500	LF	1.58	2,363	Routed in 3/4" Conduit	0.05	80	80	WIRE	69.06	5,490				7,900
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	0	LF	2.67	0	Routed in 1-1/2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	1,500	LF	0.67	1,008	Routed in 3/4" Conduit	0.03	48	48	WIRE	69.06	3,315				4,300
	Control Cables - TR Sets	7/C #14, 600V	Est	3,600	LF	0.81	2,911	Routed in 1-1/2" Conduit	0.04	144	144	WIRE	69.06	9,945				12,900
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	4,750	LF	2.06	9,776		0.19	922	922	ECND	49.67	45,771				55,500
	1-1/2" Conduit		Est	3,600	LF	4.67	16,821		0.28	1,022	1,022	ECND	49.67	50,783				67,600
	2" Conduit		Est	1,000	LF	6.25	6,248		0.35	352	352	ECND	49.67	17,484				23,700
	3" Conduit		Est	0	LF	13.13	0		0.65	0	0	ECND	49.67	0				0
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**1,609,556**				**7,569**			**441,458**				**2,051,200**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	87150.00	87,150		3250.00	3,250	3,250	PNTR	55.58	180,635				267,800

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Louisville Gas & Electric
Ghent Unit 3
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22010A
Project No.: 10584-022
Date: 12/20/2005
Rev Date:
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	1	LS	46000.00	46,000		380.00	380	380	PBIT	62.43	23,723				69,700
MISC-3	STORM DRAINAGE		Est	1	LS	7350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
MISC-5	**MISC. SUBTOTAL**						**140,500**				**3,930**			**219,949**				**360,400**
MISC-1	PAINTING	Touch-up and Field Finish	Est	0	LS		0		3250.00	0	0	PNTR	55.58	0				0
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	0	LS		0		475.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	0	LS		0		538.43	0	0	YDRN	51.97	0				0
MISC-4	OTHER																	
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-5	**MISC. SUBTOTAL**						**0**				**40**			**3,458**				**3,500**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	CRANE RENTAL	700 Ton - 4 months	Est	1	LT		0	Includes freight in and out						480,000				480,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**580,000**				**580,000**
	SUBTOTAL						**31,088,131**			0	**92,410**			**8,198,540**				**39,286,900**
																		0
	Craft Support During Startup	At 3% of Total Manhours									2,772	MECH	66.86	185,357				185,400
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs - WESP																517,100
	Erection Contractor's Profit	At 8% of Material and Labor Costs - WESP																827,400
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																155,400

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Ghent Unit 3
SO3 Mitigation System
Option 6 - Vertical Flow WESP
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-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22010A
Project No.: 10584-022
Date: 12/20/2005
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Freight To Site	At 4.5% of Equipment/Material Cost																1,399,000
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	95,183			8,383,896				42,371,200
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								1,906,700
	PERMITTING, MODELING, ETC.									0								0
	STARTUP AND TESTING									0								100,000
	CONTINGENCY	At 20% of Total								0								8,875,600
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								200,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								53,453,500

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Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22011A
Project No.: 10584-022
Date: 12/20/2005
Rev Date
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS	COSTS																
	WESP & ASSOCIATED EQUIP																	
WE-1	WESP (Two ESP boxes, with 29 feet three fields, 9 feet long 1st field at 9.75" spacing with 76 gas passages, and 11 feet long 2nd and 3rd fields at 11.75" spacing with 64 passages, total 170 SCA. All internal 2205, with 2205 carbon steel clad alloy plate construction)	INCLUDES ALL ASSOCIATED DUCTWORK AND WASTE WATER EQUIPMENT,PIPING AND TANKS	Est	1	EA	30,490,000.00	30,490,000	BUDGETARY INPUT FROM VENDOR	142817	142,817	142,817	PREC	86.72	12,385,047				42,875,000
WE-2	Chimney Liner Adjustment (WITH MODIFIED BREECHING AT WESP OUTLET ELEVATION)	RETURN TO EXISTING BREECHING	Est	0	LF	5,302.50	0		55	0	0	PREC	86.72	0				0
	Chimney Breaching Adjustment		Est	0	LS	21,000.00	0		220	0	0	PREC	86.72	0				0
WE-4	Electrical Building	20'x40'	Est	1	EA	21,000.00	21,000		100.00	100	100	STST	86.46	8,646				29,600
WE-5	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	810	CY	157.50	127,575		7.00	5,670	5,670	CONP	52.91	300,000				427,600
WE-6	STRUCTURAL STEEL		Est	170	TN	2,200.00	374,000		16.00	2,720	2,720	STST	86.46	235,171				609,200
WE-7	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,000	LF	10.00	20,000		0.52	1,040	1,040	PILE	82.81	86,122				106,100
WE-7	FIBER GLASS DUCT 23' DIA		Est	450	LF	7,200.00	3,240,000		50.00	22,500	22,500	DUCT	59.32	1,334,700				4,574,700
WE-8	**WE SYSTEM SUBTOTAL**						**34,272,575**				**174,847**			**14,349,686**				**48,622,200**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	52,500.00	105,000		240.00	480	480	EHEA	53.92	25,882				130,900
	Misc Electrical Equipment & Controls		Est	1	LS	86,100.00	86,100		324.00	324	324	EHEA	53.92	17,470				103,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	0	LF	14.70	0	Routed in 3" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	1,000	LF	8.40	8,400	Routed in 2" Conduit	0.35	350	350	WIRE	69.06	24,171				32,600
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	2,400	LF	6.30	15,120	Routed in 1-1/2" Conduit	0.52	1,248	1,248	WIRE	69.06	86,187				101,300
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	0	LF	0.76	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	1,500	LF	1.58	2,363	Routed in 3/4" Conduit	0.05	80	80	WIRE	69.06	5,490				7,900
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE	69.06	0				0

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22011A
Project No.: 10584-022
Date: 12/20/2005
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	0	LF	2.67	0	Routed in 1-1/2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	1,500	LF	0.67	1,008	Routed in 3/4" Conduit	0.03	48	48	WIRE	69.06	3,315				4,300
	Control Cables - TR Sets	7/C #14, 600V	Est	2,400	LF	0.81	1,940	Routed in 1-1/2" Conduit	0.04	96	96	WIRE	69.06	6,630				8,600
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	4,750	LF	2.06	9,776		0.19	922	922	ECND	49.67	45,771				55,500
	1-1/2" Conduit		Est	2,400	LF	4.67	11,214		0.28	682	682	ECND	49.67	33,855				45,100
	2" Conduit		Est	1,000	LF	6.25	6,248		0.35	352	352	ECND	49.67	17,484				23,700
	3" Conduit		Est	0	LF	13.13	0		0.65	0	0	ECND	49.67	0				0
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**957,418**				**5,776**			**336,065**				**1,293,700**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	87,150.00	87,150		3250.00	3,250	3,250	PNTR	55.58	180,635				267,800
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	1	LS	45,937.50	45,938		380.00	380	380	PBIT	62.43	23,723				69,700
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
MISC-5	**MISC. SUBTOTAL**						**140,438**				**3,930**			**219,949**				**360,400**
-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
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Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22011A
Project No.: 10584-022
Date: 12/20/2005
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GS-2	CRANE RENTAL	700 Ton - 2 months	Est	1	LT		0	Includes freight in and out						310,000				310,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**410,000**				**410,000**
	SUBTOTAL						**35,370,431**			0	**184,593**			**15,319,159**				**50,689,800**
																		0
	Craft Support During Startup	At 3% of Total Manhours									5,538	MECH	66.86	370,256				370,300
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs - WESP																1,010,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs - WESP																1,616,000
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																176,900
	Freight To Site	At 4.5% of Equipment/Material Cost																1,591,700
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	**190,131**			**15,689,415**				**55,454,700**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								2,495,000
	PERMITTING, MODELING, ETC.									0								0
	STARTUP AND TESTING									0								100,000
	CONTINGENCY	At 20% of Total								0								11,609,900
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								200,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**69,859,600**

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22012B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
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Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	5	EA	55,125.00	275,625		105.00	525	525	PUMP	65.83	34,561				310,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	2,937,600 lb full - 19,615 ft³ - D=20.5' - H=82.0' - CS Silo - SS Hopper	Est	1	EA	808,000.00	808,000		2545.52	2,546	2,546	TANK	65.78	167,444				975,400
	Short-Term Storage Silo - (24 Hours)	293,760 lb full - 1,920 ft³ - D=8.5' - H=38.0' - CS Silo - SS Hopper	Est	1	EA	200,000.00	200,000		764.00	764	764	TANK	65.78	50,256				250,300
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	161	161	SPNG	70.4	11,334				17,800
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	50	CY	157.50	7,875		7.00	350	350	CONP	52.91	18,519				26,400
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-4	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-5	**IS SYSTEM SUBTOTAL**						**1,429,593**				**6,704**			**464,542**				**1,894,000**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK DELIVERY	INCLUDED IN SILO	Est	0	Set	315,000.00	0		1753.67	0	0	SPNG	70.4	0				0
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22012B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 6900V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	300	LF	6.25	1,874		0.35	106	106	ECND	49.67	5,245				7,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**871,538**				**3,370**			**188,413**				**1,060,000**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																

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Ghent Unit 4
SO3 Mitigation System
Option 1 - Hydrated Lime
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-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22012B
Project No.: 10584-022
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	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	0	LS	7,350.00	0		300.00	0	0	YDRN	51.97	0				0
MISC-4	OTHER																	
	BLOWER HOUSE																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG. 15'X20'		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
I 6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**75,088**				**1,835**			**116,653**				**191,800**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							150,000				150,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**150,000**				**150,000**
	SUBTOTAL						**2,402,574**			0	**12,238**			**944,258**				**3,346,900**
																		0
	Craft Support During Startup	At 3% of Total Manhours									367	MECH	66.86	24,548				24,500
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																167,300
	Erection Contractor's Profit	At 8% of Material and Labor Costs																267,800
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																12,000
	Freight To Site	At 4.5% of Equipment/Material Cost																108,100
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included

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	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	12,606			968,806				3,926,600
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								392,660
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								873,900
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								5,343,160

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22013B
Project No.: 10584-022
Date: 12/20/2005
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	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	6" THICK INSULATION	Est	200	SF	21.00	4,200		0.27	54	54	DINS	59.32	3,203				7,400
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-6	BOILER MODS																	
	WALL AND TUBE MODS		Est	2	TN	2,625.00	5,250		35.00	70	70	FLDU	89.66	6,276				11,500
DW-7	**DUCTWORK SUBTOTAL**						**34,125**				**399**			**30,926**				**65,100**
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Air Blowers	Not required	Est	3	EA	21,000.00	63,000		40.00	120	120	MECH	66.86	8,023				71,000
	VFD Rotary Feeder	Not required	Est	1	EA	10,500.00	10,500		30.00	30	30	MECH	66.86	2,006				12,500
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	1,617,900 lb full - 17,060 ft3 - D=26.3' - H=31.6' - CS Silo - SS Hopper	Est	1	EA	139,000.00	139,000		580.00	580	580	TANK	65.78	38,152				177,200
	Short-Term Storage Silo - (24 Hours)	Not required	Est	0	EA	0.00	0		60.00	0	0	TANK	65.78	0				0
	Air Compressors (2 Qty)	50 hp - 2 X 100%	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Mixing Tank - 1 Unit - (24 Hours)	808,320 lb full - 8,520 ft3 - D=20.8' - H=25.0' - CS Silo - SS Hopper	Est	1	EA	61,000.00	61,000		880.00	880	880	TANK	65.78	57,886				118,900
	Mixing Tank Agitator (1 Qty)	20 hp - CS Shaft	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Water Storage Tank - 1 Unit (24 Hrs)	125,000 lb full - 2,000 ft3 - D=13.7' - H=13.7' - CS	Est	1	EA	55,500.00	55,500		880.00	880	880	TANK	65.78	57,886				113,400
	Slurry/Water Pumps (6 Qty)	2 hp - CS	Est	6	EA	5,250.00	31,500		20.00	120	120	PUMP	65.83	7,900				39,400
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (20 Qty)	Stainless Steel	Est	1	LT	42,000.00	42,000		96.00	96	96	MECH	66.86	6,419				48,400
	System Piping																	
	1" - CS	Includes fitting allowance	Est	300	LF	2.27	680		0.16	49	49	SPNG	70.4	3,464				4,100
	4" - CS	Includes fitting allowance	Est	50	LF	9.28	464		0.33	17	17	SPNG	70.4	1,162				1,600
	Piping Insulation & Lagging		Est	350	LF	2.99	1,047		0.08	26	26	INSUL	53.39	1,402				2,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	200	LS	840.00	168,000		100.00	20,000	20,000	SPNG	70.4	1,408,000				1,576,000
	Air Supply	Allowance	Est	200	LS	525.00	105,000		80.00	16,000	16,000	SPNG	70.4	1,126,400				1,231,400
	Piping Supports	Allowance	Est	1	LS	2,100.00	2,100		40.00	40	40	SPNG	70.4	2,816				4,900
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	110	CY	157.50	17,325		7.00	770	770	CONP	52.91	40,741				58,100

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
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IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-4	AUGER CAST PILES (120 TON CAPACITY)	90 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-5	**IS SYSTEM SUBTOTAL**						**833,517**				**40,731**			**2,843,955**				**3,677,300**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA						63,000
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
											0							
AP-2	GROUNDING										0							
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE						
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE						
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	300	LF	0.76	227	Routed in 3/4" Conduit	0.05	16	16	WIRE	69.06	1,098				1,300
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE						
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE						
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	50	LF	3.58	179	Routed in 2" Conduit	0.35	18	18	WIRE	69.06	1,209				1,400
	Control Cables - Pumps	5/C #14, 600V	Est	300	LF	0.67	202	Routed in 3/4" Conduit	0.03	10	10	WIRE	69.06	663				900
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE						
	RACEWAY																	
	3/4" Conduit		Est	2,500	LF	2.06	5,145		0.19	485	485	ECND						
	1-1/2" Conduit		Est	100	LF	4.67	467		0.28	28	28	ECND						
	2" Conduit		Est	50	LF	6.25	312		0.35	18	18	ECND						
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND						
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND						

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22013B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
											0							
AP-5	DCS SYSTEM ADDITIONS										0							
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA						
AP-8	DCS PROGRAMMING/INTERFACE										0							
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC						
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL						
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**689,199**				**2,615**			**80,761**				**709,200**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	5,250.00	5,250		1550.00	1,550	1,550	PNTR	55.58	86,149				91,400
MISC-2	ROADWORK	Not Required	Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	100,000.00	100,000		40.00	40	40	STST	86.46	3,458				103,500
MISC-6	TANK BERM		Est	1	LS	76,000.00	76,000		260.00	260	260	STST	86.46	22,480				98,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	35,000.00	35,000		60.00	60	60	STST	86.46	5,188				40,200
MISC-5	**MISC. SUBTOTAL**						**54,538**				**2,155**			**122,239**				**176,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
G	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**1,927,379**			0	**47,514**			**3,297,288**				**5,163,800**
																		0

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SO3 Mitigation System
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Craft Support During Startup	At 3% of Total Manhours									1,425	MECH	66.86	95,303				95,300
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																258,200
	Erection Contractor's Profit	At 8% of Material and Labor Costs																413,100
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																9,600
	Freight To Site	At 4.5% of Equipment/Material Cost																86,700
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	**48,939**			**3,392,592**				**6,026,700**
ENGINEERING / CONSTRUCTION MANAGEMENT		Furnished by Project Team								0								602,700
PERMITTING, MODELING, ETC.										0								0
STARTUP, TESTING AND REAGENT (15 DAYS)										0								50,000
CONTINGENCY		At 20% of Total								0								1,335,900
CLIENT INTERNAL COST		To Be Furnished by Owner								0								100,000
SPARE PARTS										0								Not Included
ESCALATION		Not Included																0
INTEREST DURING CONSTRUCTION (AFUDC)		Not Included																0
	PROJECT TOTAL :									0								**8,115,300**

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22014B
Project No.: 10584-022
Date: 12/20/2005
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
IS-	EQUIPMENT/COMPONENTS																	
	Process Technology Package (PTP) by URS		Est	1	EA	1,800,000.00	1,800,000		20.00	20	20	PUMP	65.83	1,317				1,801,300
	Pumps (6 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	6	EA	2,100.00	12,600		20.00	120	120	PUMP	65.83	7,900				20,500
	Long-Term Storage Silo - Common for 2 Units (10 Days),	420,250 lb full - 5,180 ft^3 - D=17.6' - H=21.2' - SS	Est	1	EA	363,000.00	363,000		535.21	535	535	TANK	65.78	35,206				398,200
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	309,312 lb full - 4,957 ft^3 - D=18.48' - H=18.48' - CS	Est	1	EA	83,000.00	83,000		489.52	490	490	TANK	65.78	32,201				115,200
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Air Compressors (2 Qty)	2 x 100% - 50 HP	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Est	1	LT	21,000.00	21,000		480.00	480	480	MECH	66.86	32,093				53,100
	System Piping	L=250' - D=4" - SS / L=50' - D=4" - CS / L=50' - D=2" - SS																
	6" - SS	Includes fitting allowance	Est	250	LF	30.61	7,652		0.42	105	105	SPNG	70.4	7,392				15,000
	6" - CS	Includes fitting allowance	Est	50	LF	11.89	594		0.42	21	21	SPNG	70.4	1,478				2,100
	4" - SS	Includes fitting allowance	Est	50	LF	24.89	1,244		0.33	17	17	SPNG	70.4	1,162				2,400
	Piping Insulation & Lagging		Est	350	LF	9.14	3,197		0.17	60	60	INSUL	53.39	3,177				6,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	75	CY	157.50	11,813		7.00	525	525	CONP	52.91	27,778				39,600
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-3	ROYALTY FEE	0	Est	0	LF									0				0

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 3 - Soda Ash
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Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22014B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	**IS SYSTEM SUBTOTAL**						**2,446,275**				**3,810**			**253,595**				**2,699,800**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	900	LF	2.12	1,909	Routed in 1-1/2" Conduit	0.09	81	81	WIRE	69.06	5,594				7,500
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	250	LF	2.67	667	Routed in 1-1/2" Conduit	0.35	88	88	WIRE	69.06	6,043				6,700
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	900	LF	0.67	605	Routed in 3/4" Conduit	0.03	29	29	WIRE	69.06	1,989				2,600
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,850	LF	2.06	5,865		0.19	553	553	ECND	49.67	27,463				33,300
	1-1/2" Conduit		Est	1,150	LF	4.67	5,373		0.28	327	327	ECND	49.67	16,222				21,600
	2" Conduit		Est	0	LF	6.25	0		0.35	0	0	ECND	49.67	0				0
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	

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	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**701,985**				**3,135**			**175,156**				**877,400**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
MISC-6	TANK BERM		Est	1	LS	61,000.00	61,000		260.00	260	260	STST	86.46	22,480				83,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	22,000.00	22,000		60.00	60	60	STST	86.46	5,188				27,200
MISC-5	**MISC. SUBTOTAL**						**165,963**				**2,215**			**136,691**				**302,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**3,445,578**			0	**10,743**			**778,373**				**4,224,300**
																		0
	Craft Support During Startup	At 3% of Total Manhours									322	MECH	66.86	21,549				21,500
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22014B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																211,200
	Erection Contractor's Profit	At 8% of Material and Labor Costs																337,900
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																17,200
	Freight To Site	At 4.5% of Equipment/Material Cost																155,100
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	**11,066**			**799,922**				**4,967,200**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								496,700
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,102,800
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**6,716,700**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22015B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/26/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Process Technology Package (PTP). The cost shown here is for a single skid shared by Unit 3 and 4.	P&ID, Control Logic, Injection and metering pump skids, Proprietory injection lances	Budget	1	EA	1,200,000.00	1,200,000		200.00	200	200	MISC	65.83	13,166				1,213,200
	Pumps (0 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP, included in PTP	Est	0	EA	0.00	0		20.00	0	0	PUMP	65.83	0				0
	SBS Solution Tank - 1 Unit (10 Days)	825,400 lb full - 12,100 ft^3 - D=23.4' - H=28.0' - SS	Est	1	EA	221,000.00	221,000		1064.00	1,064	1,064	TANK	65.78	69,990				291,000
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	309,312 lb full - 4,957 ft^3 - D=18.48' - H=18.48' - CS	Est	1	EA	83,000.00	83,000		1514.14	1,514	1,514	TANK	65.78	99,600				182,600
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	10,000.00	10,000		30.00	30	30	MECH	66.86	2,006				12,000
	Air Compressors (2 operating, 1 standby for each Unit)	3 x 100% - 150 HP	Est	3	EA	225,000.00	675,000		120.00	360	360	MECH	66.86	24,070				699,100
	Injection Manifold (2 Qty)	Stainless Steel included in PTP	Est	2	EA	0.00	0		0.00	0	0	MECH	66.86	0				0
	System Piping	L=500' - D=6" - SS / L=400' - D=6" - CS / L=300' - D=4" - SS																
	6" - SS	Includes fitting allowance	Est	500	LF	30.61	15,304		0.42	210	210	SPNG	70.4	14,784				30,100
	6" - CS	Includes fitting allowance	Est	300	LF	11.89	3,566		0.42	126	126	SPNG	70.4	8,870				12,400
	4" - SS	Includes fitting allowance	Est	300	LF	24.89	7,466		0.33	99	99	SPNG	70.4	6,970				14,400
	Piping Insulation & Lagging		Est	500	LF	9.14	4,568		0.17	85	85	INSUL	53.39	4,538				9,100
	Heat Tracing		Est	500	LF	21.00	10,500		0.31	155	155	WIRE	69.06	10,704				21,200
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply piping	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply piping	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
IS-3	STRUCTURAL STEEL	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22015B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/26/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-3	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-4	ROYALTY FEE	Not Included, $ per MW, to be negotiated with Vendor	Est	0	LF									0				0
IS-5	**IS SYSTEM SUBTOTAL**										**6,077**			**421,203**				**2,751,700**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	488,750.00	488,750		500.00	500	500	EHEA	53.92	26,960				515,700
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 150HP	3/C #2, 600V	Est	250	LF	3.58	895	Routed in 2" Conduit	0.35	88	88	WIRE	69.06	6,043				6,900
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	250	LF	6.25	1,562		0.35	88	88	ECND	49.67	4,371				5,900
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22015B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/26/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**731,530**				**2,916**			**164,329**				**895,900**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	PREFAB BLDG.			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-6	TANK BERM		Est	1	LS	61,000.00	61,000		260.00	260	260	STST	86.46	22,480				83,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	37,000.00	37,000		60.00	60	60	STST	86.46	5,188				42,200
MISC-8	**MISC. SUBTOTAL**						**150,963**				**2,215**			**136,691**				**287,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
	GENERAL SUPPORT SUBTOTAL						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**3,331,250**			0	**12,991**			**948,321**				**4,279,700**
																		0
	Craft Support During Startup	At 3% of Total Manhours									390	MECH	66.86	26,057				26,100

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22015B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/26/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																214,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs																342,400
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																16,700
	Freight To Site	At 4.5% of Equipment/Material Cost																149,900
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST								0		13,380			974,377				**5,028,800**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team							0									502,900
	PERMITTING, MODELING, ETC.								0									0
	STARTUP, TESTING AND REAGENT (15 DAYS)								0									50,000
	CONTINGENCY	At 20% of Total							0									1,116,300
	CLIENT INTERNAL COST	Furnished by Owner							0									100,000
	SPARE PARTS								0									Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :								0									**6,798,000**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22016B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	6	EA	55,125.00	330,750		105.00	630	630	PUMP	65.83	41,473				372,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	2,687,900 lb full - 11,610 ft³ - D=20.7' - H=83.0' - CS Silo - SS Hopper	Est	1	EA	590,000.00	590,000		1624.00	1,624	1,624	TANK	65.78	106,827				696,800
	Short-Term Storage Silo - (24 Hours)	268,800 lb full - 1,160 ft³ - D=8.7' - H=39.0' - CS Silo - SS Hopper	Est	1	EA	180,000.00	180,000		120.00	120	120	TANK	65.78	7,894				187,900
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		530.00	1,060	1,060	MECH	66.86	70,872				91,900
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	21,000.00	21,000		540.00	540	540	MECH	66.86	36,104				57,100
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	160	160	SPNG	70.4	11,236				17,700
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-4	**IS SYSTEM SUBTOTAL**						**1,263,518**				**6,402**			**442,027**				**1,705,400**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM	Included in silo	Est	0	Set	105,000.00	0		1254.00	0	0	SPNG	70.4	0				0
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**0**				**0**			**0**				**0**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22016B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	580,000.00	580,000		500.00	500	500	EHEA	53.92	26,960				607,000
	New Breaker at Existing 4160V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 600kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	250	LF	8.40	2,100	Routed in 2" Conduit	0.35	88	88	WIRE	69.06	6,043				8,100
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	900	LF	2.10	1,890	Routed in 1-1/2" Conduit	0.09	81	81	WIRE	69.06	5,594				7,500
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	950	LF	9.45	8,978	Routed in 1-1/2" Conduit	0.50	475	475	WIRE	69.06	32,804				41,800
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2"	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	1,850	LF	4.67	8,644		0.28	525	525	ECND	49.67	26,097				34,700
	2" Conduit		Est	550	LF	6.25	3,436		0.35	194	194	ECND	49.67	9,616				13,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**896,341**				**4,445**			**252,428**				**1,148,900**

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22016B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	BLOWER HOUSE																	
	PREFAB BLDG (15' x 20')			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD MODEL STUDY		Est	1	LS	60,000.00	60,000		40.00	40	40	STST	86.46	3,458				63,500
MISC-6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**112,438**				**2,135**			**132,244**				**244,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**2,298,651**			0	**13,312**			**951,349**				**3,250,100**
																		0
	Craft Support During Startup	At 3% of Total Manhours									399	MECH	66.86	26,701				26,700
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																162,500
	Erection Contractor's Profit	At 8% of Material and Labor Costs																260,000
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22016B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																11,500
	Freight To Site	At 4.5% of Equipment/Material Cost																103,400
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	13,711			978,050				**3,814,200**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								381,400
	PERMITTING, MODELING, ETC.									0								0
	STARTUP REAGENT TESTING (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								849,100
	NT INTERNAL COST	To Be Furnished by Owner								0								100,000
	IE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**5,194,700**

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22017B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT FOR WESP AND TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	0	TN	2,500.00	0		35.00	0	0	FLDU	89.66	0				0
	INSULATION & LAGGING		Est	0	SF	8.00	0		0.27	0	0	DINS	59.32	0				0
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	0	TN	1,800.00	0		16.00	0	0	STST	86.46	0				0
	ACCESS & GALLERIES		Est	0	SF	30.00	0		0.40	0	0	GALL	71.2	0				0
DW-5	FOUNDATIONS																	
	FOUNDATIONS FOR DUCTWORK AND STRUCTURAL STEEL	INCLUDES EXCAVATION & BACKFILL	Est	0	CY	150.00	0		7.00	0	0	CONP	52.91	0				0
DW-6	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
DW-8	**DUCTWORK SUBTOTAL**						**0**				**0**			**0**				**0**
	WESP & ASSOCIATED EQUIP																	
WE-1	EQUIPMENT/COMPONENTS																	
WE-2	WESP (One ESP boxes, with three fields, 6 feet long, total 150 SCA. All internal 2205, with 2205 carbon steel clad alloy plate construction)	INCLUDES ALL ASSOCIATED DUCTWORK AND WASTE WATER EQUIPMENT.PIPING AND TANKS	Est	1	EA	28,945,000.00	28,945,000	BUDGETARY INPUT FROM VENDORS	76901	76,901	76,901	PREC	86.72	6,668,871				35,613,900
WE-3	Chimney Liner Adjustment	RETURN TO EXISTING CHIMNEY	Est	0	LF	-5302.50	0		-55	0	0	PREC	86.72	0				0
WE-4	Chimney Breaching Adjustment	NONE	Est	0	LS	0.00	0		0	0	0	PREC	86.72	0				0
WE-5	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	210	CY	157.50	33,075		7.00	1,470	1,470	CONP	52.91	77,778				110,900
WE-6	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
WE-7	FIBERGLASS DUCT			50	LF	7,200.00	360,000		50.00	2,500	2,500	DUCT	82.81	207,025				567,000
WE-8	**WE SYSTEM SUBTOTAL**						**29,338,075**				**80,871**			**6,953,674**				**36,291,800**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	2	EA	575,000.00	1,150,000		500.00	1,000	1,000	EHEA	53.92	53,920				1,203,900
	New Breaker at Existing 13.2kV Switchgear		Est	2	EA	63,000.00	126,000		100.00	200	200	EHEA	53.92	10,784				136,800
	MCC		Est	2	EA	52,500.00	105,000		240.00	480	480	EHEA	53.92	25,882				130,900

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Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22017B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
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Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Misc Electrical Equipment & Controls		Est	1	LS	86,100.00	86,100		504.00	504	504	EHEA	53.92	27,176				113,300
AP-2	GROUNDING																	0
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	0	LF	14.70	0	Routed in 3" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	1,000	LF	8.40	8,400	Routed in 2" Conduit	0.35	350	350	WIRE	69.06	24,171				32,600
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	3,600	LF	6.30	22,680	Routed in 1-1/2" Conduit	0.52	1,872	1,872	WIRE	69.06	129,280				152,000
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	0	LF	0.76	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	1,500	LF	1.58	2,363	Routed in 3/4" Conduit	0.05	80	80	WIRE	69.06	5,490				7,900
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	0	LF	2.67	0	Routed in 1-1/2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	1,500	LF	0.67	1,008	Routed in 3/4" Conduit	0.03	48	48	WIRE	69.06	3,315				4,300
	Control Cables - TR Sets	7/C #14, 600V	Est	3,600	LF	0.81	2,911	Routed in 1-1/2" Conduit	0.04	144	144	WIRE	69.06	9,945				12,900
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	4,750	LF	2.06	9,776		0.19	922	922	ECND	49.67	45,771				55,500
	1-1/2" Conduit		Est	3,600	LF	4.67	16,821		0.28	1,022	1,022	ECND	49.67	50,783				67,600
	2" Conduit		Est	1,000	LF	6.25	6,248		0.35	352	352	ECND	49.67	17,484				23,700
	3" Conduit		Est	0	LF	13.13	0		0.65	0	0	ECND	49.67	0				0
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**1,609,556**				**7,569**			**441,458**				**2,051,200**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	87150.00	87,150		3250.00	3,250	3,250	PNTR	55.58	180,635				267,800

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Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22017B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
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Preparer:
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	1	LS	46000.00	46,000		380.00	380	380	PBIT	62.43	23,723				69,700
MISC-3	STORM DRAINAGE		Est	1	LS	7350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
MISC-5	**MISC. SUBTOTAL**						**140,500**				**3,930**			**219,949**				**360,400**
MISC-1	PAINTING	Touch-up and Field Finish	Est	0	LS		0		3250.00	0	0	PNTR	55.58	0				0
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	0	LS		0		475.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	0	LS		0		538.43	0	0	YDRN	51.97	0				0
MISC-4	OTHER																	
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-5	**MISC. SUBTOTAL**						**0**				**40**			**3,458**				**3,500**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	CRANE RENTAL	700 Ton - 4 months	Est	1	LT		0	Includes freight in and out						480,000				480,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**580,000**				**580,000**
	SUBTOTAL						**31,088,131**			0	**92,410**			**8,198,540**				**39,286,900**
	Craft Support During Startup	At 3% of Total Manhours									2,772	MECH	66.86	185,357				0 185,400
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs - WESP																517,100
	Erection Contractor's Profit	At 8% of Material and Labor Costs - WESP																827,400
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																155,400

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 6 - Vertical Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.:	22017B
Project No.:	10584-022
Date:	12/20/2005
Rev Date	1/27/2006
Run Date:	1/27/2006
Preparer:	
Reviewer:	

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Freight To Site	At 4.5% of Equipment/Material Cost																1,399,000
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	95,183			8,383,896				**42,371,200**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								1,906,700
	PERMITTING, MODELING, ETC.									0								0
	STARTUP AND TESTING									0								100,000
	CONTINGENCY	At 20% of Total								0								8,875,600
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								200,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**53,453,500**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22018B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS	COSTS																
	WESP & ASSOCIATED EQUIP																	
WE-1	WESP (Two ESP boxes, with 29 feet three fields, 9 feet long 1st field at 9.75" spacing with 76 gas passages, and 11 feet long 2nd and 3rd fields at 11.75" spacing with 64 passages, total 170 SCA. All internal 2205, with 2205 carbon steel clad alloy plate construction)	INCLUDES ALL ASSOCIATED DUCTWORK AND WASTE WATER EQUIPMENT,PIPING AND TANKS	Est	1	EA	31,570,000.00	31,570,000	BUDGETARY INPUT FROM VENDOR	142817	142,817	142,817	PREC	86.72	12,385,047				43,955,000
WE-2	Chimney Liner Adjustment (WITH MODIFIED BREECHING AT WESP OUTLET ELEVATION)	RETURN TO EXISTING BREECHING	Est	0	LF	5,302.50	0		55	0	0	PREC	86.72	0				0
WE-3	Chimney Breaching Adjustment		Est	0	LS	21,000.00	0		220	0	0	PREC	86.72	0				0
4	Electrical Building	20'x40'	Est	1	EA	21,000.00	21,000		100.00	100	100	STST	86.46	8,646				29,600
WE-5	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	810	CY	157.50	127,575		7.00	5,670	5,670	CONP	52.91	300,000				427,600
WE-6	STRUCTURAL STEEL		Est	170	TN	2,200.00	374,000		16.00	2,720	2,720	STST	86.46	235,171				609,200
WE-7	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,000	LF	10.00	20,000		0.52	1,040	1,040	PILE	82.81	86,122				106,100
WE-7	FIBER GLASS DUCT 23' DIA		Est	450	LF	7,200.00	3,240,000		50.00	22,500	22,500	DUCT	59.32	1,334,700				4,574,700
WE-8	**WE SYSTEM SUBTOTAL**						**35,352,575**				**174,847**			**14,349,686**				**49,702,200**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	52,500.00	105,000		240.00	480	480	EHEA	53.92	25,882				130,900
	Misc Electrical Equipment & Controls		Est	1	LS	86,100.00	86,100		324.00	324	324	EHEA	53.92	17,470				103,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	0	LF	14.70	0	Routed in 3" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	1,000	LF	8.40	8,400	Routed in 2" Conduit	0.35	350	350	WIRE	69.06	24,171				32,600
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	2,400	LF	6.30	15,120	Routed in 1-1/2" Conduit	0.52	1,248	1,248	WIRE	69.06	86,187				101,300
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	0	LF	0.76	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	1,500	LF	1.58	2,363	Routed in 3/4" Conduit	0.05	80	80	WIRE	69.06	5,490				7,900
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE	69.06	0				0

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22018B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	0	LF	2.67	0	Routed in 1-1/2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	1,500	LF	0.67	1,008	Routed in 3/4" Conduit	0.03	48	48	WIRE	69.06	3,315				4,300
	Control Cables - TR Sets	7/C #14, 600V	Est	2,400	LF	0.81	1,940	Routed in 1-1/2" Conduit	0.04	96	96	WIRE	69.06	6,630				8,600
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	4,750	LF	2.06	9,776		0.19	922	922	ECND	49.67	45,771				55,500
	1-1/2" Conduit		Est	2,400	LF	4.67	11,214		0.28	682	682	ECND	49.67	33,855				45,100
	2" Conduit		Est	1,000	LF	6.25	6,248		0.35	352	352	ECND	49.67	17,484				23,700
	3" Conduit		Est	0	LF	13.13	0		0.65	0	0	ECND	49.67	0				0
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-6	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**957,418**				**5,776**			**336,065**				**1,293,700**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	87,150.00	87,150		3250.00	3,250	3,250	PNTR	55.58	180,635				267,800
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	1	LS	45,937.50	45,938		380.00	380	380	PBIT	62.43	23,723				69,700
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-5	**MISC. SUBTOTAL**						**140,438**				**3,970**			**223,408**				**363,900**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Ghent Unit 4
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 22018B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
GS-2	CRANE RENTAL	700 Ton - 2 months	Est	1	LT		0	Includes freight in and out						310,000				310,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**410,000**				**410,000**
	SUBTOTAL						**36,450,431**			0	**184,593**			**15,319,159**				**51,769,800**
																		0
	Craft Support During Startup	At 3% of Total Manhours									5,538	MECH	66.86	370,256				370,300
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs - WESP																1,010,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs - WESP																1,616,000
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																182,300
	Freight To Site	At 4.5% of Equipment/Material Cost																1,640,300
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	**190,131**			**15,689,415**				**56,588,700**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								2,546,000
	PERMITTING, MODELING, ETC.									0								0
	STARTUP AND TESTING									0								100,000
	CONTINGENCY	At 20% of Total								0								11,846,900
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								200,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**71,281,600**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21984B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
IS	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	5	EA	55,125.00	275,625		105.00	525	525	PUMP	65.83	34,561				310,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	2,020,600 lb full - 13,492 ft^3 - D=16.3' - H=65.2' - CS Silo - SS Hopper	Est	1	EA	645,000.00	645,000		2545.52	2,546	2,546	TANK	65.78	167,444				812,400
	Short-Term Storage Silo Common for Units 3 and 4- (24 Hours)	202,100 lb full - 1,350 ft^3 - D=7.5' - H=30.0' - CS Silo - SS Hopper	Est	1	EA	162,000.00	162,000		764.00	764	764	TANK	65.78	50,256				212,300
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	161	161	SPNG	70.4	11,334				17,800
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	50	CY	157.50	7,875		7.00	350	350	CONP	52.91	18,519				26,400
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-4	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-5	**IS SYSTEM SUBTOTAL**						**1,228,593**				**6,704**			**464,542**				**1,693,000**
	MATERIAL UNLOADING SYSTEM																	
	TRUCK DELIVERY	INCLUDED IN SILO	Est	0	Set	315,000.00	0		1753.67	0	0	SPNG	70.4	0				0
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21984B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 6900V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	300	LF	6.25	1,874		0.35	106	106	ECND	49.67	5,245				7,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**871,538**				**3,370**			**188,413**				**1,060,000**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21984B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	0	LS	7,350.00	0		300.00	0	0	YDRN	51.97	0				0
MISC-4	OTHER																	
	BLOWER HOUSE																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG. 15'X20'		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
MISC-6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**75,088**				**1,835**			**116,653**				**191,800**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							150,000				150,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**150,000**				**150,000**
	SUBTOTAL						**2,201,574**			0	**12,238**			**944,258**				**3,145,900**
																		0
	Craft Support During Startup	At 3% of Total Manhours									367	MECH	66.86	24,548				24,500
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																157,300
	Erection Contractor's Profit	At 8% of Material and Labor Costs																251,700
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																11,000
	Freight To Site	At 4.5% of Equipment/Material Cost																99,100

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SO3 Mitigation System
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	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	12,606			968,806				3,689,500
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								368,950
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								821,700
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								5,030,150

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21985B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	6" THICK INSULATION	Est	200	SF	21.00	4,200		0.27	54	54	DINS	59.32	3,203				7,400
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-6	BOILER MODS																	
	WALL AND TUBE MODS		Est	2	TN	2,625.00	5,250		35.00	70	70	FLDU	89.66	6,276				11,500
	DUCTWORK SUBTOTAL						**34,125**				**399**			**30,926**				**65,100**
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Air Blowers	15 hp each	Est	3	EA	21,000.00	63,000		40.00	120	120	MECH	66.86	8,023				71,000
	VFD Rotary Feeder	3 hp -Stainless steel	Est	1	EA	10,500.00	10,500		30.00	30	30	MECH	66.86	2,006				12,500
	Long-Term Storage Tank - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	1,617,900 lb full - 17,060 ft3 - D=26.3' - H=31.6' - CS	Est	1	EA	151,000.00	151,000		580.00	580	580	TANK	65.78	38,152				189,200
	Short-Term Storage Silo - (24 Hours)	Not required	Est	0	EA	10,500.00	0		60.00	0	0	TANK	65.78	0				0
	Air Compressors (2 Qty)	50 hp - 2 X 100%	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Mixing Tank - 1 Unit - (24 Hours)	808,320 lb full - 8,520 ft3 - D=20.8' - H=25.0'	Est	1	EA	63,000.00	63,000		880.00	880	880	TANK	65.78	57,886				120,900
	Mixing Tank Agitator (1 Qty)	20 hp - CS Shaft	Est	2	EA	21,000.00	42,000		30.00	60	60	MECH	66.86	4,012				46,000
	Water Storage Tank - 1 Unit (24 Hrs)	125,000 lb full - 2,000 ft3 - D=13.7' - H=13.7' - CS	Est	1	EA	46,000.00	46,000		880.00	880	880	TANK	65.78	57,886				103,900
	Slurry/Water Pumps (6 Qty)	2 hp - CS	Est	6	EA	5,250.00	31,500		20.00	120	120	PUMP	65.83	7,900				39,400
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (20 Qty)	Stainless Steel	Est	1	LT	42,000.00	42,000		96.00	96	96	MECH	66.86	6,419				48,400
	System Piping																	
	1" - CS	Includes fitting allowance	Est	300	LF	2.27	680		0.16	49	49	SPNG	70.4	3,464				4,100
	4" - CS	Includes fitting allowance	Est	50	LF	9.28	464		0.33	17	17	SPNG	70.4	1,162				1,600
	Piping Insulation & Lagging		Est	350	LF	2.99	1,047		0.08	26	26	INSUL	53.39	1,402				2,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	200	LS	840.00	168,000		100.00	20,000	20,000	SPNG	70.4	1,408,000				1,576,000
	Air Supply	Allowance	Est	200	LS	525.00	105,000		80.00	16,000	16,000	SPNG	70.4	1,126,400				1,231,400
	Piping Supports	Allowance	Est	1	LS	2,100.00	2,100		40.00	40	40	SPNG	70.4	2,816				4,900
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	110	CY	157.50	17,325		7.00	770	770	CONP	52.91	40,741				58,100
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21985B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	AUGER CAST PILES (120 TON CAPACITY)	90 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-5	**IS SYSTEM SUBTOTAL**						**859,017**				**40,761**			**2,845,961**				**3,704,800**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA						63,000
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
											0							
AP-2	GROUNDING										0							
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE						
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE						
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	300	LF	0.76	227	Routed in 3/4" Conduit	0.05	16	16	WIRE	69.06	1,098				1,300
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE						
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE						
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	50	LF	3.58	179	Routed in 2" Conduit	0.35	18	18	WIRE	69.06	1,209				1,400
	Control Cables - Pumps	5/C #14, 600V	Est	300	LF	0.67	202	Routed in 3/4" Conduit	0.03	10	10	WIRE	69.06	663				900
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE						
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,500	LF	2.06	5,145		0.19	485	485	ECND						
	1-1/2" Conduit		Est	100	LF	4.67	467		0.28	28	28	ECND						
	2" Conduit		Est	50	LF	6.25	312		0.35	18	18	ECND						
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND						
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND						
											0							
AP-5	DCS SYSTEM ADDITIONS										0							

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Chicago

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
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Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21985B
Project No.: 10584-022
Date: 12/20/2005
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	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA						
											0							
AP-8	DCS PROGRAMMING/INTERFACE										0							
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC						
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
											0							
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL						
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**689,199**				**2,615**			**80,761**				**709,200**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	5,250.00	5,250		1550.00	1,550	1,550	PNTR	55.58	86,149				91,400
MISC-2	ROADWORK	Not Required	Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	100,000.00	100,000		40.00	40	40	STST	86.46	3,458				103,500
MISC-6	TANK BERM		Est	1	LS	65,000.00	65,000		260.00	260	260	STST	86.46	22,480				87,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	25,000.00	25,000		60.00	60	60	STST	86.46	5,188				30,200
MISC-5	**MISC. SUBTOTAL**						**54,538**				**2,155**			**122,239**				**176,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**1,931,879**			0	**47,544**			**3,299,294**				**5,170,300**
																		0
	Craft Support During Startup	At 3% of Total Manhours									1,426	MECH	66.86	95,364				95,400
	Allowance for Premium Time Labor																	Not Included

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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																258,500
	Erection Contractor's Profit	At 8% of Material and Labor Costs																413,600
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																9,700
	Freight To Site	At 4.5% of Equipment/Material Cost																86,900
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	48,970			3,394,658				6,034,400
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								603,400
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,337,600
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								8,125,400

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21986B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Process Technology Package (PTP) by URS		Est	1	EA	1,800,000.00	1,800,000		300.00	300	300	PUMP	65.83	19,749				1,819,700
	Pumps (6 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	6	EA	2,100.00	12,600		20.00	120	120	PUMP	65.83	7,900				20,500
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	420,250 lb full - 5,180 ft^3 - D=17.6' - H=21.2' - SS	Est	1	EA	151,000.00	151,000		535.21	535	535	TANK	65.78	35,206				186,200
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	309,312 lb full - 4,957 ft^3 - D=18.48' - H=18.48' - CS	Est	1	EA	39,375.00	39,375		489.52	490	490	TANK	65.78	32,201				71,600
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Air Compressors (2 Qty)	2 x 100% - 50 HP	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Est	1	LT	21,000.00	21,000		480.00	480	480	MECH	66.86	32,093				53,100
	System Piping	L=250' - D=4" - SS / L=50' - D=4" - CS / L=50' - D=2" - SS																
	6" - SS	Includes fitting allowance	Est	250	LF	30.61	7,652		0.42	105	105	SPNG	70.4	7,392				15,000
	6" - CS	Includes fitting allowance	Est	50	LF	11.89	594		0.42	21	21	SPNG	70.4	1,478				2,100
	4" - SS	Includes fitting allowance	Est	50	LF	24.89	1,244		0.33	17	17	SPNG	70.4	1,162				2,400
	Piping Insulation & Lagging		Est	350	LF	9.14	3,197		0.17	60	60	INSUL	53.39	3,177				6,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	75	CY	157.50	11,813		7.00	525	525	CONP	52.91	27,778				39,600
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-3	ROYALTY FEE	0	Est	0	LF									0				0

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Louisville Gas & Electric
Mill Creek Unit 3
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-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21986B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
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Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	**IS SYSTEM SUBTOTAL**						**2,190,650**				**4,090**			**272,027**				**2,462,600**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	0	LF	6.25	0		0.35	0	0	ECND	49.67	0				0
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
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-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21986B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**693,130**				**2,558**			**143,552**				**836,900**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
I 2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	**MISC. SUBTOTAL**						**52,963**				**1,855**			**105,565**				**158,500**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**3,068,098**			0	**10,087**			**734,076**				**3,802,400**
																		0
	Craft Support During Startup	At 3% of Total Manhours									303	MECH	66.86	20,232				20,200
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																190,100
	Erection Contractor's Profit	At 8% of Material and Labor Costs																304,200
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 3 - Soda Ash
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	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																15,300
	Freight To Site	At 4.5% of Equipment/Material Cost																138,100
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	10,389			754,308				**4,470,300**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								447,000
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								993,500
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**6,060,800**

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Chicago

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21987B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Process Technology Package (PTP). The cost shown here is for a single skid shared by Unit 3 and 4.	P&ID, Control Logic, Injection and metering pump skids, Proprietory injection lances	Budget	1	EA	1,800,000.00	1,800,000		200.00	200	200	PUMP	65.83	13,166				1,213,200
	Pumps (6 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	6	EA	2,100.00	12,600		20.00	120	120	PUMP	65.83	7,900				20,500
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	825,400 lb full - 12,100 ft^3 - D=16.2' - H=20.0' - SS	Est	1	EA	605,000.00	605,000		1064.00	1,064	1,064	TANK	65.78	69,990				675,000
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	Included in Soft water Supply System	Est	0	EA	0.00	0		0.00	0	0	TANK	65.78	0				0
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	0	EA	21,000.00	0		0.00	0	0	MECH	66.86	0				0
	Air Compressors (2 Qty)	2 x 100% - 150 HP	Est	3	EA	275,000.00	825,000		80.00	240	240	MECH	66.86	16,046				841,000
	Injection Manifold (2 Qty)	Stainless Steel	Est	0	EA	10,500.00	0		0.00	0	0	MECH	66.86	0				0
	Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Est	0	LT	21,000.00	0		0.00	0	0	MECH	66.86	0				0
	System Piping	L=250' - D=4" - SS / L=50' - D=4" - CS / L=50' - D=2" - SS																
	6" - SS	Includes fitting allowance	Est	250	LF	30.61	7,652		0.42	105	105	SPNG	70.4	7,392				15,000
	6" - CS	Includes fitting allowance	Est	50	LF	11.89	594		0.42	21	21	SPNG	70.4	1,478				2,100
	4" - SS	Includes fitting allowance	Est	50	LF	24.89	1,244		0.33	17	17	SPNG	70.4	1,162				2,400
	Piping Insulation & Lagging		Est	350	LF	9.14	3,197		0.17	60	60	INSUL	53.39	3,177				6,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
IS-3	STRUCTURAL STEEL	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700

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Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21987B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	ROYALTY FEE	Not Included, $ per MW, to be negotiated with Vendor	Est	0	LF									0				0
IS-5	**IS SYSTEM SUBTOTAL**						**3,349,638**				**4,369**			**307,475**				**3,057,000**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 150HP	3/C #250kcmil, 600V	Est	100	LF	1,980.00	198,000	Routed in 2" Conduit	0.35	35	35	WIRE	69.06	2,417				200,400
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	100	LF	6.25	625		0.35	35	35	ECND	49.67	1,748				2,400
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21987B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**891,755**				**2,629**			**147,718**				**1,039,700**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	PREFAB BLDG.			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-6	TANK BERM		Est	1	LS	87,000.00	87,000		260.00	260	260	STST	86.46	22,480				109,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	27,000.00	27,000		60.00	60	60	STST	86.46	5,188				32,200
MISC-8	**MISC. SUBTOTAL**						**166,963**				**2,215**			**136,691**				**303,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**4,539,710**			0	**10,795**			**804,815**				**4,744,800**
																		0
	Craft Support During Startup	At 3% of Total Manhours									324	MECH	66.86	21,653				21,700
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21987B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																237,200
	Erection Contractor's Profit	At 8% of Material and Labor Costs																379,600
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																22,700
	Freight To Site	At 4.5% of Equipment/Material Cost																204,300
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	11,119			826,468				5,610,300
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								561,000
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,244,300
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								7,565,600

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21988B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	6	EA	55,125.00	330,750		105.00	630	630	PUMP	65.83	41,473				372,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	2,687,900 lb full - 11,610 ft^3 - D=20.7' - H=83.0' - CS Silo - SS Hopper	Est	1	EA	590,000.00	590,000		1624.00	1,624	1,624	TANK	65.78	106,827				696,800
	Short-Term Storage Silo - (24 Hours)	268,800 lb full - 1,160 ft^3 - D=8.7' - H=39.0' - CS Silo - SS Hopper	Est	1	EA	180,000.00	180,000		120.00	120	120	TANK	65.78	7,894				187,900
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	160	160	SPNG	70.4	11,236				17,700
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-4	**IS SYSTEM SUBTOTAL**						**1,253,018**				**5,522**			**383,190**				**1,636,000**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM	Included in silo	Est	0	Set	105,000.00	0		1254.00	0	0	SPNG	70.4	0				0
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**0**				**0**			**0**				**0**

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21988B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	570,000.00	570,000		4228.49	4,228	4,228	EHEA	53.92	228,000				798,000
	New Breaker at Existing 4160V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		1418.55	1,419	1,419	EHEA	53.92	76,488				137,400
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 600kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	250	LF	8.40	2,100	Routed in 2" Conduit	0.35	88	88	WIRE	69.06	6,043				8,100
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	950	LF	2.10	1,995	Routed in 1-1/2" Conduit	0.09	86	86	WIRE	69.06	5,905				7,900
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2"	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	1,100	LF	4.67	5,140		0.28	312	312	ECND	49.67	15,517				20,700
	2" Conduit		Est	550	LF	6.25	3,436		0.35	194	194	ECND	49.67	9,616				13,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
/	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**875,382**				**8,684**			**475,887**				**1,351,400**

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

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Date: 12/20/2005
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	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	BLOWER HOUSE																	
	PREFAB BLDG (15' x 20')			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
MISC-6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**82,438**				**2,135**			**132,244**				**214,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**2,237,192**			0	**16,670**			**1,115,972**				**3,353,200**
	Craft Support During Startup	At 3% of Total Manhours									500	MECH	66.86	33,437				0 33,400
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																167,700
	Erection Contractor's Profit	At 8% of Material and Labor Costs																268,300
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.:	21988B
Project No.:	10584-022
Date:	12/20/2005
Rev Date	1/27/2006
Run Date:	1/27/2006
Preparer:	
Reviewer:	

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																11,200
	Freight To Site	At 4.5% of Equipment/Material Cost																100,700
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	17,170			1,149,409				**3,934,500**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								393,500
	PERMITTING, MODELING, ETC.									0								0
	STARTUP REAGENT TESTING (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								875,600
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								100,000
	E PARTS									0								Not Included
	LATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**5,353,600**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21990B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS	COSTS																
	WESP & ASSOCIATED EQUIP																	
WE-1	WESP (Two ESP boxes, with 29 feet three fields, 9 feet long 1st field at 9.75" spacing with 76 gas passages, and 11 feet long 2nd and 3rd fields at 11.75" spacing with 64 passages, total 170 SCA. All internal 2205, with 2205 carbon steel clad alloy plate construction)	INCLUDES ALL ASSOCIATED DUCTWORK AND WASTE WATER EQUIPMENT,PIPING AND TANKS	Est	1	EA	31,570,000.00	31,570,000	BUDGETARY INPUT FROM VENDOR	142817	142,817	142,817	PREC	86.72	12,385,047				43,955,000
WE-2	Chimney Liner Adjustment (WITH MODIFIED BREECHING AT WESP OUTLET ELEVATION)	RETURN TO EXISTING BREECHING	Est	0	LF	5,302.50	0		55	0	0	PREC	86.72	0				0
WE-3	Chimney Breaching Adjustment		Est	0	LS	21,000.00	0		220	0	0	PREC	86.72	0				0
	Electrical Building	20'x40'	Est	1	EA	21,000.00	21,000		100.00	100	100	STST	86.46	8,646				29,600
WE-5	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	810	CY	157.50	127,575		7.00	5,670	5,670	CONP	52.91	300,000				427,600
WE-6	STRUCTURAL STEEL		Est	170	TN	2,200.00	374,000		16.00	2,720	2,720	STST	86.46	235,171				609,200
WE-7	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,000	LF	10.00	20,000		0.52	1,040	1,040	PILE	82.81	86,122				106,100
WE-7	FIBER GLASS DUCT 23' DIA		Est	450	LF	7,200.00	3,240,000		50.00	22,500	22,500	DUCT	59.32	1,334,700				4,574,700
WE-8	**WE SYSTEM SUBTOTAL**						**35,352,575**				**174,847**			**14,349,686**				**49,702,200**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	52,500.00	105,000		240.00	480	480	EHEA	53.92	25,882				130,900
	Misc Electrical Equipment & Controls		Est	1	LS	86,100.00	86,100		324.00	324	324	EHEA	53.92	17,470				103,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	0	LF	14.70	0	Routed in 3" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	1,000	LF	8.40	8,400	Routed in 2" Conduit	0.35	350	350	WIRE	69.06	24,171				32,600
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	2,400	LF	6.30	15,120	Routed in 1-1/2" Conduit	0.52	1,248	1,248	WIRE	69.06	86,187				101,300
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	0	LF	0.76	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	1,500	LF	1.58	2,363	Routed in 3/4" Conduit	0.05	80	80	WIRE	69.06	5,490				7,900
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE	69.06	0				0

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21990B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	0	LF	2.67	0	Routed in 1-1/2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	1,500	LF	0.67	1,008	Routed in 3/4" Conduit	0.03	48	48	WIRE	69.06	3,315				4,300
	Control Cables - TR Sets	7/C #14, 600V	Est	2,400	LF	0.81	1,940	Routed in 1-1/2" Conduit	0.04	96	96	WIRE	69.06	6,630				8,600
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	4,750	LF	2.06	9,776		0.19	922	922	ECND	49.67	45,771				55,500
	1-1/2" Conduit		Est	2,400	LF	4.67	11,214		0.28	682	682	ECND	49.67	33,855				45,100
	2" Conduit		Est	1,000	LF	6.25	6,248		0.35	352	352	ECND	49.67	17,484				23,700
	3" Conduit		Est	0	LF	13.13	0		0.65	0	0	ECND	49.67	0				0
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**957,418**				**5,776**			**336,065**				**1,293,700**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	87,150.00	87,150		3250.00	3,250	3,250	PNTR	55.58	180,635				267,800
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	1	LS	45,937.50	45,938		380.00	380	380	PBIT	62.43	23,723				69,700
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
MISC-5	PHYSICAL MODEL STUDY		Est	1	LS	120,000.00	120,000		40.00	40	40	STST	86.46	3,458				123,500
MISC-5	**MISC. SUBTOTAL**						**260,438**				**3,970**			**223,408**				**483,900**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 3
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21990B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
GS-2	CRANE RENTAL	700 Ton - 2 months	Est	1	LT		0	Includes freight in and out						310,000				310,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**410,000**				**410,000**
	SUBTOTAL						**36,570,431**			0	**184,593**			**15,319,159**				**51,889,800**
																		0
	Craft Support During Startup	At 3% of Total Manhours									5,538	MECH	66.86	370,256				370,300
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs - WESP																1,016,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs - WESP																1,625,600
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																182,900
	Freight To Site	At 4.5% of Equipment/Material Cost																1,645,700
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	**190,131**			**15,689,415**				**56,730,300**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								2,553,000
	PERMITTING, MODELING, ETC.									0								0
	STARTUP AND TESTING									0								100,000
	CONTINGENCY	At 20% of Total								0								11,876,700
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								200,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**71,460,000**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on:	Louisville, KY
Labor Productivity =	1

Estimate No.:	21991B
Project No.:	10584-022
Date:	12/20/2005
Rev Date	1/27/2006
Run Date:	1/27/2006
Preparer:	
Reviewer:	

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS																	
	INSULATION & LAGGING	3 1/2" INSUL	Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
			Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL																	
	ACCESS & GALLERIES		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
			Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	5	EA	55,125.00	275,625		105.00	525	525	PUMP	65.83	34,561				310,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	2,937,600 lb full - 19,615 ft³ - D=20.5' - H=82.0' - CS Silo - SS Hopper	Est	1	EA	808,000.00	808,000		2545.52	2,546	2,546	TANK	65.78	167,444				975,400
	Short-Term Storage Silo - (24 Hours)	293,760 lb full - 1,920 ft³ - D=8.5' - H=38.0' - CS Silo - SS Hopper	Est	1	EA	200,000.00	200,000		764.00	764	764	TANK	65.78	50,256				250,300
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	161	161	SPNG	70.4	11,334				17,800
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	50	CY	157.50	7,875		7.00	350	350	CONP	52.91	18,519				26,400
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-4	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-5	**IS SYSTEM SUBTOTAL**						**1,429,593**				**6,704**			**464,542**				**1,894,000**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK DELIVERY	INCLUDED IN SILO	Est	0	Set	315,000.00	0		1753.67	0	0	SPNG	70.4	0				0
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.: 21991B
Project No.: 10584-022
Date: 12/20/2005
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Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 6900V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	300	LF	6.25	1,874		0.35	106	106	ECND	49.67	5,245				7,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**871,538**				**3,370**			**188,413**				**1,060,000**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21991B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	0	LS	7,350.00	0		300.00	0	0	YDRN	51.97	0				0
MISC-4	OTHER																	
	BLOWER HOUSE																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG. 15'X20'		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
MISC-6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**75,088**				**1,835**			**116,653**				**191,800**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							150,000				150,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**150,000**				**150,000**
	SUBTOTAL						**2,402,574**			0	**12,238**			**944,258**				**3,346,900**
																		0
	Craft Support During Startup	At 3% of Total Manhours									367	MECH	66.86	24,548				24,500
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																167,300
	Erection Contractor's Profit	At 8% of Material and Labor Costs																267,800
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																12,000
	Freight To Site	At 4.5% of Equipment/Material Cost																108,100
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included

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Mill Creek Unit 4
SO3 Mitigation System
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	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	12,606			968,806				3,926,600
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								392,660
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								873,900
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								5,343,160

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Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.:	21992B
Project No.:	10584-022
Date:	12/20/2005
Rev Date	1/27/2006
Run Date:	1/27/2006
Preparer:	
Reviewer:	

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	6" THICK INSULATION	Est	200	SF	21.00	4,200		0.27	54	54	DINS	59.32	3,203				7,400
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-6	BOILER MODS																	
	WALL AND TUBE MODS		Est	2	TN	2,625.00	5,250		35.00	70	70	FLDU	89.66	6,276				11,500
DW-7	**DUCTWORK SUBTOTAL**						**34,125**				**399**			**30,926**				**65,100**
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Air Blowers	15 hp each	Est	3	EA	21,000.00	63,000		40.00	120	120	MECH	66.86	8,023				71,000
	VFD Rotary Feeder	3 hp -Stainless steel	Est	1	EA	10,500.00	10,500		30.00	30	30	MECH	66.86	2,006				12,500
	Long-Term Storage Tank - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	1,617,900 lb full - 17,060 ft3 - D=26.3' - H=31.6' -	Est	1	EA	151,000.00	151,000		580.00	580	580	TANK	65.78	38,152				189,200
	Short-Term Storage Silo - (24 Hours)	Not required	Est	0	EA	0.00	0		60.00	0	0	TANK	65.78	0				0
	Air Compressors (2 Qty)	50 hp - 2 X 100%	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Mixing Tank - 1 Unit - (24 Hours)	808,320 lb full - 8,520 ft3 - D=20.8' - H=25.0' - CS Silo - SS Hopper	Est	1	EA	122,000.00	122,000		880.00	880	880	TANK	65.78	57,886				179,900
	Mixing Tank Agitator (1 Qty)	20 hp - CS Shaft	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Water Storage Tank - 1 Unit (24 Hrs)	125,000 lb full - 2,000 ft3 - D=13.7' - H=13.7' - CS	Est	1	EA	115,500.00	115,500		880.00	880	880	TANK	65.78	57,886				173,400
	Slurry/Water Pumps (6 Qty)	2 hp - CS	Est	6	EA	5,250.00	31,500		20.00	120	120	PUMP	65.83	7,900				39,400
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (20 Qty)	Stainless Steel	Est	1	LT	42,000.00	42,000		96.00	96	96	MECH	66.86	6,419				48,400
	System Piping																	
	1" - CS	Includes fitting allowance	Est	300	LF	2.27	680		0.16	49	49	SPNG	70.4	3,464				4,100
	4" - CS	Includes fitting allowance	Est	50	LF	9.28	464		0.33	17	17	SPNG	70.4	1,162				1,600
	Piping Insulation & Lagging		Est	350	LF	2.99	1,047		0.08	26	26	INSUL	53.39	1,402				2,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	200	LS	840.00	168,000		100.00	20,000	20,000	SPNG	70.4	1,408,000				1,576,000
	Air Supply	Allowance	Est	200	LS	525.00	105,000		80.00	16,000	16,000	SPNG	70.4	1,126,400				1,231,400
	Piping Supports	Allowance	Est	1	LS	2,100.00	2,100		40.00	40	40	SPNG	70.4	2,816				4,900
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	110	CY	157.50	17,325		7.00	770	770	CONP	52.91	40,741				58,100
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800

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Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21992B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	AUGER CAST PILES (120 TON CAPACITY)	90 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-5	**IS SYSTEM SUBTOTAL**						**966,517**				**40,731**			**2,843,955**				**3,810,300**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA						63,000
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
											0							
AP-2	GROUNDING										0							
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE						
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE						
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	300	LF	0.76	227	Routed in 3/4" Conduit	0.05	16	16	WIRE	69.06	1,098				1,300
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE						
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE						
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	50	LF	3.58	179	Routed in 2" Conduit	0.35	18	18	WIRE	69.06	1,209				1,400
	Control Cables - Pumps	5/C #14, 600V	Est	300	LF	0.67	202	Routed in 3/4" Conduit	0.03	10	10	WIRE	69.06	663				900
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE						
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,500	LF	2.06	5,145		0.19	485	485	ECND						
	1-1/2" Conduit		Est	100	LF	4.67	467		0.28	28	28	ECND						
	2" Conduit		Est	50	LF	6.25	312		0.35	18	18	ECND						
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND						
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND						
											0							

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Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
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Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21992B
Project No.: 10584-022
Date: 12/20/2005
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AP-5	DCS SYSTEM ADDITIONS										0							
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA						
AP-8	DCS PROGRAMMING/INTERFACE										0							
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	0 20	EHEC						
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	0 100	INEL						
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**689,199**				**2,615**			**80,761**				**709,200**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	5,250.00	5,250		1550.00	1,550	1,550	PNTR	55.58	86,149				91,400
MISC-2	ROADWORK	Not Required	Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	100,000.00	100,000		40.00	40	40	STST	86.46	3,458				103,500
MISC-6	TANK BERM		Est	1	LS	76,000.00	76,000		260.00	260	260	STST	86.46	22,480				98,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	26,000.00	26,000		60.00	60	60	STST	86.46	5,188				31,200
MISC-5	**MISC. SUBTOTAL**						**54,538**				**2,155**			**122,239**				**176,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
G	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**2,051,379**			0	**47,514**			**3,297,288**				**5,287,800**
	Craft Support During Startup	At 3% of Total Manhours									1,425	MECH	66.86	95,303				0 95,300

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21992B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																264,400
	Erection Contractor's Profit	At 8% of Material and Labor Costs																423,000
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																10,300
	Freight To Site	At 4.5% of Equipment/Material Cost																92,300
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	48,939			3,392,592				6,173,100
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								617,300
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,368,100
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								8,308,500

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21993B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Process Technology Package (PTP) by URS		Est	1	EA	1,800,000.00	1,800,000		100.00	100	100	PUMP	65.83	6,583				1,806,600
	Pumps (6 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	6	EA	2,100.00	12,600		20.00	120	120	PUMP	65.83	7,900				20,500
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	420,250 lb full - 5,180 ft³ - D=17.6' - H=21.2' - SS	Est	1	EA	133,000.00	133,000		535.21	535	535	TANK	65.78	35,206				168,200
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	309,312 lb full - 4,957 ft³ - D=18.48' - H=18.48' - CS	Est	1	EA	83,000.00	83,000		489.52	490	490	TANK	65.78	32,201				115,200
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Air Compressors (2 Qty)	2 x 100% - 50 HP	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Est	1	LT	21,000.00	21,000		480.00	480	480	MECH	66.86	32,093				53,100
	System Piping	L=250' - D=4" - SS / L=50' - D=4" - CS / L=50' - D=2" - SS																
	6" - SS	Includes fitting allowance	Est	250	LF	30.61	7,652		0.42	105	105	SPNG	70.4	7,392				15,000
	6" - CS	Includes fitting allowance	Est	50	LF	11.89	594		0.42	21	21	SPNG	70.4	1,478				2,100
	4" - SS	Includes fitting allowance	Est	50	LF	24.89	1,244		0.33	17	17	SPNG	70.4	1,162				2,400
	Piping Insulation & Lagging		Est	350	LF	9.14	3,197		0.17	60	60	INSUL	53.39	3,177				6,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	75	CY	157.50	11,813		7.00	525	525	CONP	52.91	27,778				39,600
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-3	ROYALTY FEE	0	Est	0	LF									0				0

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21993B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	**IS SYSTEM SUBTOTAL**						**2,216,275**				**3,890**			**258,861**				**2,475,100**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	0	LF	6.25	0		0.35	0	0	ECND	49.67	0				0
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
A	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21993B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**693,130**				**2,558**			**143,552**				**836,900**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-6	TANK BERM		Est	1	LS	62,000.00	62,000		260.00	260	260	STST	86.46	22,480				84,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	16,000.00	16,000		60.00	60	60	STST	86.46	5,188				21,200
MISC-5	**MISC. SUBTOTAL**						**130,963**				**2,215**			**136,691**				**267,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**3,171,723**			0	**10,247**			**752,036**				**3,924,100**
																		0
	Craft Support During Startup	At 3% of Total Manhours									307	MECH	66.86	20,553				20,600
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.:	21993B
Project No.:	10584-022
Date:	12/20/2005
Rev Date	1/27/2006
Run Date:	1/27/2006
Preparer:	
Reviewer:	

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																196,200
	Erection Contractor's Profit	At 8% of Material and Labor Costs																313,900
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																15,900
	Freight To Site	At 4.5% of Equipment/Material Cost																142,700
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	10,554			772,588				4,613,400
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								461,300
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,024,900
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								6,249,600

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21994B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS							25.9										
	Process Technology Package (PTP). The cost shown here is for a single skid shared by Unit 3 and 4.	P&ID, Control Logic, Injection and metering pump skids, Proprietory injection lances	Budget	1	EA	1,800,000.00	1,800,000		200.00	200	200	MISC	65.83	13,166				1,813,200
	Pumps (0 Qty), included in PTP	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	0	EA	2,100.00	0		20.00	0	0	PUMP	65.83	0				0
	Long-Term Storage Silo -	60,000 gallon - D=16.5' - H=23.1' - SS	Est	1	EA	173,000.00	173,000		535.21	535	535	TANK	65.78	35,206				208,200
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	included in Soft Water supply system	Est	0	EA	0.00	0		489.52	0	0	TANK	65.78	0				0
	Agitator (1 Qty), included in PTP	SS Shaft - 20 HP	Est	0	EA	0.00	0		30.00	0	0	MECH	66.86	0				0
	Air Compressors (2operating+ 1 spare Qty)	3 x 100% - 150 HP	Est	3	EA	275,000.00	825,000		80.00	240	240	MECH	66.86	16,046				841,000
	Injection Manifold (2 Qty), PTP	Stainless Steel	Est	0	EA	0.00	0		240.00	0	0	MECH	66.86	0				0
	Dual Fluid Injection Nozzles (0 Qty), PTP	Stainless Steel	Est	0	LT	0.00	0		480.00	0	0	MECH	66.86	0				0
	System Piping	L=250' - D=4" - SS / L=50' - D=4" - CS / L=50' - D=2" - SS																
	6" - SS	Includes fitting allowance	Est	250	LF	30.61	7,652		0.42	105	105	SPNG	70.4	7,392				15,000
	6" - CS	Includes fitting allowance	Est	50	LF	11.89	594		0.42	21	21	SPNG	70.4	1,478				2,100
	4" - SS	Includes fitting allowance	Est	50	LF	24.89	1,244		0.33	17	17	SPNG	70.4	1,162				2,400
	Piping Insulation & Lagging		Est	350	LF	9.14	3,197		0.17	60	60	INSUL	53.39	3,177				6,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
IS-3	STRUCTURAL STEEL	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21994B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	ROYALTY FEE	Not Included, $ per MW, to be negotiated with Vendor	Est	0	LF									0				0
IS-5	**IS SYSTEM SUBTOTAL**						**2,905,038**				**3,720**			**264,791**				**3,169,700**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 150HP	3/C 250kcmil, 600V	Est	100	LF	1,980.00	198,000	Routed in 3" Conduit	0.35	35	35	WIRE	69.06	2,417				200,400
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	900	LF	3.15	2,835	Routed in 3/4" Conduit	0.03	29	29	WIRE	69.06	1,989				4,800
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,025	LF	2.06	4,168		0.19	393	393	ECND	49.67	19,513				23,700
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	100	LF	6.25	625		0.35	35	35	ECND	49.67	1,748				2,400
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21994B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**891,234**				**2,606**			**146,533**				**1,038,000**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	PREFAB BLDG.			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD Model Study	included in PTP	Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-6	Berm around Tanks	60,000 gallon tank, 12" concrete wall, 6" slab, sump, for 110% containment (40' x 40' x 6' high)	Est	1	LS	74,000.00	74,000		260.00	260	260	STST	86.46	22,480				96,500
MISC-7	Soft Water Supply System	50 gpm capacity	Est	1	LS	50,000.00	50,000		60.00	60	60	STST	86.46	5,188				55,200
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-6	TANK BERM		Est	1	LS	74,000.00	74,000		260.00	260	260	STST	86.46	22,480				96,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	28,000.00	28,000		60.00	60	60	STST	86.46	5,188				33,200
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000

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Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21994B
Project No.: 10584-022
Date: 12/20/2005
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**4,206,589**			**0**	**10,484**			**792,073**				**4,999,000**
																		0
	Craft Support During Startup	At 3% of Total Manhours									315	MECH	66.86	21,028				21,000
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																250,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs																399,900
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																21,000
	Freight To Site	At 4.5% of Equipment/Material Cost																189,300
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	**10,798**			**813,101**				**5,880,200**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								588,000
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,303,600
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**7,921,800**

Sargent & Lundy LLC
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Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21995B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	6	EA	55,125.00	330,750		105.00	630	630	PUMP	65.83	41,473				372,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - Common for 2 Units (10 Days), Unit cost is split between Units 3 and 4	2,687,900 lb full - 11,610 ft³ - D=20.7' - H=83.0' - CS Silo - SS Hopper	Est	1	EA	590,000.00	590,000		1624.00	1,624	1,624	TANK	65.78	106,827				696,800
	Short-Term Storage Silo - (24 Hours)	268,800 lb full - 1,160 ft³ - D=8.7' - H=39.0' - CS Silo - SS Hopper	Est	1	EA	180,000.00	180,000		120.00	120	120	TANK	65.78	7,894				187,900
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	160	160	SPNG	70.4	11,236				17,700
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-4	**IS SYSTEM SUBTOTAL**						**1,253,018**				**5,522**			**383,190**				**1,636,000**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM	Included in silo	Est	0	Set	105,000.00	0		1254.00	0	0	SPNG	70.4	0				0
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**0**				**0**			**0**				**0**

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21995B
Project No.: 10584-022
Date: 12/20/2005
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	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 4160V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 600kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	250	LF	8.40	2,100	Routed in 2" Conduit	0.35	88	88	WIRE	69.06	6,043				8,100
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2"	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	550	LF	6.25	3,436		0.35	194	194	ECND	49.67	9,616				13,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**759,964**				**3,538**			**198,278**				**958,300**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21995B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	BLOWER HOUSE																	
	PREFAB BLDG (15' x 20')			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD MODEL STUDY		Est	1	LS	30,000.00	30,000		40.00	40	40	STST	86.46	3,458				33,500
MISC-6	TANK BERM		Est	1	LS	0.00	0		260.00	260	260	STST	86.46	22,480				22,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	0.00	0		60.00	60	60	STST	86.46	5,188				5,200
MISC-5	**MISC. SUBTOTAL**						**82,438**				**2,135**			**132,244**				**214,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**2,121,774**			0	**11,524**			**838,362**				**2,960,100**
																		0
	Craft Support During Startup	At 3% of Total Manhours									346	MECH	66.86	23,115				23,100
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																148,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs																236,800
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21995B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																10,600
	Freight To Site	At 4.5% of Equipment/Material Cost																95,500
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	11,870			861,477				**3,474,100**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								347,400
	PERMITTING, MODELING, ETC.									0								0
	STARTUP REAGENT TESTING (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								774,300
	IT INTERNAL COST	To Be Furnished by Owner								0								100,000
	E PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**4,745,800**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21997B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS	COSTS																
	WESP & ASSOCIATED EQUIP																	
WE-1	WESP (Two ESP boxes, with 29 feet three fields, 9 feet long 1st field at 9.75" spacing with 76 gas passages, and 11 feet long 2nd and 3rd fields at 11.75" spacing with 64 passages, total 170 SCA. All internal 2205, with 2205 carbon steel clad alloy plate construction)	INCLUDES ALL ASSOCIATED DUCTWORK AND WASTE WATER EQUIPMENT,PIPING AND TANKS	Est	1	EA	31,570,000.00	31,570,000	BUDGETARY INPUT FROM VENDOR	142817	142,817	142,817	PREC	86.72	12,385,047				43,955,000
WE-2	Chimney Liner Adjustment (WITH MODIFIED BREECHING AT WESP OUTLET ELEVATION)	RETURN TO EXISTING BREECHING	Est	0	LF	5,302.50	0		55	0	0	PREC	86.72	0				0
	Chimney Breaching Adjustment		Est	0	LS	21,000.00	0		220	0	0	PREC	86.72	0				0
WE-4	Electrical Building	20'x40'	Est	1	EA	21,000.00	21,000		100.00	100	100	STST	86.46	8,646				29,600
WE-5	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	810	CY	157.50	127,575		7.00	5,670	5,670	CONP	52.91	300,000				427,600
WE-6	STRUCTURAL STEEL		Est	170	TN	2,200.00	374,000		16.00	2,720	2,720	STST	86.46	235,171				609,200
WE-7	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,000	LF	10.00	20,000		0.52	1,040	1,040	PILE	82.81	86,122				106,100
WE-7	FIBER GLASS DUCT 23' DIA		Est	450	LF	7,200.00	3,240,000		50.00	22,500	22,500	DUCT	59.32	1,334,700				4,574,700
WE-8	**WE SYSTEM SUBTOTAL**						**35,352,575**				**174,847**			**14,349,686**				**49,702,200**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	52,500.00	105,000		240.00	480	480	EHEA	53.92	25,882				130,900
	Misc Electrical Equipment & Controls		Est	1	LS	86,100.00	86,100		324.00	324	324	EHEA	53.92	17,470				103,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	0	LF	14.70	0	Routed in 3" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	1,000	LF	8.40	8,400	Routed in 2" Conduit	0.35	350	350	WIRE	69.06	24,171				32,600
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	2,400	LF	6.30	15,120	Routed in 1-1/2" Conduit	0.52	1,248	1,248	WIRE	69.06	86,187				101,300
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	0	LF	0.76	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	1,500	LF	1.58	2,363	Routed in 3/4" Conduit	0.05	80	80	WIRE	69.06	5,490				7,900
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE	69.06	0				0

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21997B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	0	LF	2.67	0	Routed in 1-1/2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	1,500	LF	0.67	1,008	Routed in 3/4" Conduit	0.03	48	48	WIRE	69.06	3,315				4,300
	Control Cables - TR Sets	7/C #14, 600V	Est	2,400	LF	0.81	1,940	Routed in 1-1/2" Conduit	0.04	96	96	WIRE	69.06	6,630				8,600
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	4,750	LF	2.06	9,776		0.19	922	922	ECND	49.67	45,771				55,500
	1-1/2" Conduit		Est	2,400	LF	4.67	11,214		0.28	682	682	ECND	49.67	33,855				45,100
	2" Conduit		Est	1,000	LF	6.25	6,248		0.35	352	352	ECND	49.67	17,484				23,700
	3" Conduit		Est	0	LF	13.13	0		0.65	0	0	ECND	49.67	0				0
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**957,418**				**5,776**			**336,065**				**1,293,700**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	87,150.00	87,150		3250.00	3,250	3,250	PNTR	55.58	180,635				267,800
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	1	LS	45,937.50	45,938		380.00	380	380	PBIT	62.43	23,723				69,700
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-5	**MISC. SUBTOTAL**						**140,438**				**3,970**			**223,408**				**363,900**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Mill Creek Unit 4
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21997B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
GS-2	CRANE RENTAL	700 Ton - 2 months	Est	1	LT		0	Includes freight in and out						310,000				310,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**410,000**				**410,000**
	SUBTOTAL						**36,450,431**			**0**	**184,593**			**15,319,159**				**51,769,800**
																		0
	Craft Support During Startup	At 3% of Total Manhours									5,538	MECH	66.86	370,256				370,300
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs - WESP																1,010,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs - WESP																1,616,000
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																182,300
	Freight To Site	At 4.5% of Equipment/Material Cost																1,640,300
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									**0**	**190,131**			**15,689,415**				**56,588,700**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								**0**								2,546,000
	PERMITTING, MODELING, ETC.									**0**								0
	STARTUP AND TESTING									**0**								100,000
	CONTINGENCY	At 20% of Total								**0**								11,846,900
	CLIENT INTERNAL COST	To Be Furnished by Owner								**0**								200,000
	SPARE PARTS									**0**								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									**0**								**71,281,600**

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.: 21975B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	DUCTWORK MODS		Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
	INSULATION & LAGGING	3 1/2" INSUL																
DW-2	DUCTWORK SUPPORT STRUCTURES		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	STRUCTURAL STEEL		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
	ACCESS & GALLERIES																	
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	5	EA	55,125.00	275,625		105.00	525	525	PUMP	65.83	34,561				310,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - 1 Unit (10 Days)	2,937,600 lb full - 19,615 ft^3 - D=20.5' - H=82.0' - CS Silo - SS Hopper	Est	1	EA	609,000.00	609,000		2545.52	2,546	2,546	TANK	65.78	167,444				776,400
	Short-Term Storage Silo - (24 Hours)	293,760 lb full - 1,920 ft^3 - D=8.5' - H=38.0' - CS Silo - SS Hopper	Est	1	EA	201,600.00	201,600		764.00	764	764	TANK	65.78	50,256				251,900
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	161	161	SPNG	70.4	11,334				17,800
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	50	CY	157.50	7,875		7.00	350	350	CONP	52.91	18,519				26,400
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-4	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-5	**IS SYSTEM SUBTOTAL**						**1,232,193**				**6,704**			**464,542**				**1,696,600**
	MATERIAL UNLOADING SYSTEM																	
AUX-1	TRUCK DELIVERY	INCLUDED IN SILO	Est	0	Set	315,000.00	0		1753.67	0	0	SPNG	70.4	0				0
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.: 21975B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 6900V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		300.00	300	300	EHEA	53.92	16,176				77,100
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	300	LF	10.50	3,150	Routed in 2" Conduit	0.69	207	207	WIRE	69.06	14,295				17,400
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	300	LF	6.25	1,874		0.35	106	106	ECND	49.67	5,245				7,100
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
	AUXILIARY POWER SYSTEM / I&C SUBTOTAL						**871,538**				**3,370**			**188,413**				**1,060,000**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																

Sa[illegible] & Lundy LLC
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Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 1 - Hydrated Lime
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

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Labor Productivity = 1

Estimate No.: 21975B
Project No.: 10584-022
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	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	0	LS	7,350.00	0		300.00	0	0	YDRN	51.97	0				0
MISC-4	OTHER																	
	BLOWER HOUSE																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG. 15'X20'		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
							45,088				1,475			85,528				130,600
MISC-5	**MISC. SUBTOTAL**																	
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							150,000				150,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						0				0			150,000				150,000
	SUBTOTAL						2,175,174			0	11,878			913,133				3,088,300
	Craft Support During Startup	At 3% of Total Manhours																0
	Allowance for Premium Time Labor										356	MECH	66.86	23,826				23,800
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																Not Included
	Erection Contractor's Profit	At 8% of Material and Labor Costs																154,400
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																247,100
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																Included w\Equipment Costs
	Freight To Site	At 4.5% of Equipment/Material Cost																10,900
	Taxes - Sales/Use/VAT/Business/Etc.																	97,900
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																Not Included
	SUBTOTAL INSTALLED COST									0	12,235			936,958				By Owner
																		3,622,400

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Trimble County Unit 1
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	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								362,240
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								806,900
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								4,941,540

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Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
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-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21969B
Project No.: 10584-022
Date: 12/20/2005
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Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	DUCTWORK MODS		Est	200	SF	21.00	4,200		0.27	54	54	DINS	59.32	3,203				7,400
	INSULATION & LAGGING	6" THICK INSULATION																
DW-4	DUCTWORK SUPPORT STRUCTURES		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	STRUCTURAL STEEL		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
	ACCESS & GALLERIES																	
DW-6	BOILER MODS		Est	2	TN	2,625.00	5,250		35.00	70	70	FLDU	89.66	6,276				11,500
	WALL AND TUBE MODS																	
							34,125				399			30,926				65,100
	DUCTWORK SUBTOTAL																	
	Injection System																	
IS-1	EQUIPMENT/COMPONENTS																	
	Air Blowers	Not required	Est	3	EA	21,000.00	63,000		40.00	120	120	MECH	66.86	8,023				71,000
	VFD Rotary Feeder	Not required	Est	1	EA	10,500.00	10,500		30.00	30	30	MECH	66.86	2,006				12,500
	Long-Term Storage Tank - 1 Unit (10 Days)	1,617,900 lb full - 17,060 ft3 - D=26.3' - H=31.6' -	Est	1	EA	105,000.00	105,000		580.00	580	580	TANK	65.78	38,152				143,200
	Short-Term Storage Silo - (24 Hours)	Not required	Est	0	EA	10,500.00	0		60.00	0	0	TANK	65.78	0				0
	Air Compressors (2 Qty)	50 hp - 2 X 100%	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Mixing Tank - 1 Unit - (24 Hours)	808,320 lb full - 8,520 ft3 - D=20.8' - H=25.0' - CS Silo - SS Hopper	Est	1	EA	115,500.00	115,500		880.00	880	880	TANK	65.78	57,886				173,400
	Mixing Tank Agitator (1 Qty)	20 hp - CS Shaft	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Water Storage Tank - 1 Unit (24 Hrs)	125,000 lb full - 2,000 ft3 - D=13.7' - H=13.7' - CS	Est	1	EA	115,500.00	115,500		880.00	880	880	TANK	65.78	57,886				173,400
	Slurry/Water Pumps (6 Qty)	2 hp - CS	Est	6	EA	5,250.00	31,500		20.00	120	120	PUMP	65.83	7,900				39,400
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (20 Qty)	Stainless Steel	Est	1	LT	42,000.00	42,000		96.00	96	96	MECH	66.86	6,419				48,400
	System Piping																	
	1" - CS	Includes fitting allowance	Est	300	LF	2.27	680		0.16	49	49	SPNG	70.4	3,464				4,100
	4" - CS	Includes fitting allowance	Est	50	LF	9.28	464		0.33	17	17	SPNG	70.4	1,162				1,600
	Piping Insulation & Lagging		Est	350	LF	2.99	1,047		0.08	26	26	INSUL	53.39	1,402				2,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	200	LS	840.00	168,000		100.00	20,000	20,000	SPNG	70.4	1,408,000				1,576,000
	Air Supply	Allowance	Est	200	LS	525.00	105,000		80.00	16,000	16,000	SPNG	70.4	1,126,400				1,231,400
	Piping Supports	Allowance	Est	1	LS	2,100.00	2,100		40.00	40	40	SPNG	70.4	2,816				4,900
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	110	CY	157.50	17,325		7.00	770	770	CONP	52.91	40,741				58,100
IS-3	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800

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Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
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IS-4	AUGER CAST PILES (120 TON CAPACITY)	90 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-5	**IS SYSTEM SUBTOTAL**						**914,017**				**40,731**			**2,843,955**				**3,757,800**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	570,000.00	570,000		4228.49	4,228	4,228	EHEA	53.92	228,000				798,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA						63,000
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		1418.55	1,419	1,419	EHEA	53.92	76,488				84,900
											0							
AP-2	GROUNDING										0							
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE						
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE						
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	300	LF	0.76	227	Routed in 3/4" Conduit	0.05	16	16	WIRE	69.06	1,098				1,300
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	150	LF	1.58	236	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				800
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE						
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE						
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	50	LF	3.58	179	Routed in 2" Conduit	0.35	18	18	WIRE	69.06	1,209				1,400
	Control Cables - Pumps	5/C #14, 600V	Est	300	LF	0.67	202	Routed in 3/4" Conduit	0.03	10	10	WIRE	69.06	663				900
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE						
	RACEWAY		Est	2,500	LF	2.06	5,145		0.19	485	485	ECND						
	3/4" Conduit		Est	100	LF	4.67	467		0.28	28	28	ECND						
	1-1/2" Conduit		Est	50	LF	6.25	312		0.35	18	18	ECND						
	2" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND						
	3" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND						
	5" Conduit										0							

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											0							
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA						
											0							
AP-8	DCS PROGRAMMING/INTERFACE										0							
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC						
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
											0							
AP-9	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL						
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**799,199**				**7,462**			**342,113**				**1,080,500**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	5,250.00	5,250		1550.00	1,550	1,550	PNTR	55.58	86,149				91,400
MISC-2	ROADWORK	Not Required	Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	**MISC. SUBTOTAL**						**54,538**				**2,155**			**122,239**				**176,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**1,906,879**			0	**52,001**			**3,527,515**				**5,373,400**
																		0
	Craft Support During Startup	At 3% of Total Manhours									1,560	MECH	66.86	104,304				104,300
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																268,700

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Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 2 - Magnesium Hydroxide
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.: 21969B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Erection Contractor's Profit	At 8% of Material and Labor Costs																429,900
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																9,500
	Freight To Site	At 4.5% of Equipment/Material Cost																85,800
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	53,561			3,631,818				**6,271,600**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								627,200
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,389,800
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								100,000
	SPARE PARTS																	Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**8,438,600**

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.: 21983B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS		Est	1	EA	1,800,000.00	1,800,000		200.00	200	200	PUMP	65.83	13,166				1,813,200
	Process Technology Package (PTP) by URS																	
	Pumps (6 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	6	EA	2,100.00	12,600		20.00	120	120	PUMP	65.83	7,900				20,500
	Soda Ash Solution Tank - 1 Unit (10 Days)	420,250 lb full - 5,180 ft^3 - D=17.6' - H=21.2' - SS	Est	1	EA	43,050.00	43,050		535.21	535	535	TANK	65.78	35,206				78,300
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	309,312 lb full - 4,957 ft^3 - D=18.48' - H=18.48' - CS	Est	1	EA	39,375.00	39,375		489.52	490	490	TANK	65.78	32,201				71,600
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Air Compressors (2 Qty)	2 x 100% - 50 HP	Est	2	EA	21,000.00	42,000		80.00	160	160	MECH	66.86	10,698				52,700
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Est	1	LT	21,000.00	21,000		480.00	480	480	MECH	66.86	32,093				53,100
	System Piping	L=250' - D=4" - SS / L=50' - D=4" - CS / L=50' - D=2" - SS																
	6" - SS	Includes fitting allowance	Est	250	LF	30.61	7,652		0.42	105	105	SPNG	70.4	7,392				15,000
	6" - CS	Includes fitting allowance	Est	50	LF	11.89	594		0.42	21	21	SPNG	70.4	1,478				2,100
	4" - SS	Includes fitting allowance	Est	50	LF	24.89	1,244		0.33	17	17	SPNG	70.4	1,162				2,400
	Piping Insulation & Lagging		Est	350	LF	9.14	3,197		0.17	60	60	INSUL	53.39	3,177				6,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	75	CY	157.50	11,813		7.00	525	525	CONP	52.91	27,778				39,600
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	0	LF	10.00	0		0.52	0	0	PILE	82.81	0				0
IS-3	ROYALTY FEE	0	Est	0	LF									0				0

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21983B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	**IS SYSTEM SUBTOTAL**						**2,082,700**				**3,990**			**265,444**				**2,348,200**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	460,000.00	460,000		500.00	500	500	EHEA	53.92	26,960				487,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		300.00	300	300	EHEA	53.92	16,176				24,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads -150HP	3/C #2, 600V	Est	200	LF	9.90	1,980	Routed in 2" Conduit	1.55	310	310	WIRE	69.06	21,409				23,400
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	200	LF	6.25	1,250		0.35	70	70	ECND	49.67	3,497				4,700
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21983B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**696,360**				**2,939**			**168,458**				**865,000**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
	PREFAB BLDG.		Est	1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
MISC-5	**MISC. SUBTOTAL**						**52,963**				**1,855**			**105,565**				**158,500**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**2,963,377**			0	**10,367**			**752,399**				**3,716,100**
																		0
	Craft Support During Startup	At 3% of Total Manhours									311	MECH	66.86	20,794				20,800
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																185,800
	Erection Contractor's Profit	At 8% of Material and Labor Costs																297,300
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs

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Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 3 - Soda Ash
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.: 21983B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																14,800
	Freight To Site	At 4.5% of Equipment/Material Cost																133,400
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	10,678			773,193				**4,368,200**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								436,800
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								971,000
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS																	Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
										0								
	PROJECT TOTAL :																	**5,926,000**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21970B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-4	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-9	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
	EQUIPMENT/COMPONENTS																	
	Process Technology Package (URS). The cost shown here is on a single unit basis, multi-contract or economies of scale is not included.	P&ID, Control Logic, Injection and metering pump skids, Proprietory injection lances	Budget	1	EA	1,800,000.00	1,800,000		300.00	300	300	MISC	65.83	19,749				1,819,700
	Pumps (6 Qty)	4 - CS internals - 2.0 HP / 4 - SS internals - 1.0 HP	Est	6	EA	2,100.00	12,600		20.00	120	120	PUMP	65.83	7,900				20,500
	SBS Solution Tank - 1 Unit (10 Days)	62,000 gallon - D=23.4' - H=28.0' SS	Est	1	EA	205,000.00	205,000		535.21	535	535	TANK	65.78	35,206				240,200
	Soft H_2O Storage Tank - 1 Unit - (24 Hours)	Included in SoftWater supply system	Est	0	EA	0.00	0		489.52	0	0	TANK	65.78	0				0
	Agitator (1 Qty)	SS Shaft - 20 HP	Est	1	EA	21,000.00	21,000		30.00	30	30	MECH	66.86	2,006				23,000
	Air Compressors (2 Qty)	2 x 100% - 50 HP	Est	3	EA	225,000.00	675,000		80.00	240	240	MECH	66.86	16,046				691,000
	Injection Manifold (2 Qty)	Stainless Steel	Est	0	EA	10,500.00	0		240.00	0	0	MECH	66.86	0				0
	Dual Fluid Injection Nozzles (100 Qty)	Stainless Steel	Est	0	LT	21,000.00	0		480.00	0	0	MECH	66.86	0				0
	System Piping	L=250' - D=4" - SS / L=50' - D=4" - CS / L=50' - D=2" - SS																
	6" - SS	Includes fitting allowance	Est	250	LF	30.61	7,652		0.42	105	105	SPNG	70.4	7,392				15,000
	6" - CS	Includes fitting allowance	Est	50	LF	11.89	594		0.42	21	21	SPNG	70.4	1,478				2,100
	4" - SS	Includes fitting allowance	Est	50	LF	24.89	1,244		0.33	17	17	SPNG	70.4	1,162				2,400
	Piping Insulation & Lagging		Est	350	LF	9.14	3,197		0.17	60	60	INSUL	53.39	3,177				6,400
	Heat Tracing		Est	350	LF	21.00	7,350		0.31	109	109	WIRE	69.06	7,493				14,800
	Valves	Allowance	Est	1	LS	2,520.00	2,520		48.00	48	48	SPNG	70.4	3,379				5,900
	Supply Piping																	
	Water Supply	Allowance	Est	1	LS	840.00	840		100.00	100	100	SPNG	70.4	7,040				7,900
	Air Supply	Allowance	Est	1	LS	525.00	525		80.00	80	80	SPNG	70.4	5,632				6,200
	Piping Supports	Allowance	Est	1	LS	2,940.00	2,940		112.00	112	112	SPNG	70.4	7,885				10,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
IS-3	STRUCTURAL STEEL	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (125 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21970B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
IS-4	ROYALTY FEE	Not Included, $ per MW, to be negotiated with Vendor	Est	0	LF									0				0
IS-5	**IS SYSTEM SUBTOTAL**						**1,020,638**				**3,670**			**261,531**				**1,282,000**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM		Est	1	Set	105,000.00	105,000		1254.00	1,254	1,254	SPNG	70.4	88,282				193,300
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**105,000**				**1,254**			**88,282**				**193,300**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 1 MVA, 6.9-480V XFMR's	Est	1	EA	570,000.00	570,000		4228.49	4,228	4,228	EHEA	53.92	228,000				798,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	8,400.00	8,400		1418.55	1,419	1,419	EHEA	53.92	76,488				84,900
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	0	LF	8.40	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	200	LF	0.76	151	Routed in 3/4" Conduit	0.05	11	11	WIRE	69.06	732				900
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	50	LF	2.12	106	Routed in 1-1/2" Conduit	0.09	5	5	WIRE	69.06	311				400
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	100	LF	2.67	267	Routed in 1-1/2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,700
	Power Cables from MCC to Loads - 150HP	3/C 250kcmil, 600V	Est	100	LF	3.58	358	Routed in 2" Conduit	0.35	35	35	WIRE	69.06	2,417				2,800
	Control Cables - Pumps	5/C #14, 600V	Est	175	LF	0.67	118	Routed in 3/4" Conduit	0.03	6	6	WIRE	69.06	387				500
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2" Conduit	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,125	LF	2.06	4,373		0.19	412	412	ECND	49.67	20,477				24,800
	1-1/2" Conduit		Est	150	LF	4.67	701		0.28	43	43	ECND	49.67	2,116				2,800
	2" Conduit		Est	100	LF	6.25	625		0.35	35	35	ECND	49.67	1,748				2,400
	3" Conduit		Est	250	LF	13.13	3,281		0.65	161	161	ECND	49.67	8,009				11,300
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.: 21970B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**804,113**				**7,476**			**409,070**				**1,213,400**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,675.00	3,675		1250.00	1,250	1,250	PNTR	55.58	69,475				73,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	PUMP HOUSE 15' X 20'																	
	PREFAB BLDG.			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	CFD MODEL STUDY		Est	1	LS	0.00	0		40.00	40	40	STST	86.46	3,458				3,500
MISC-6	TANK BERM		Est	1	LS	75,000.00	75,000		260.00	260	260	STST	86.46	22,480				97,500
MISC-7	SOFT WATER SUPPLY SYSTEM		Est	1	LS	27,000.00	27,000		60.00	60	60	STST	86.46	5,188				32,200
MISC-8	**MISC. SUBTOTAL**						**154,963**				**2,215**			**136,691**				**291,700**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**3,911,068**			0	**15,243**			**1,039,972**				**4,951,200**
																		0
	Craft Support During Startup	At 3% of Total Manhours									457	MECH	66.86	30,575				30,600
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included

Sargent & Lundy LLC
Chicago

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 4 - Sodium Bisulfite (SBS)
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.: 21970B
Project No.: 10584-022
Date: 12/20/2005
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Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																247,600
	Erection Contractor's Profit	At 8% of Material and Labor Costs																396,100
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																19,600
	Freight To Site	At 4.5% of Equipment/Material Cost																176,000
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	15,701			1,070,547				**5,821,100**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								582,100
	PERMITTING, MODELING, ETC.									0								0
	STARTUP, TESTING AND REAGENT (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								1,290,600
	CLIENT INTERNAL COST	Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**7,843,800**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21972B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS																	
DW-1	MODIFY GAS DUCT TO ACCEPT INJECTION NOZZLES																	
	DUCTWORK MODS		Est	1	TN	2,625.00	2,625		35.00	35	35	FLDU	89.66	3,138				5,800
	INSULATION & LAGGING	3 1/2" INSUL	Est	200	SF	8.40	1,680		0.27	54	54	DINS	59.32	3,203				4,900
DW-2	DUCTWORK SUPPORT STRUCTURES																	
	STRUCTURAL STEEL		Est	5	TN	1,890.00	9,450		16.00	80	80	STST	86.46	6,917				16,400
	ACCESS & GALLERIES		Est	400	SF	31.50	12,600		0.40	160	160	GALL	71.2	11,392				24,000
DW-4	**DUCTWORK SUBTOTAL**						**26,355**				**329**			**24,650**				**51,100**
	Injection System																	
I	EQUIPMENT/COMPONENTS																	
	Air Blowers	150 hp each	Est	6	EA	55,125.00	330,750		105.00	630	630	PUMP	65.83	41,473				372,200
	VFD Rotary Feeder	3 hp - Stainless Steel	Est	3	EA	10,500.00	31,500		30.00	90	90	TANK	65.78	5,920				37,400
	Long-Term Storage Silo - 1 Unit (10 Days)	2,687,900 lb full - 11,610 ft^3 - D=20.7' - H=83.0' - CS Silo - SS Hopper	Est	1	EA	304,500.00	304,500		1624.00	1,624	1,624	TANK	65.78	106,827				411,300
	Short-Term Storage Silo - (24 Hours)	268,800 lb full - 1,160 ft^3 - D=8.7' - H=39.0' - CS Silo - SS Hopper	Est	1	EA	23,100.00	23,100		120.00	120	120	TANK	65.78	7,894				31,000
	Injection Manifold (2 Qty)	Stainless Steel	Est	2	EA	10,500.00	21,000		240.00	480	480	MECH	66.86	32,093				53,100
	Injection Nozzles (50 Qty)	Stainless Steel	Est	1	LT	10,500.00	10,500		240.00	240	240	MECH	66.86	16,046				26,500
	System Piping																	
	8" - CS	Includes fitting allowance	Est	350	LF	18.48	6,468		0.46	160	160	SPNG	70.4	11,236				17,700
	Piping Insulation & Lagging		Est	0	LF	6.62	0		0.14	0	0	INSUL	53.39	0				0
	Heat Tracing		Est	0	LF	0.00	0		0.00	0	0	WIRE	69.06	0				0
	Valves	Allowance	Est	1	LS	1,050.00	1,050		24.75	25	25	SPNG	70.4	1,742				2,800
	Supply Piping																	
	Water Supply	Allowance	Est	0	LS	840.00	0		100.00	0	0	SPNG	70.4	0				0
	Air Supply	Allowance	Est	0	LS	525.00	0		80.00	0	0	SPNG	70.4	0				0
	Piping Supports	Allowance	Est	1	LS	1,575.00	1,575		60.00	60	60	SPNG	70.4	4,224				5,800
	Piping Rack	Allowance	Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-2	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	90	CY	157.50	14,175		7.00	630	630	CONP	52.91	33,333				47,500
	STRUCTURAL STEEL		Est	10	TN	2,200.00	22,000		16.00	160	160	STST	86.46	13,834				35,800
IS-3	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,200	LF	10.00	22,000		0.52	1,144	1,144	PILE	82.81	94,735				116,700
IS-4	**IS SYSTEM SUBTOTAL**						**810,618**				**5,522**			**383,190**				**1,193,600**
	MATERIAL UNLOADING SYSTEM																	
ASH-1	TRUCK UNLOADING SYSTEM	Included in silo	Est	0	Set	105,000.00	0		1254.00	0	0	SPNG	70.4	0				0
AH-6	**MATERIAL UNLOADING SYSTEM SUBTOTAL**						**0**				**0**			**0**				**0**

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21972B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	480V SWITCHGEAR	Double Ended Unit Substation with (2) 1MVA, 6.9-480V XFMR's	Est	1	EA	570,000.00	570,000		4280.00	4,280	4,280	EHEA	53.92	230,778				800,800
	New Breaker at Existing 4160V Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	42,000.00	84,000		200.00	400	400	EHEA	53.92	21,568				105,600
	Misc Electrical Equipment & Controls		Est	1	LS	60,900.00	60,900		1434.00	1,434	1,434	EHEA	53.92	77,321				138,200
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	0	LF	33.60	0	Routed in 5" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for MCC's	3/C 500kcmil, 600kV	Est	250	LF	14.70	3,675	Routed in 3" Conduit	0.69	173	173	WIRE	69.06	11,913				15,600
	Power Cables for 480V Switchgear	3/C 4/0kcmil, 5kV	Est	250	LF	8.40	2,100	Routed in 2" Conduit	0.35	88	88	WIRE	69.06	6,043				8,100
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	0	LF	6.30	0	Routed in 1-1/2" Conduit	0.52	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	150	LF	0.76	113	Routed in 3/4" Conduit	0.05	8	8	WIRE	69.06	549				700
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	0	LF	1.58	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 50 HP	3/C #4, 600V	Est	150	LF	2.10	315	Routed in 1-1/2" Conduit	0.09	14	14	WIRE	69.06	932				1,200
	Power Cables from MCC to Loads - 100HP	3/C #4/0, 600V	Est	150	LF	9.45	1,418	Routed in 1-1/2" Conduit	0.50	75	75	WIRE	69.06	5,180				6,600
	Power Cables from MCC to Loads - 150HP	3/C #350, 600V	Est	900	LF	10.50	9,450	Routed in 2" Conduit	0.69	621	621	WIRE	69.06	42,886				52,300
	Control Cables - Pumps	5/C #14, 600V	Est	150	LF	0.67	101	Routed in 3/4" Conduit	0.03	5	5	WIRE	69.06	332				400
	Control Cables - TR Sets	7/C #14, 600V	Est	0	LF	0.81	0	Routed in 1-1/2"	0.04	0	0	WIRE	69.06	0				0
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	2,300	LF	2.06	4,733		0.19	446	446	ECND	49.67	22,163				26,900
	1-1/2" Conduit		Est	300	LF	4.67	1,402		0.28	85	85	ECND	49.67	4,232				5,600
	2" Conduit		Est	1,150	LF	6.25	7,185		0.35	405	405	ECND	49.67	20,106				27,300
	3" Conduit		Est	900	LF	13.13	11,813		0.65	581	581	ECND	49.67	28,833				40,600
	5" Conduit		Est	0	LF	38.33	0		1.13	0	0	ECND	49.67	0				0
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
	LIGHTING ALLOWANCE		Est	1	LT	10,500.00	10,500		100.00	100	100	INEL	60.02	6,002				16,500
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**880,012**				**9,077**			**502,322**				**1,382,300**

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21972B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	3,150.00	3,150		1170.00	1,170	1,170	PNTR	55.58	65,029				68,200
MISC-2	ROADWORK		Est	0	LS	36,750.00	0		380.00	0	0	PBIT	62.43	0				0
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
	BLOWER HOUSE																	
	PREFAB BLDG (15' x 20')			1	LS	38,000.00	38,000		130.00	130	130	STST	86.46	11,240				49,200
	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	25	CY	157.50	3,938		7.00	175	175	CONP	52.91	9,259				13,200
MISC-5	**MISC. SUBTOTAL**						**52,438**				**1,775**			**101,119**				**153,500**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**100,000**				**100,000**
	SUBTOTAL						**1,769,423**			0	**16,703**			**1,111,281**				**2,880,500**
																		0
	Craft Support During Startup	At 3% of Total Manhours									501	MECH	66.86	33,504				33,500
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs																144,000
	Erection Contractor's Profit	At 8% of Material and Labor Costs																230,400
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																8,800

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 5 - Trona
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21972B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Freight To Site	At 4.5% of Equipment/Material Cost																79,600
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	17,204			1,144,784				**3,376,800**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								337,700
	PERMITTING, MODELING, ETC.									0								0
	STARTUP REAGENT TESTING (15 DAYS)									0								50,000
	CONTINGENCY	At 20% of Total								0								752,900
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								100,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**4,617,400**

Sargent & Lundy LLC
hicago

Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Estimate No.: 21973B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Cost Type: Est = Estimated, Bid = Vendor quote

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	DUCTWORK MODIFICATIONS	COSTS																
	WESP & ASSOCIATED EQUIP																	
WE-1	WESP (Two ESP boxes, with 29 feet three fields, 9 feet long 1st field at 9.75" spacing with 76 gas passages, and 11 feet long 2nd and 3rd fields at 11.75" spacing with 64 passages, total 170 SCA. All internal 2205, with 2205 carbon steel clad alloy plate construction)	INCLUDES ALL ASSOCIATED DUCTWOR, MODAL STUDY, WASTE WATER EQUIPMENT,PIPING AND TANKS	Est	1	EA	30,490,000.00	30,490,000	BUDGETARY INPUT FROM VENDOR	142817	142,817	142,817	PREC	86.72	12,385,047				42,875,000
WE-2	Chimney Liner Adjustment (WITH MODIFIED BREECHING AT WESP OUTLET ELEVATION)	RETURN TO EXISTING BREECHING	Est	0	LF	5,302.50	0		55	0	0	PREC	86.72	0				0
3	Chimney Breaching Adjustment		Est	0	LS	21,000.00	0		220	0	0	PREC	86.72	0				0
WE-4	Electrical Building	20'x40'	Est	1	EA	21,000.00	21,000		100.00	100	100	STST	86.46	8,646				29,600
WE-5	FOUNDATIONS	INCLUDES EXCAVATION & BACKFILL	Est	810	CY	157.50	127,575		7.00	5,670	5,670	CONP	52.91	300,000				427,600
WE-6	STRUCTURAL STEEL		Est	170	TN	2,200.00	374,000		16.00	2,720	2,720	STST	86.46	235,171				609,200
WE-7	AUGER CAST PILES (120 TON CAPACITY)	100 ft LONG	Est	2,000	LF	10.00	20,000		0.52	1,040	1,040	PILE	82.81	86,122				106,100
WE-7	FIBER GLASS DUCT 23' DIA		Est	450	LF	7,200.00	3,240,000		50.00	22,500	22,500	DUCT	59.32	1,334,700				4,574,700
WE-8	**WE SYSTEM SUBTOTAL**						**34,272,575**				**174,847**			**14,349,686**				**48,622,200**
	AUXILIARY POWER SUPPLY SYSTEM/I&C																	
AP-1	POWER SOURCE																	
	SWITCHGEAR	Double Ended Unit Substation with (2) 2MVA, 6.9-480V XFMR's	Est	1	EA	575,000.00	575,000		500.00	500	500	EHEA	53.92	26,960				602,000
	New Breaker at Existing 13.2kV Switchgear		Est	1	EA	63,000.00	63,000		100.00	100	100	EHEA	53.92	5,392				68,400
	MCC		Est	2	EA	52,500.00	105,000		240.00	480	480	EHEA	53.92	25,882				130,900
	Misc Electrical Equipment & Controls		Est	1	LS	86,100.00	86,100		324.00	324	324	EHEA	53.92	17,470				103,600
AP-2	GROUNDING																	
	Cable - 500kcmil GND		Est	2,000	LF	2.10	4,200		0.05	100	100	WIRE	69.06	6,906				11,100
	Grounding Rod		Est	12	EA	199.50	2,394		4.00	48	48	PILE	82.81	3,975				6,400
AP-3	CABLE																	
	Power Cables for MCC's	3/C 750kcmil, 5kV	Est	100	LF	33.60	3,360	Routed in 5" Conduit	0.69	69	69	WIRE	69.06	4,765				8,100
	Power Cables for MCC's	3/C 500kcmil, 5kV	Est	0	LF	14.70	0	Routed in 3" Conduit	0.69	0	0	WIRE	69.06	0				0
	Power Cables for Switchgear	3/C 4/0kcmil, 5kV	Est	1,000	LF	8.40	8,400	Routed in 2" Conduit	0.35	350	350	WIRE	69.06	24,171				32,600
	Power Cables from Switchgear to TR Sets	3/C #2/0, 600V	Est	2,400	LF	6.30	15,120	Routed in 1-1/2" Conduit	0.52	1,248	1,248	WIRE	69.06	86,187				101,300
	Power Cables from MCC to Loads - 1 ~ 5HP	3/C #10, 600V	Est	0	LF	0.76	0	Routed in 3/4" Conduit	0.05	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 15HP	3/C #8, 600V	Est	1,500	LF	1.58	2,363	Routed in 3/4" Conduit	0.05	80	80	WIRE	69.06	5,490				7,900
	Power Cables from MCC to Loads - 20 ~ 30 HP	3/C #6, 600V	Est	0	LF	2.12	0	Routed in 1-1/2" Conduit	0.09	0	0	WIRE	69.06	0				0

Sargent & Lundy LLC
Chicago

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Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21973B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
	Power Cables from MCC to Loads - 50HP	3/C #4, 600V	Est	0	LF	2.67	0	Routed in 1-1/2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Power Cables from MCC to Loads - 60HP	3/C #2, 600V	Est	0	LF	3.58	0	Routed in 2" Conduit	0.35	0	0	WIRE	69.06	0				0
	Control Cables - Pumps	5/C #14, 600V	Est	1,500	LF	0.67	1,008	Routed in 3/4" Conduit	0.03	48	48	WIRE	69.06	3,315				4,300
	Control Cables - TR Sets	7/C #14, 600V	Est	2,400	LF	0.81	1,940	Routed in 1-1/2" Conduit	0.04	96	96	WIRE	69.06	6,630				8,600
	Instrumentation Cables	2 PR #16 SHLD	Est	750	LF	0.25	189	Routed in 3/4" Conduit	0.03	24	24	WIRE	69.06	1,657				1,800
	Data Highway Cable		Est	1,000	LF	3.15	3,150	Routed in 3/4" Conduit	0.03	32	32	WIRE	69.06	2,210				5,400
AP-4	RACEWAY																	
	3/4" Conduit		Est	4,750	LF	2.06	9,776		0.19	922	922	ECND	49.67	45,771				55,500
	1-1/2" Conduit		Est	2,400	LF	4.67	11,214		0.28	682	682	ECND	49.67	33,855				45,100
	2" Conduit		Est	1,000	LF	6.25	6,248		0.35	352	352	ECND	49.67	17,484				23,700
	3" Conduit		Est	0	LF	13.13	0		0.65	0	0	ECND	49.67	0				0
	5" Conduit		Est	100	LF	38.33	3,833		1.13	113	113	ECND	49.67	5,598				9,400
AP-5	DCS SYSTEM ADDITIONS																	
	Cabinets		Est	1	EA	31,500.00	31,500		40.00	40	40	EHEA	53.92	2,157				33,700
AP-8	DCS PROGRAMMING/INTERFACE																	
	Interface Hardware		Est	1	EA	2,625.00	2,625		20.00	20	20	EHEC	59.36	1,187				3,800
	Programming /Interface		Est	1	LT	5,250.00	5,250		0.00	0	0	WIRE	69.06	0				5,300
AP-9	LIGHTING ALLOWANCE		Est	1	LT	15,750.00	15,750		150.00	150	150	INEL	60.02	9,003				24,800
AP-10	**AUXILIARY POWER SYSTEM / I&C SUBTOTAL**						**957,418**				**5,776**			**336,065**				**1,293,700**
	REINFORCING OF EXISTING EQUIPMENT	NONE																
	DEMOLITION / RELOCATIONS	NONE																
	MISCELLANEOUS	NONE																
MISC-1	PAINTING	Touch-up and Field Finish	Est	1	LS	87,150.00	87,150		3250.00	3,250	3,250	PNTR	55.58	180,635				267,800
MISC-2	ROADWORK	20' WIDTH X 1000 LF GRAVEL	Est	1	LS	45,937.50	45,938		380.00	380	380	PBIT	62.43	23,723				69,700
MISC-3	STORM DRAINAGE		Est	1	LS	7,350.00	7,350		300.00	300	300	YDRN	51.97	15,591				22,900
MISC-4	OTHER																	
MISC-5	**MISC. SUBTOTAL**						**140,438**				**3,930**			**219,949**				**360,400**
	GENERAL SUPPORT																	
GS-1	MOBILIZATION / DEMOBILIZATION		Est	1	LT		0							100,000				100,000

Sargent & Lundy LLC
Chicago

Cost Type: Est = Estimated, Bid = Vendor quote

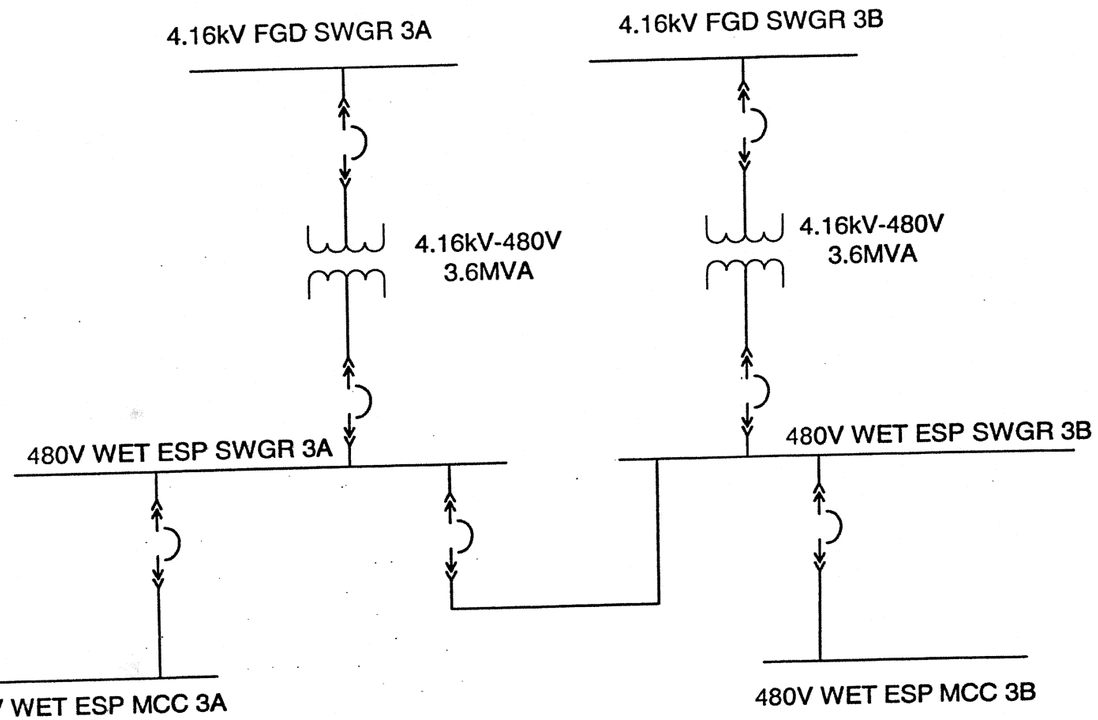
Louisville Gas & Electric
Trimble County Unit 1
SO3 Mitigation System
Option 7 - Horizontal Flow WESP
Order of Magnitude Cost Estimate
-CONFIDENTIAL-

Wage Rates Based on: Louisville, KY
Labor Productivity = 1

Estimate No.: 21973B
Project No.: 10584-022
Date: 12/20/2005
Rev Date 1/27/2006
Run Date: 1/27/2006
Preparer:
Reviewer:

Item No.	Description	Scope Definition	Cost Type	Quantity	Unit of Measure	Unit Equip./ Mat. Cost	Total Equipment or Material Cost	Cost Development	Unit Man-hours (Base)	Total Man-hours (Base)	Total Man-hours, Prod = 1	Crew Code	Crew Wage Rate	Total Construction & Erection Cost	Sub-Contracts	DOR (Furnish)	DOR (Install)	Total Projected Cost
GS-2	CRANE RENTAL	700 Ton - 2 months	Est	1	LT		0	Includes freight in and out						310,000				310,000
GS-2	**GENERAL SUPPORT SUBTOTAL**						**0**				**0**			**410,000**				**410,000**
	SUBTOTAL						**35,370,431**			0	**184,553**			**15,315,700**				**50,686,300**
	Craft Support During Startup	At 3% of Total Manhours									5,537	MECH	66.86	370,176				370,200
	Allowance for Premium Time Labor																	Not Included
	Productivity Loss Due To Overtime																	Not Included
	Per Diem Expense																	Not Included
	Project Wrap (Efficacy) Insurance																	Not Included
	Erection Contractor's General & Administrative Costs	At 5% of Material and Labor Costs - WESP																1,009,800
	Erection Contractor's Profit	At 8% of Material and Labor Costs - WESP																1,615,700
	Mandatory Spare Parts (Start-up/Testing)	Included w\Equipment Costs																Included w\Equipment Costs
	Special Tools	Included w\Equipment Costs																Included w\Equipment Costs
	Consumables	At 0.5% of Equipment/Material Cost																176,900
	Freight To Site	At 4.5% of Equipment/Material Cost																1,591,700
	Taxes - Sales/Use/VAT/Business/Etc.																	Not Included
	Construction Utilities (Elect, Water, etc.) During Construction	Furnished by Owner																By Owner
	SUBTOTAL INSTALLED COST									0	**190,089**			**15,685,876**				**55,450,600**
	ENGINEERING / CONSTRUCTION MANAGEMENT	Furnished by Project Team								0								2,495,000
	PERMITTING, MODELING, ETC.									0								0
	STARTUP AND TESTING									0								100,000
	CONTINGENCY	At 20% of Total								0								11,609,100
	CLIENT INTERNAL COST	To Be Furnished by Owner								0								200,000
	SPARE PARTS									0								Not Included
	ESCALATION	Not Included																0
	INTEREST DURING CONSTRUCTION (AFUDC)	Not Included																0
	PROJECT TOTAL :									0								**69,854,700**

TYPICAL FOR UNIT 1, 3 AND UNIT 4



Equipment	QTY	HP	Power Source
First Field Recirc Water Pumps	3		480 MCC
Second Field Recirc Water Pumps	3		480 MCC
Third Field Recirc Water Pumps	3		480 MCC
Misting Recirc Water Pumps	3		480 MCC
Make-up Water Pumps	3		480 MCC
T/R Set	12	120KVA	480 Switchgear

New 4.16kV Swgr supplied as part of the new FGD modifcation. New aux power system is expected to be designed to support these requirements. All power and control cable to support the use of the FGD 4kV Switchgear in the responsiblity of this estimate. 4kV breaker is supplied, but assume all relaying and current transformers required are not included.

Low voltage loads will be evenly across both 480V SWGR and MCC buses.

DRAWING RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	APPROVED	PURPOSE
0	12-09-05	BTC			RELEASED FOR PRELIMINARY LAYOUT

SCALE: NONE

PROJECT NUMBER: 10584-022

PRELIMINARY LAYOUT

GHENT UNIT 3

WET ESP SYSTEM

Sargent & Lundy LLC

DWG CLASS: SK-G1-WE-22 | REV. 0

SHEET 1 OF 1

8.2: First Year O&M Costs

Economic Evaluation

PLANT INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Unit Net Capacity	MW	511	511	511	511	511	511	511	511	511	511
Capacity Factor	%	80	80	80	80	80	80	80	80	80	80
SO_3 Before Treatment	lb/hr	846.0	846.0	846.0	846.0	846.0	846.0	846.0	846.0	846.0	634.0
Required Removal	wt%	90	90	---	90	90	90	90	90	90	90
SO3 Removed by Treatment	lb/hr	762.4	762.4	---	762.4	762.4	762.4	762.4	762.4	762.4	571.4

O&M COST INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Chemical Molar Stoichiometric Ratio	---	1.25	10.00	---	7.00	7.00	7.00	2.00	3.00	1.00	1.00
Chemical Use	lb/hr	202.5	7,062.1	0.0	3,869.4	2,668.6	6,671.4	2,401.7	6,461.7	1,010.2	416.4
Unit Chemical Cost	$/dry ton	$300	$109	$0	$210	$450	$30	$200	$205	$220	$210
Yearly Chemical Cost	$	$212,894	$2,697,286	$0	$2,847,263	$4,207,778	$701,296	$1,785,311	$4,641,580	$880,973	$306,400
Softened Water Consumption	gpm	0.0	0.0	75.0	38.7	0.0	75.0	43.2	0.0	18.2	0.0
Unit Softened Water Cost	$/kgal	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06
Yearly Softened Water Cost	$	$0	$0	$1,766	$910	$0	$1,766	$1,017	$0	$428	$0
Auxiliary Power Need (Total Installed Equipment)	kW	40	85	110	280	70	310	130	340	130	3,500
Unit Auxiliary Power Cost	$/MW-h	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87
Additional Outage Cost	$/MW-h	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59
Yearly Auxiliary Power Cost	$	$7,137	$15,166	$19,627	$49,959	$12,490	$55,311	$23,195	$60,664	$23,195	$624,483
O&M Labor	man-hours	333	666	333	666	666	666	666	666	666	333
O&M Labor Cost	$/man-hour	$40	$40	$40	$40	$40	$40	$40	$40	$40	$40
Yearly O&M Cost	$	$13,312.00	$26,624.00	$13,312.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$13,312.00
Subtotal	$	$233,342	$2,739,076	$34,705	$2,924,756	$4,246,892	$784,998	$1,836,147	$4,728,868	$931,220	$944,195

Single unit.
Licensing fee of $200/MW/yr applied to SBS and Soda Ash systems.
Reagent use in WESP options is for wash water neutralization.
Humidification water only saturates flue gas and won't remove the stated SO_3.

Economic Evaluation

PLANT INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Unit Net Capacity	MW	511	511	511	511	511	511	511	511	511	511
Capacity Factor	%	80	80	80	80	80	80	80	80	80	80
SO_3 Before Treatment	lb/hr	846.0	846.0	846.0	846.0	846.0	846.0	846.0	846.0	846.0	634.0
Required Removal	wt%	90	90	---	90	90	90	90	90	90	90
SO3 Removed by Treatment	lb/hr	762.4	762.4	---	762.4	762.4	762.4	762.4	762.4	762.4	571.4

O&M COST INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Chemical Molar Stoichiometric Ratio	---	1.25	10.00	---	7.00	7.00	7.00	2.00	3.00	1.00	1.00
Chemical Use	lb/hr	202.5	7,062.1	0.0	3,869.4	2,668.6	6,671.4	2,401.7	6,461.7	1,010.2	416.4
Unit Chemical Cost	$/dry ton	$300	$109	$0	$210	$450	$30	$200	$205	$220	$210
Yearly Chemical Cost	$	$212,894	$2,697,286	$0	$2,847,263	$4,207,778	$701,296	$1,785,311	$4,641,580	$880,973	$306,400
Softened Water Consumption	gpm	0.0	0.0	75.0	38.7	0.0	75.0	43.2	0.0	18.2	0.0
Unit Softened Water Cost	$/kgal	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06
Yearly Softened Water Cost	$	$0	$0	$1,766	$910	$0	$1,766	$1,017	$0	$428	$0
Auxiliary Power Need (Total Installed Equipment)	kW	40	85	110	280	70	310	130	340	130	3,500
Unit Auxiliary Power Cost	$/MW-h	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87
Additional Outage Cost	$/MW-h	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59
Yearly Auxiliary Power Cost	$	$7,137	$15,166	$19,627	$49,959	$12,490	$55,311	$23,195	$60,664	$23,195	$624,483
O&M Labor	man-hours	333	666	333	666	666	666	666	666	666	333
O&M Labor Cost	$/man-hour	$40	$40	$40	$40	$40	$40	$40	$40	$40	$40
Yearly O&M Cost	$	$13,312.00	$26,624.00	$13,312.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$13,312.00
Subtotal	$	$233,342	$2,739,076	$34,705	$2,924,756	$4,246,892	$784,998	$1,836,147	$4,728,868	$931,220	$944,195

Single unit.
Licensing fee of $200/MW/yr applied to SBS and Soda Ash systems.
Reagent use in WESP options is for wash water neutralization.
Humidification water only saturates flue gas and won't remove the stated SO_3.

Economic Evaluation

PLANT INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Unit Net Capacity	MW	386	386	386	386	386	386	386	386	386	386
Capacity Factor	%	80	80	80	80	80	80	80	80	80	80
SO_3 Before Treatment	lb/hr	511.0	511.0	511.0	511.0	511.0	511.0	511.0	511.0	511.0	345.0
Required Removal	wt%	87	87	---	87	87	87	87	87	87	87
SO3 Removed by Treatment	lb/hr	443.1	443.1	---	443.1	443.1	443.1	443.1	443.1	443.1	299.1

O&M COST INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Chemical Molar Stoichiometric Ratio	---	1.25	10.00	---	7.00	7.00	7.00	2.00	3.00	1.00	1.00
Chemical Use	lb/hr	117.7	4,103.8	0.0	2,248.5	1,550.7	3,876.7	1,395.6	3,754.9	587.0	218.0
Unit Chemical Cost	$/dry ton	$300	$109	$0	$210	$450	$30	$200	$205	$220	$210
Yearly Chemical Cost	$	$123,711	$1,567,371	$0	$1,654,521	$2,445,105	$407,518	$1,055,242	$2,697,184	$529,739	$160,403
Softened Water Consumption	gpm	0.0	0.0	75.0	22.5	0.0	75.0	25.1	0.0	10.6	0.0
Unit Softened Water Cost	$/kgal	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06
Yearly Softened Water Cost	$	$0	$0	$1,766	$529	$0	$1,766	$591	$0	$249	$0
Auxiliary Power Need (Total Installed Equipment)	kW	40	85	110	280	70	310	130	340	130	3,500
Unit Auxiliary Power Cost	$/MW-h	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87
Additional Outage Cost	$/MW-h	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59
Yearly Auxiliary Power Cost	$	$7,137	$15,166	$19,627	$49,959	$12,490	$55,311	$23,195	$60,664	$23,195	$624,483
O&M Labor	man-hours	333	666	333	666	666	666	666	666	666	333
O&M Labor Cost	$/man-hour	$40	$40	$40	$40	$40	$40	$40	$40	$40	$40
Yearly O&M Cost	$	$13,312.00	$26,624.00	$13,312.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$13,312.00
Subtotal	$	$144,160	$1,609,161	$34,705	$1,731,633	$2,484,219	$491,219	$1,105,652	$2,784,472	$579,806	$798,198

Single unit.
Licensing fee of $200/MW/yr applied to SBS and Soda Ash systems.
Reagent use in WESP options is for wash water neutralization.
Humidification water only saturates flue gas and won't remove the stated SO_3.

Economic Evaluation

PLANT INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Unit Net Capacity	MW	490	490	490	490	490	490	490	490	490	490
Capacity Factor	%	80	80	80	80	80	80	80	80	80	80
SO_3 Before Treatment	lb/hr	545.0	545.0	545.0	545.0	545.0	545.0	545.0	545.0	545.0	364.0
Required Removal	wt%	85	85	---	85	85	85	85	85	85	85
SO3 Removed by Treatment	lb/hr	465.9	465.9	---	465.9	465.9	465.9	465.9	465.9	465.9	311.2

O&M COST INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Chemical Molar Stoichiometric Ratio	---	1.25	10.00	---	7.00	7.00	7.00	2.00	3.00	1.00	1.00
Chemical Use	lb/hr	123.8	4,315.8	0.0	2,364.6	1,630.8	4,077.0	1,467.7	3,948.8	617.4	226.8
Unit Chemical Cost	$/dry ton	$300	$109	$0	$210	$450	$30	$200	$205	$220	$210
Yearly Chemical Cost	$	$130,102	$1,648,350	$0	$1,740,004	$2,571,434	$428,572	$1,126,574	$2,836,537	$573,919	$166,877
Softened Water Consumption	gpm	0.0	0.0	75.0	23.6	0.0	75.0	26.4	0.0	11.1	0.0
Unit Softened Water Cost	$/kgal	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06
Yearly Softened Water Cost	$	$0	$0	$1,766	$556	$0	$1,766	$621	$0	$261	$0
Auxiliary Power Need (Total Installed Equipment)	kW	40	85	110	280	70	310	130	340	130	3,500
Unit Auxiliary Power Cost	$/MW-h	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87
Additional Outage Cost	$/MW-h	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59
Yearly Auxiliary Power Cost	$	$7,137	$15,166	$19,627	$49,959	$12,490	$55,311	$23,195	$60,664	$23,195	$624,483
O&M Labor	man-hours	333	666	333	666	666	666	666	666	666	333
O&M Labor Cost	$/man-hour	$40	$40	$40	$40	$40	$40	$40	$40	$40	$40
Yearly O&M Cost	$	$13,312.00	$26,624.00	$13,312.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$13,312.00
Subtotal	$	$150,551	$1,690,140	$34,705	$1,817,143	$2,610,548	$512,274	$1,177,014	$2,923,825	$624,000	$804,672

Single unit.
Licensing fee of $200/MW/yr applied to SBS and Soda Ash systems.
Reagent use in WESP options is for wash water neutralization.
Humidification water only saturates flue gas and won't remove the stated SO_3.

Economic Evaluation

PLANT INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Unit Net Capacity	MW	495	495	495	495	495	495	495	495	495	495
Capacity Factor	%	80	80	80	80	80	80	80	80	80	80
SO_3 Before Treatment	lb/hr	877.0	877.0	877.0	877.0	877.0	877.0	877.0	877.0	877.0	610.0
Required Removal	wt%	90	90	---	90	90	90	90	90	90	90
SO3 Removed by Treatment	lb/hr	792.8	792.8	---	792.8	792.8	792.8	792.8	792.8	792.8	551.4

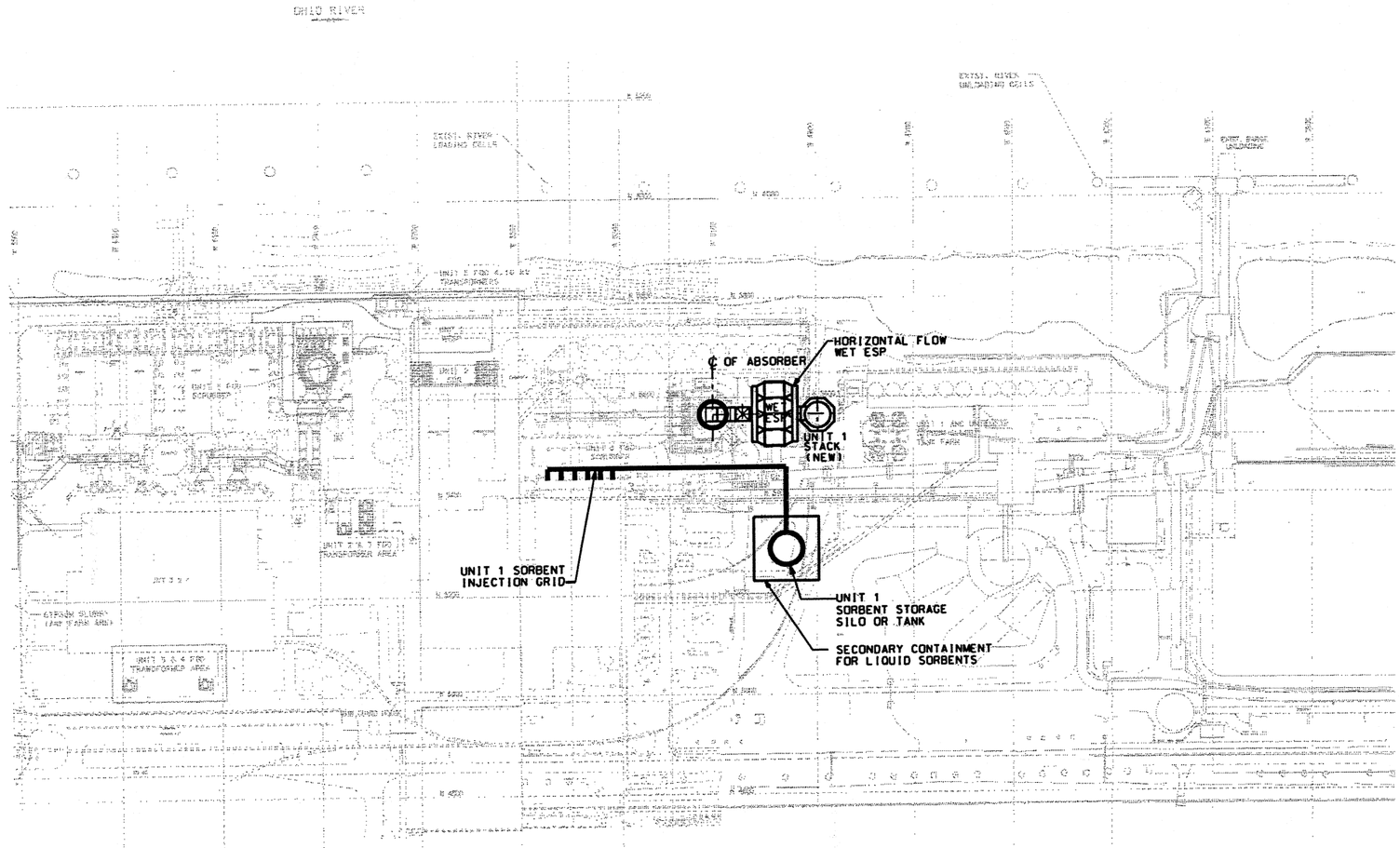
O&M COST INFORMATION

Cost Analysis Parameter	Units	Ammonia	Hydrated Lime	Humidification Water	Magnesium Hydroxide	Magnesium Oxide	Micronized Limestone	Sodium BiSulfite	Trona	Soda Ash	Wet ESP
Chemical Molar Stoichiometric Ratio	---	1.25	10.00	---	7.00	7.00	7.00	2.00	3.00	1.00	1.00
Chemical Use	lb/hr	210.6	7,343.1	0.0	4,023.4	2,774.7	6,936.8	2,497.3	6,718.8	1,050.4	401.8
Unit Chemical Cost	$/dry ton	$300	$109	$0	$210	$450	$30	$200	$205	$220	$210
Yearly Chemical Cost	$	$221,364	$2,804,599	$0	$2,960,543	$4,375,187	$729,198	$1,849,075	$4,826,248	$908,757	$295,695
Softened Water Consumption	gpm	0.0	0.0	75.0	40.2	0.0	75.0	44.9	0.0	18.9	0.0
Unit Softened Water Cost	$/kgal	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06	$0.06
Yearly Softened Water Cost	$	$0	$0	$1,766	$946	$0	$1,766	$1,057	$0	$445	$0
Auxiliary Power Need (Total Installed Equipment)	kW	40	85	110	280	70	310	130	340	130	3,500
Unit Auxiliary Power Cost	$/MW-h	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87	$16.87
Additional Outage Cost	$/MW-h	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59	$8.59
Yearly Auxiliary Power Cost	$	$7,137	$15,166	$19,627	$49,959	$12,490	$55,311	$23,195	$60,664	$23,195	$624,483
O&M Labor	man-hours	333	666	333	666	666	666	666	666	666	333
O&M Labor Cost	$/man-hour	$40	$40	$40	$40	$40	$40	$40	$40	$40	$40
Yearly O&M Cost	$	$13,312.00	$26,624.00	$13,312.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$26,624.00	$13,312.00
Subtotal	$	$241,813	$2,846,389	$34,705	$3,038,072	$4,414,301	$812,899	$1,899,951	$4,913,536	$959,021	$933,490

Single unit.
Licensing fee of $200/MW/yr applied to SBS and Soda Ash systems.
Reagent use in WESP options is for wash water neutralization.
Humidification water only saturates flue gas and won't remove the stated SO_3.

9: Drawings

Ghent 1



PLAN

SCALE: 1" = 100'-0"

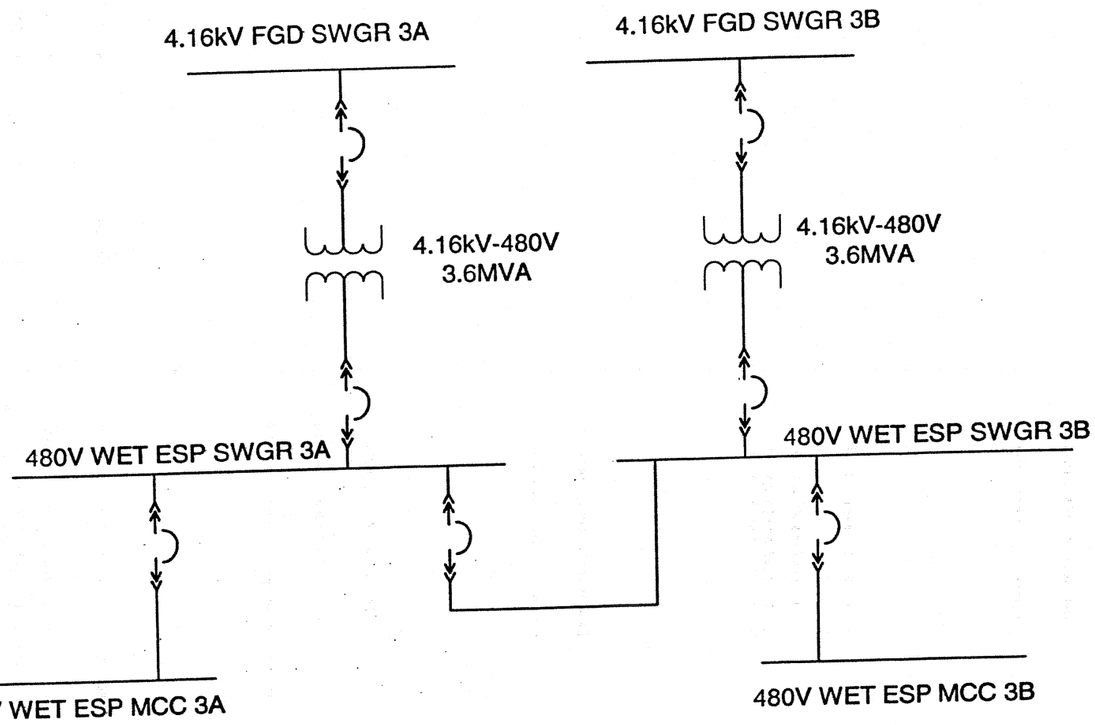
DRAWING RELEASE RECORD			
REV	DATE RELEASED	PURPOSE	
			PREPARED
			REVIEWED
			APPROVED
08	01-27-06		N.PATEL
			G. SWITAK

GENERAL ARRANGEMENT
SITE PLAN
SO3 MITIGATION STRATEGY STUDY
EQUIPMENT ARRANGEMENT
GHENT UNIT 1

Sargent & Lundy

DRAWING NO.	REV.
GHTS03GA01	08
SHEET OF	

TYPICAL FOR UNIT 1, 3 AND UNIT 4



Equipment	QTY	HP	Power Source
First Field Recirc Water Pumps	3		480 MCC
Second Field Recirc Water Pumps	3		480 MCC
Third Field Recirc Water Pumps	3		480 MCC
Misting Recirc Water Pumps	3		480 MCC
Make-up Water Pumps	3		480 MCC
T/R Set	12	120KVA	480 Switchgear

New 4.16kV Swgr supplied as part of the new FGD modifcation. New aux power system is expected to be designed to support these requirements. All power and control cable to support the use of the FGD 4kV Switchgear in the responsiblity of this estimate. 4kV breaker is supplied, but assume all relaying and current transformers required are not included.

Low voltage loads will be evenly across both 480V SWGR and MCC buses.

DRAWING RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	APPROVED	PURPOSE
0	12-09-05	BTC			RELEASED FOR PRELIMINARY LAYOUT

SCALE: NONE

PROJECT NUMBER: 10584-022

PRELIMINARY LAYOUT

GHENT UNIT 3

WET ESP SYSTEM

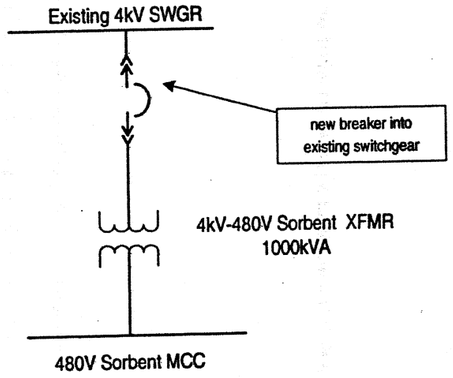
Sargent & Lundy LLC

DWG CLASS: SK-G1-WE-22

REV. 0

SHEET 1 OF 1

TYPICAL FOR UNIT 1, 3 AND UNIT 4



Description	HP	units	QTY
Convey Air Blower Motor	250	hp	2
Blower Enclosure Fan Motor	10	hp	2
Hydraulic Duty Pump Motor	25	hp	1
Hydraulic Standby Motor	25	hp	1
Hydraulic Recirculation Pump Motor	10	hp	1
Dust Collector Fan Motor	10	hp	2
Dust Collector Rotory Feeder Motor	10	hp	1
Hydraulic Cooling Fan Motor	10	hp	1
Silo Screw Feeder Motor	25	hp	1
Weigh Bin Rotory Feeder Motor	10	hp	2
Airlock Rotory Feeder Motor	10	hp	2
Glycol Duty Pump Motor	25	hp	1
Glycol Standby Pump Motor	25	hp	1
Chiller Motor	10	hp	7
Desicant Wheel Reg Fan Motor	1	hp	2
Desicant Wheel Drive Motor	2	hp	2
Desicant Wheel React Heater	24	kw	2
Main Elevator Motor	50	hp	1
Transformer 480:208V Lighting/HVAC 3 phase	28	kva	1
Transformer 480:120/240V Control 1 phase	50	kva	1
HVAC Exhaust Fan Motor	7.5	hp	2
HVAC Supply Fan Motor	7.5	hp	2
HVAC Blower Heater	5	kw	4
HVAC Blower Heater	10	kw	4

DRAWer RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	APPROVED	PURPOSE
0	12-09-05	BTC			RELEASED FOR PRELIMINARY LAYOUT

SCALE: NONE

PROJECT NUMBER: 10584-022

PRELIMINARY LAYOUT

GHENT UNIT 3

SORBENT INJECTION SYSTEM

Sargent & Lundy LLC

DWG CLASS:

SK-G3-SI-22

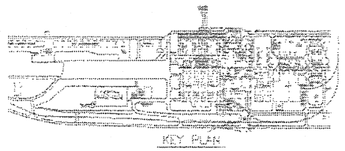
REV. 1

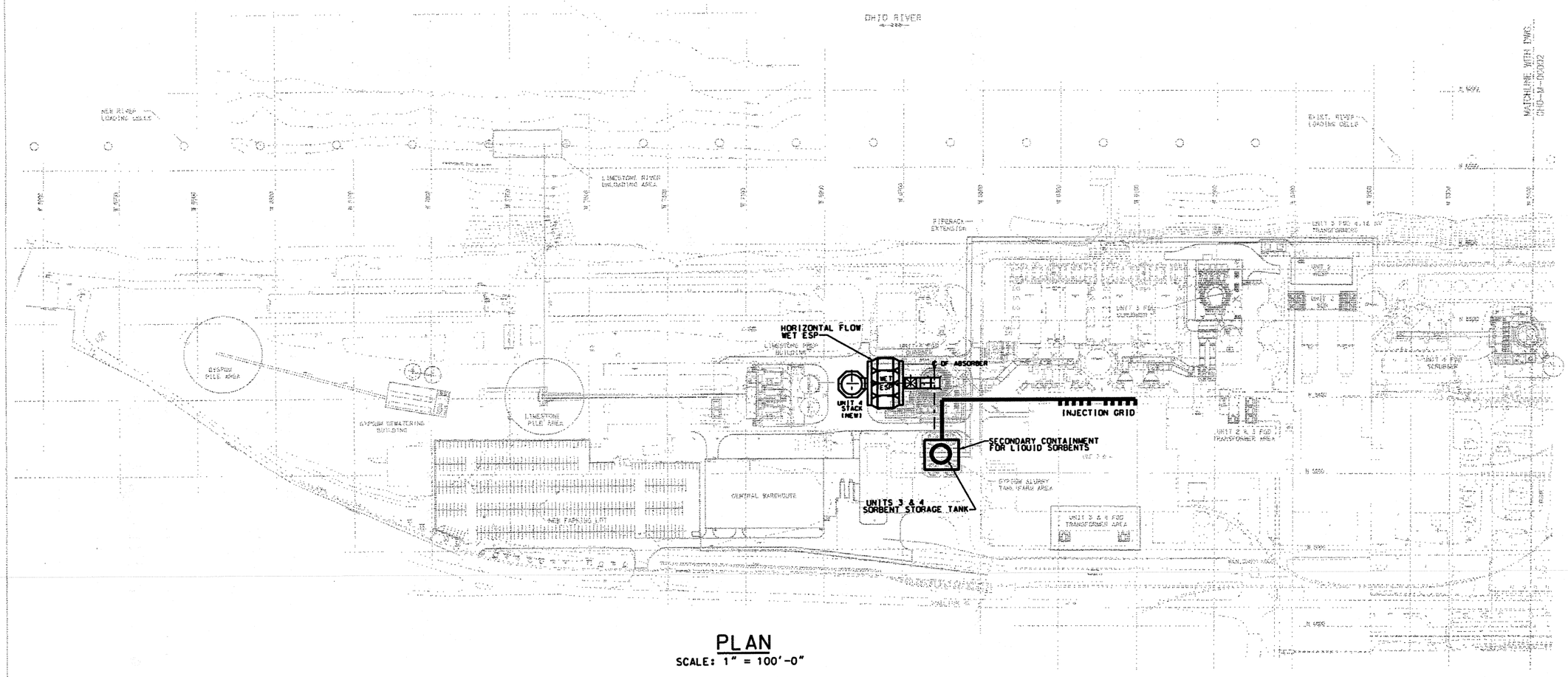
SHEET 1 OF 1

9: Drawings

Ghent 3

10000-M-0ND





PLAN
SCALE: 1" = 100'-0"

DRAWING RELEASE RECORD									
REV	DATE	PREPARED	APPROVED	PURPOSE	REV	DATE	PREPARED	APPROVED	PURPOSE

FLUOR

100 Fluor Daniel Drive
Greenville
South Carolina 29607
864-281-4400

PROJECT NUMBER

TITLE
GHENT POWER STATION
MASTER PLANNING ARRG'T DWG.
WEST SIDE PLAN

LOCATION AND UNIT
GHENT, KY.

Kentucky Utilities Company

DRAWING NO. OHG-M-00001 REV.

Sargent & Lundy

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DRAWING RELEASE RECORD			
REV	DATE RELEASED	PURPOSE	PREPARED / REVIEWED / APPROVED
08	1-27-06		N.PATEL / G. SWITAK

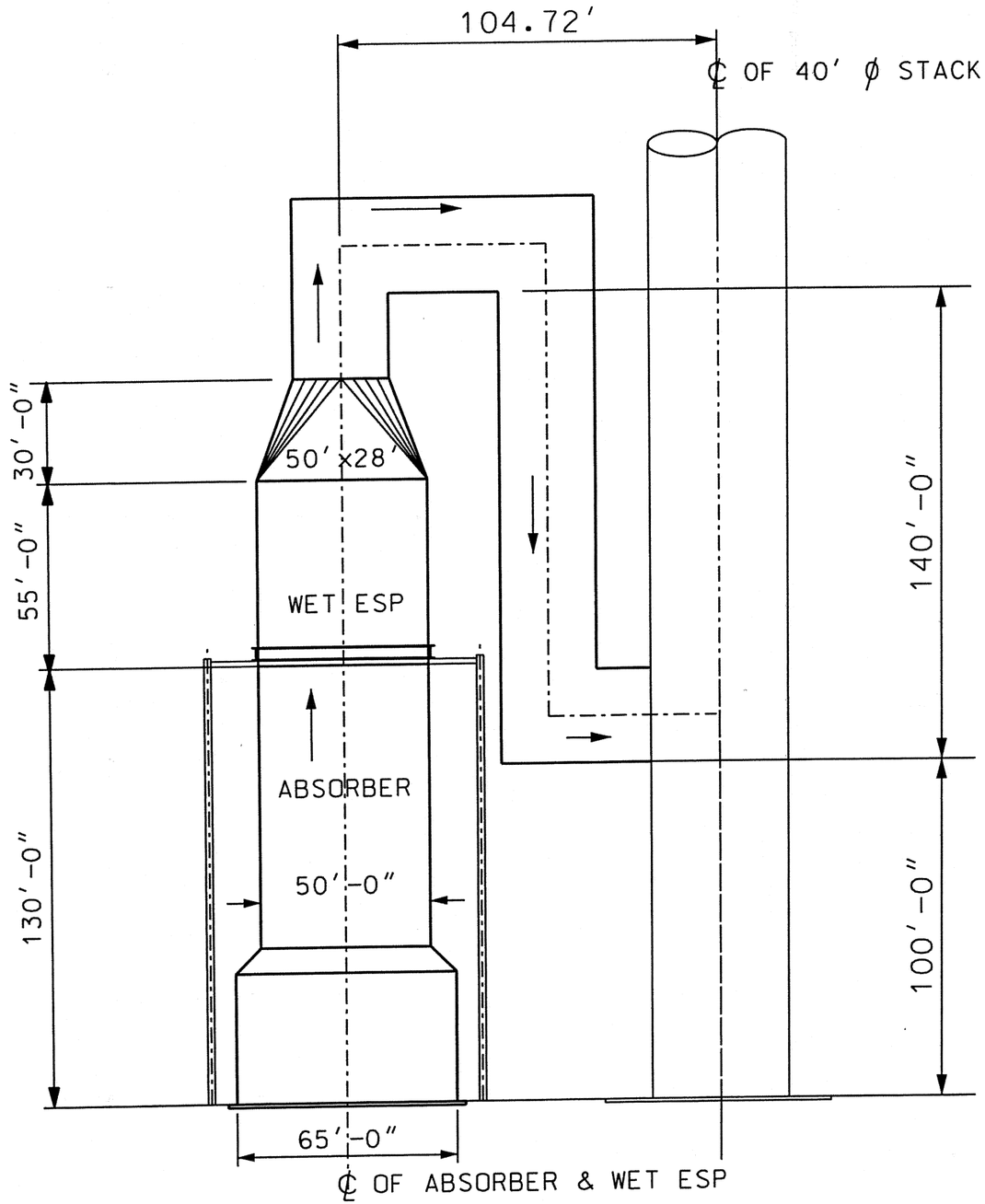
GENERAL ARRANGEMENT
SITE PLAN
SO3 MITIGATION STRATEGY STUDY
EQUIPMENT ARRANGEMENT
GHENT UNIT 3 & 4

Sargent & Lundy

DRAWING NO. GHTS03GA02 REV. 08

SHEET OF

GHENT UNIT 3
OPTION 1



ELEVATION

SO3 MITIGATION STUDY
EQUIPMENT ARRANGEMENT
GHENT PLANT UNIT 3

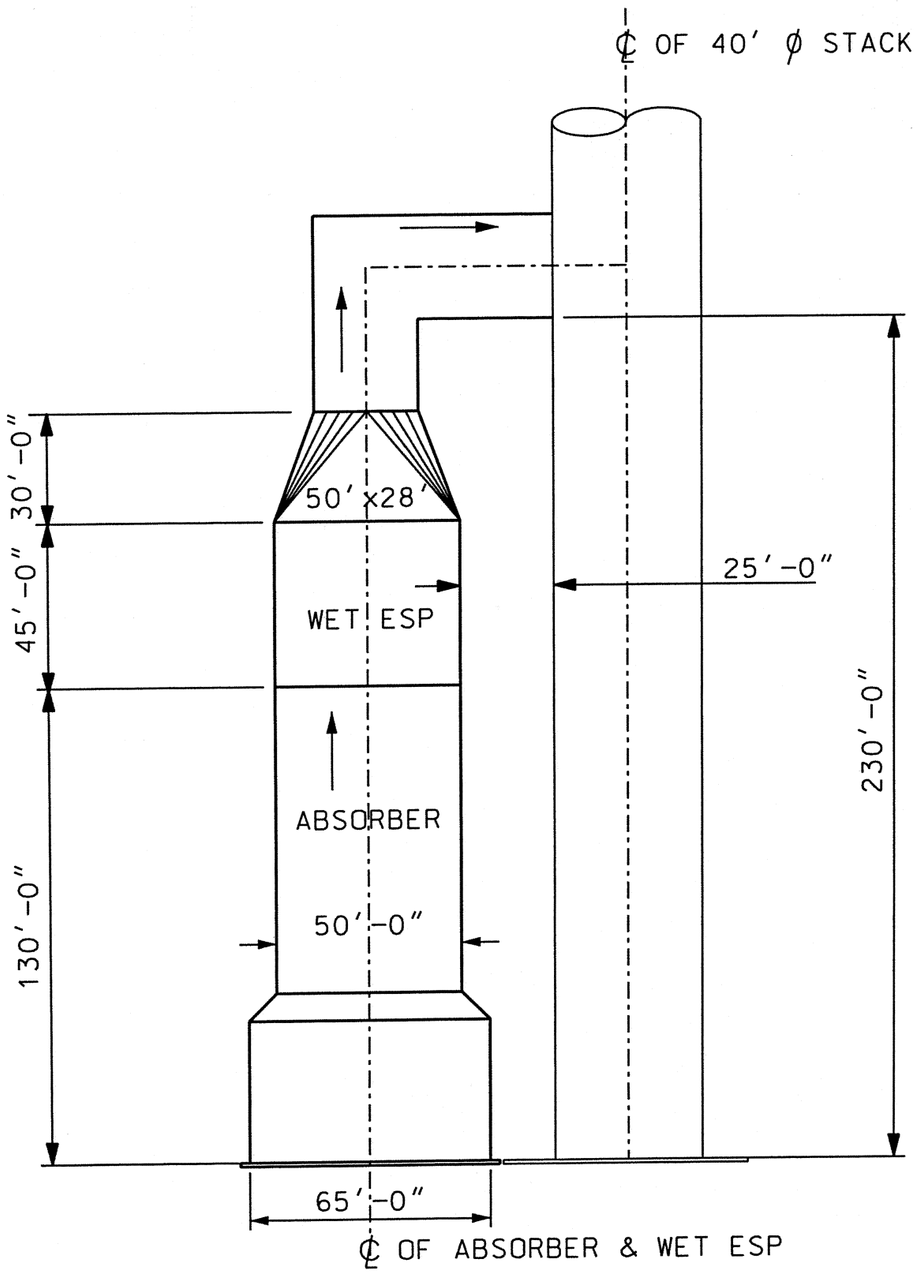
Sargent & Lundy LLC

DRAWING NO.	REV.
GHENTGA03	0
SHEET OF	

9: Drawings

Ghent 4

GHENT UNIT 4
OPTION 1



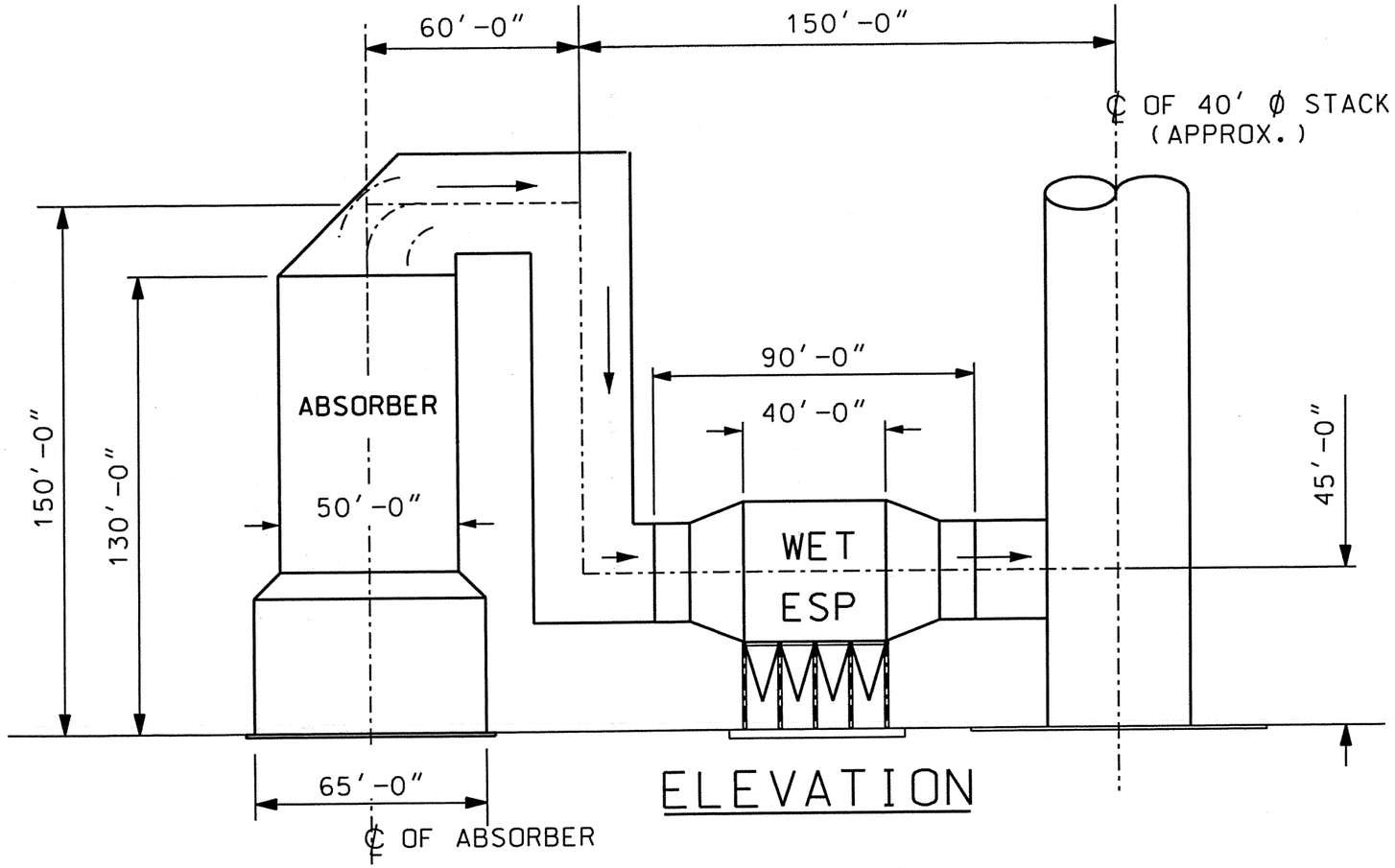
ELEVATION

SO3 MITIGATION STUDY
EQUIPMENT ARRANGEMENT
GHENT PLANT UNIT 4

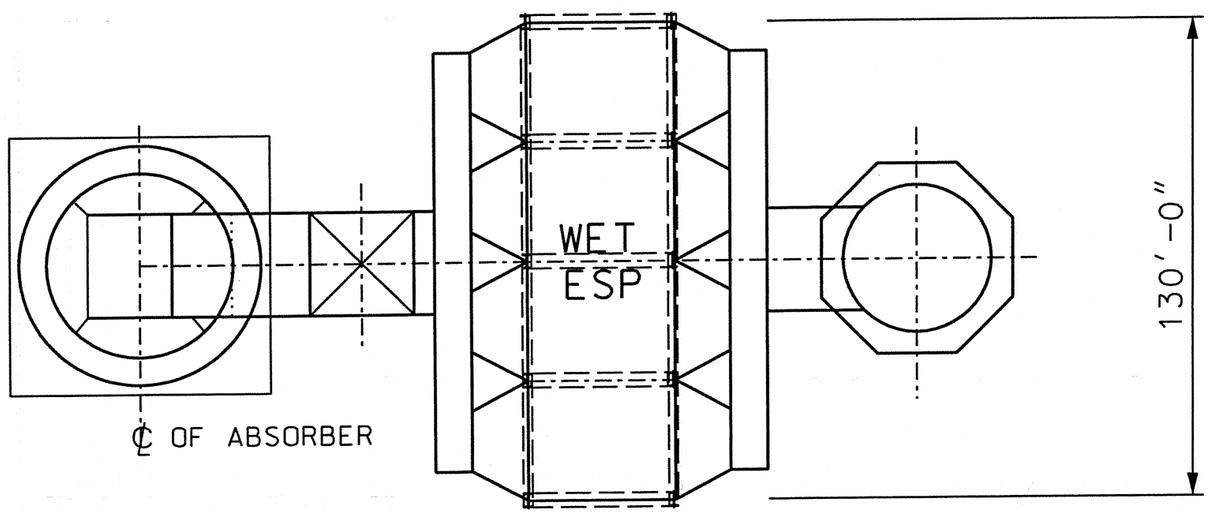
Sargent & Lundy LLC

DRAWING NO.	REV.
GHENTGA01	0
SHEET OF	

GHENT UNIT 4
OPTION 2



ELEVATION



PLAN

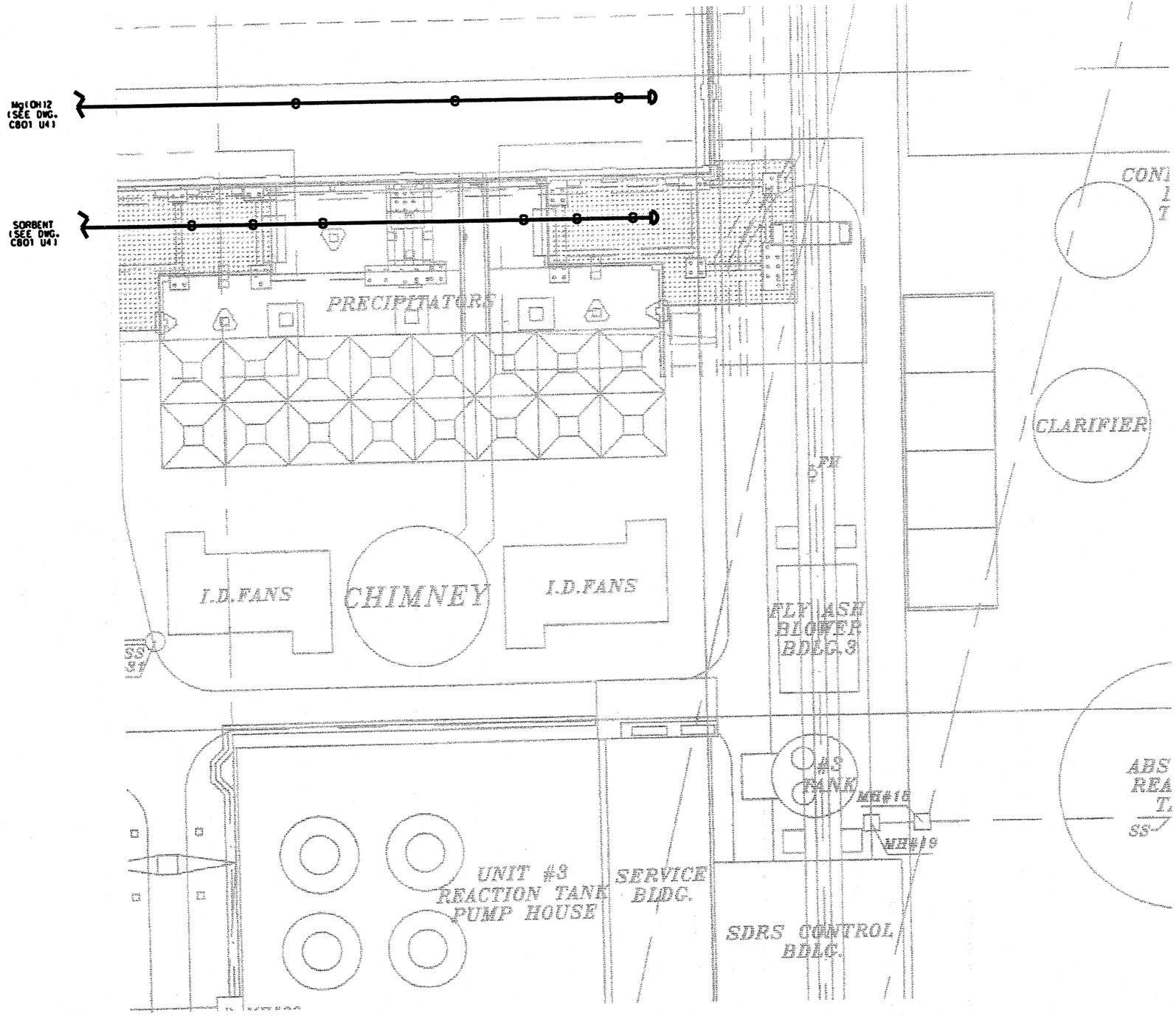
SO3 MITIGATION STUDY
EQUIPMENT ARRANGEMENT
GHENT PLANT UNIT 4

Sargent & Lundy

DRAWING NO.	REV.
GHENTGA02	0
SHEET OF	

9: Drawings

Mill Creek 3



PLAN

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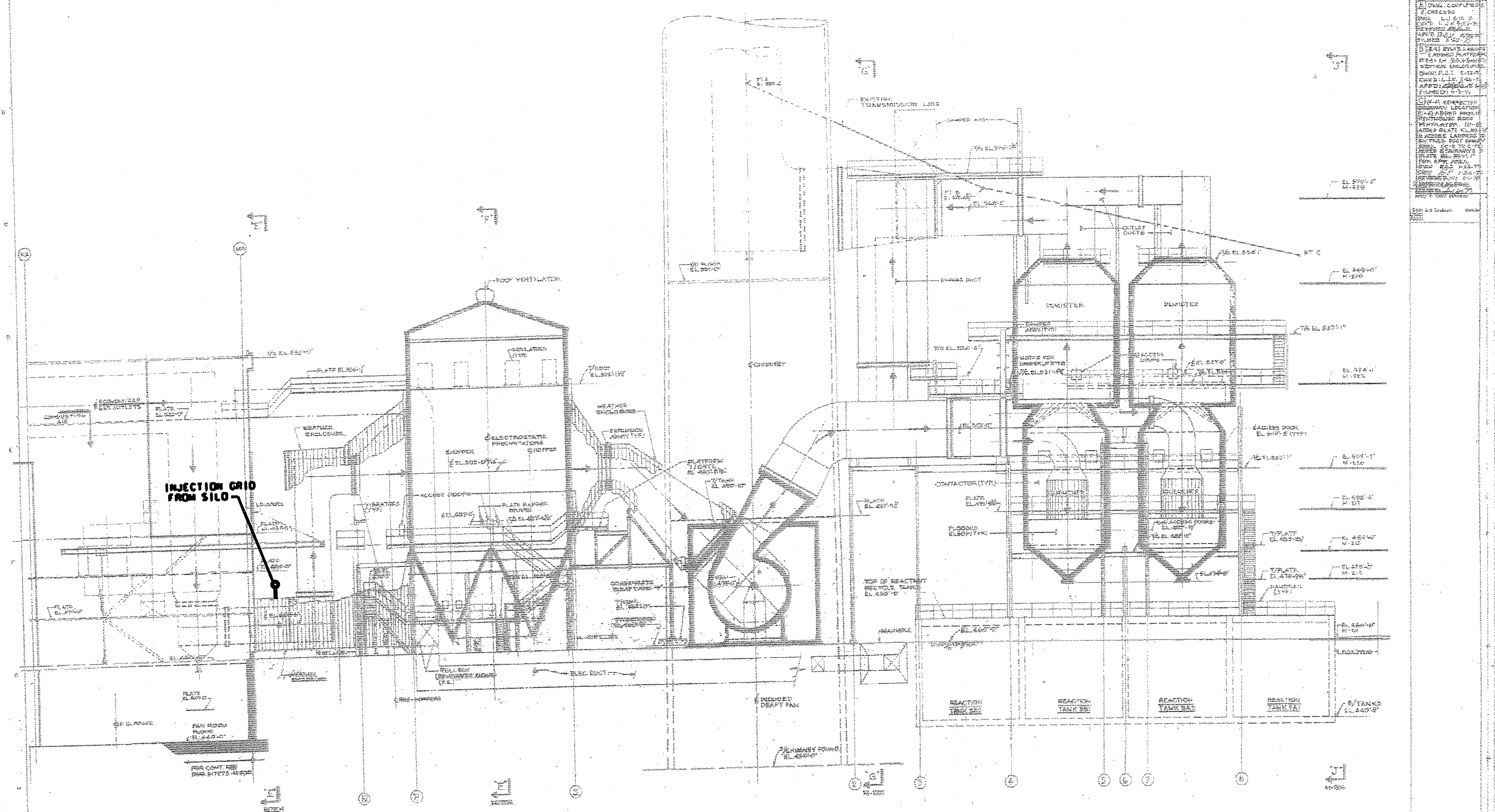
DRAWING RELEASE RECORD			
REV	DATE RELEASED	PURPOSE	PREPARED / REVIEWED / APPROVED
08	01-27-06		N.PATEL / G. SWITAK

GENERAL ARRANGEMENT
SITE PLAN
SO3 MITIGATION STRATEGY STUDY
EQUIPMENT ARRANGEMENT
MILL CREEK UNIT 3

Sargent & Lundy

DRAWING NO.	REV.
C801 U3	08
SHEET OF	



PLAN

SCALE: 1/8" = 1'-0"

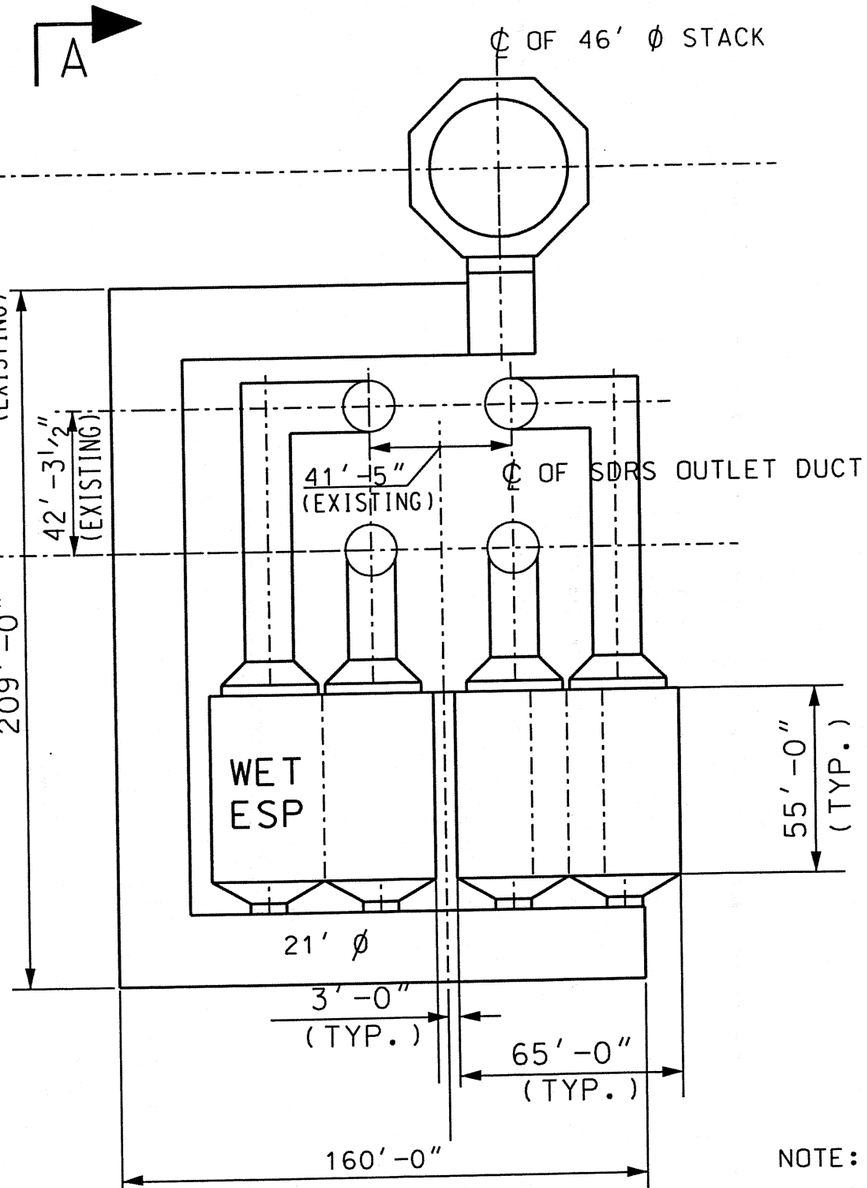
LOUISVILLE GAS & ELECTRIC COMPANY

General Arrangement
Cross Section "B-B" Looking North
Precipitators & S.D.R.S

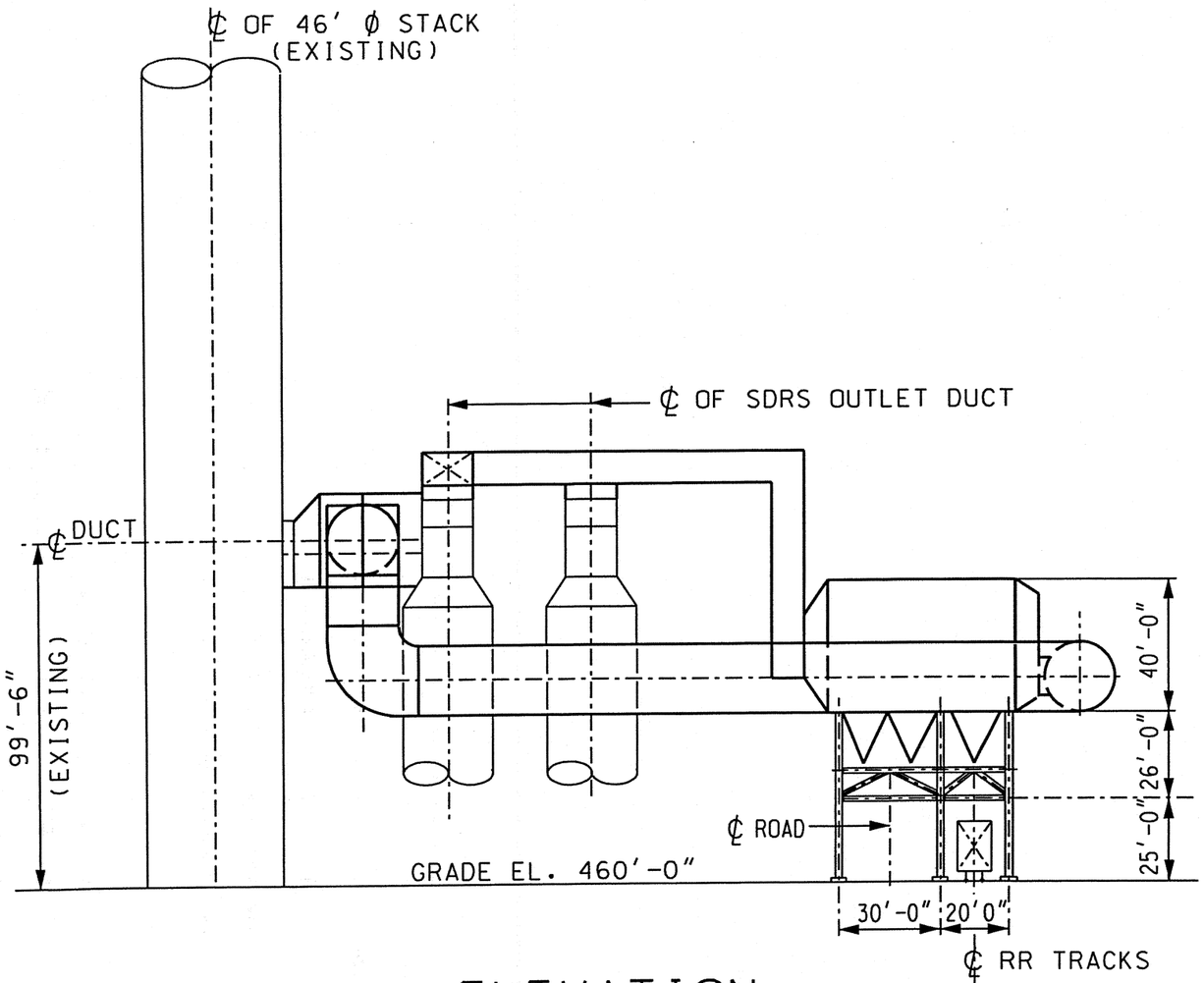
Mechanical

Pioneer Service | 317273 | M201 U3 D

317273 - M201 C



PLAN



ELEVATION "A-A"

NOTE:

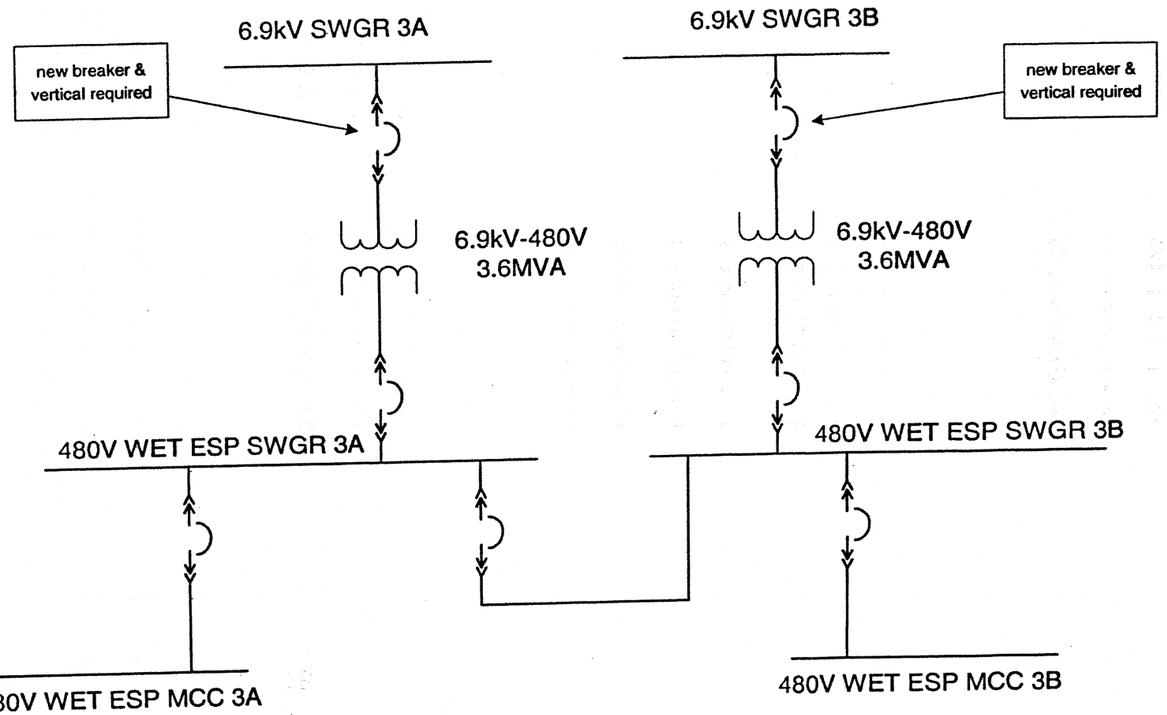
1. SUPPORTS FOR NEW DUCT NOT SHOWN.

SO3 MITIGATION STUDY
EQUIPMENT ARRANGEMENT
MILL CREEK PLANT UNIT 3

Sargent & Lundy

DRAWING NO.	REV.
MILLCA03	0
SHEET OF	

TYPICAL FOR BOTH UNIT 3 AND UNIT 4



Equipment	QTY	HP	Power Source
First Field Recirc Water Pumps	3		480 MCC
Second Field Recirc Water Pumps	3		480 MCC
Third Field Recirc Water Pumps	3		480 MCC
Misting Recirc Water Pumps	3		480 MCC
Make-up Water Pumps	3		480 MCC
T/R Set	12	120KVA	480 Switchgear

New 6.9kV Swgr vertical sections, breakers relaying, current transformers, etc will need to be supplied as part of this estimate. All power and control cable to support the use of the 6.9kV Switchgear in the responsiblity of this estimate. The 6.9kV switchgear is rated 500MVA and the additional breakers and vertical sections will need to meet these requirements.

Low voltage loads will be evenly across both 480V SWGR and MCC buses.

Equipment Location Notes:
- Existing 6.9kV Switchgear are located in the station in the between the boiler area and the turbine area.
- New Wet ESP Switchgear and MCCs will need to be located in new Electrical Equipment Building.

DRAWING RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	APPROVED	PURPOSE
0	12-09-05	BTC			RELEASED FOR PRELIMINARY LAYOUT

SCALE: NONE

PROJECT NUMBER: 10584-022

PRELIMINARY LAYOUT

MILL CREEK UNIT 3

WET ESP SYSTEM

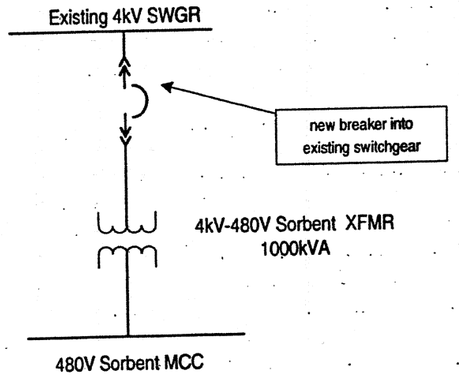
Sargent & Lundy LLC

DWG CLASS: SK-MC3-WE-22

REV.: 0

SHEET 1 OF 1

TYPICAL FOR BOTH UNIT 3 AND UNIT 4



Description	HP	units	QTY
Convey Air Blower Motor	250	hp	2
Blower Enclosure Fan Motor	10	hp	2
Hydraulic Duty Pump Motor	25	hp	1
Hydraulic Standby Motor	25	hp	1
Hydraulic Recirculation Pump Motor	10	hp	1
Dust Collector Fan Motor	10	hp	2
Dust Collector Rotory Feeder Motor	10	hp	1
Hydraulic Cooling Fan Motor	10	hp	1
Silo Screw Feeder Motor	25	hp	1
Weigh Bin Rotory Feeder Motor	10	hp	2
Airlock Rotory Feeder Motor	10	hp	2
Glycol Duty Pump Motor	25	hp	1
Glycol Standby Pump Motor	25	hp	1
Chiller Motor	10	hp	7
Desicant Wheel Reg Fan Motor	1	hp	2
Desicant Wheel Drive Motor	2	hp	2
Desicant Wheel React Heater	24	kw	2
Main Elevator Motor	50	hp	1
Transformer 480:208V Lighting/HVAC 3 phase	28	kva	1
Transformer 480:120/240V Control 1 phase	50	kva	1
HVAC Exhaust Fan Motor	7.5	hp	2
HVAC Supply Fan Motor	7.5	hp	2
HVAC Blower Heater	5	kw	4
HVAC Blower Heater	10	kw	4

DRAWING RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	APPROVED	PURPOSE
0	12-09-05	BTC			RELEASED FOR PRELIMINARY LAYOUT

SCALE: NONE

PROJECT NUMBER: 10584-022

PRELIMINARY LAYOUT

MILL CREEK UNIT 3

SORBENT INJECTION SYSTEM

Sargent & Lundy LLC

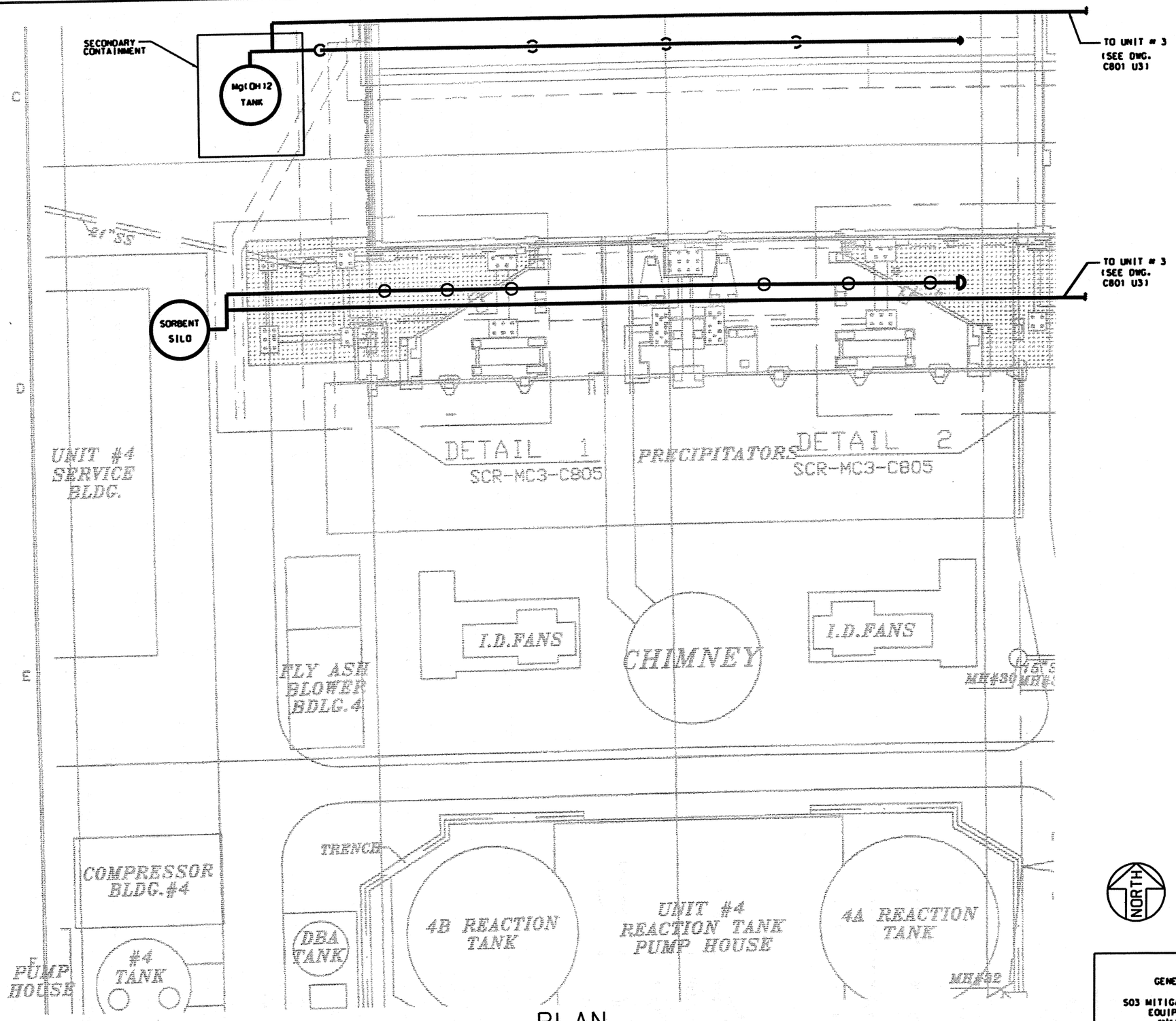
DWG CLASS: SK-MC3-SI-22

REV.: 0

SHEET 1 OF 1

9: Drawings

Mill Creek 4



PLAN

NORTH

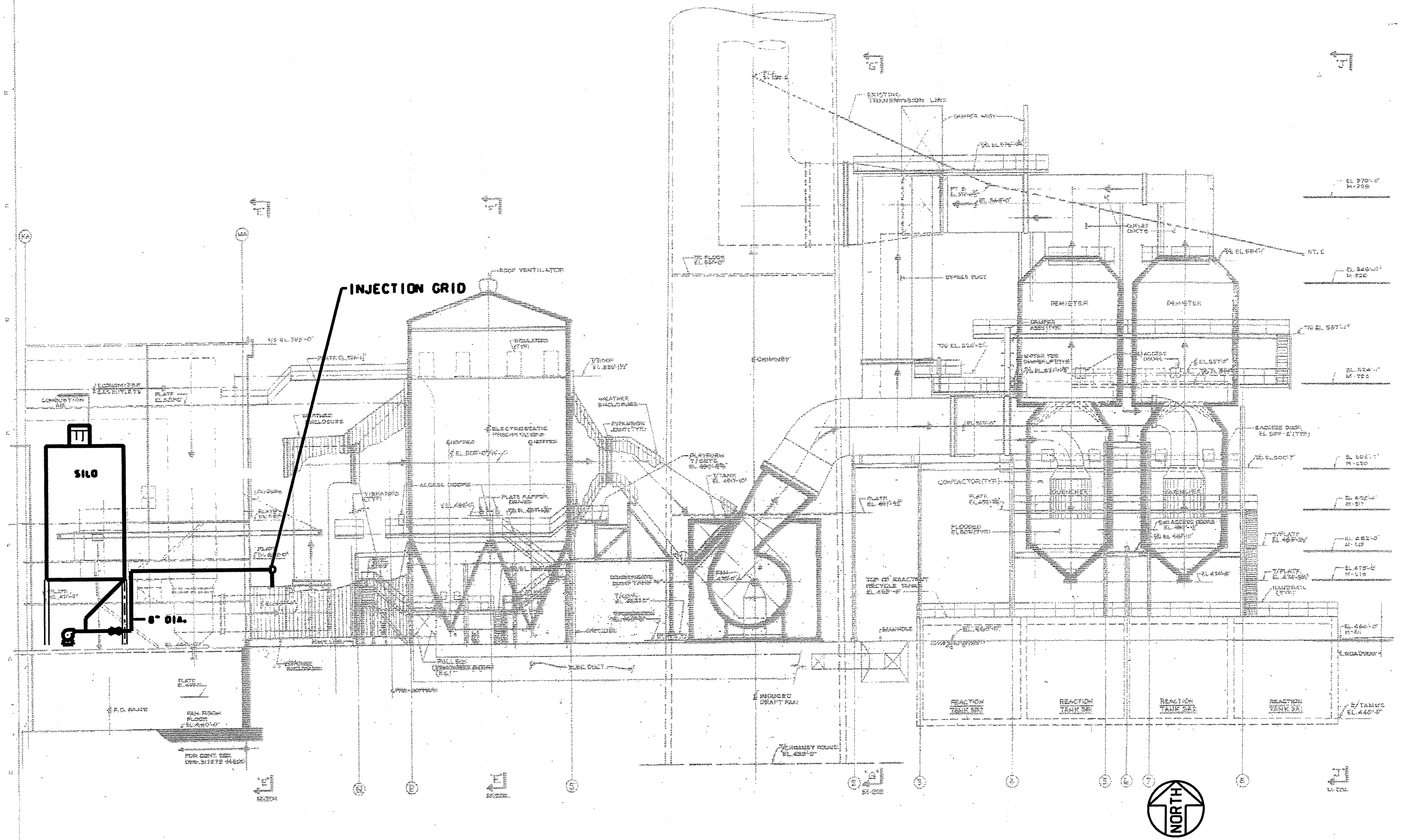
DRAWING RELEASE RECORD			
REV	DATE RELEASED	PURPOSE	PREPARED / REVIEWED / APPROVED
08	01-27-06		N.PATEL / G. SWITAK

GENERAL ARRANGEMENT
SITE PLAN
SO3 MITIGATION STRATEGY STUDY
EQUIPMENT ARRANGEMENT
MILL CREEK UNIT 4

Sargent & Lundy

DRAWING NO. C801 U4 — REV. 08

SHEET OF



PLAN

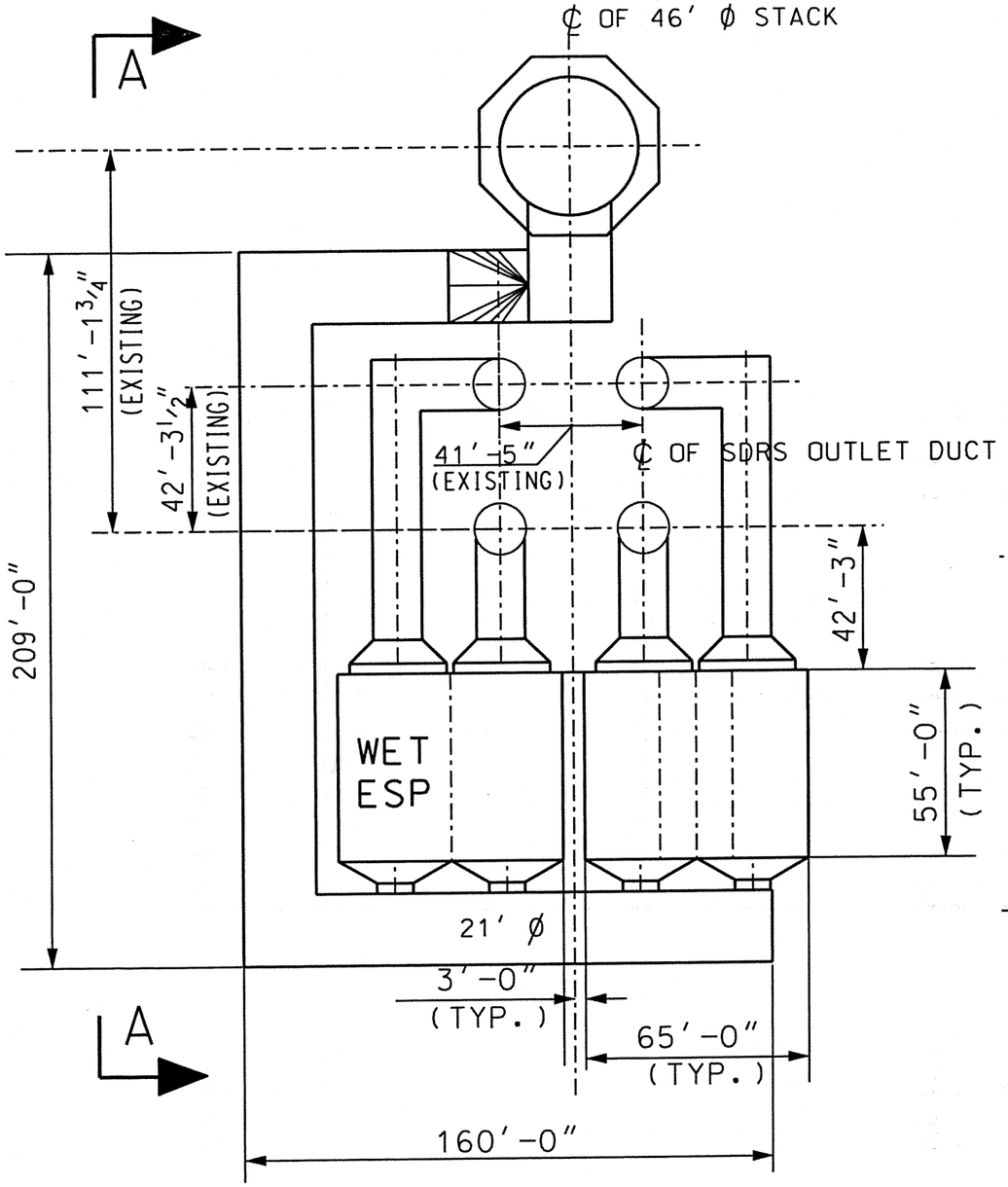
SCALE: 1/8" = 1'-0"

LOUISVILLE GAS & ELECTRIC COMPANY

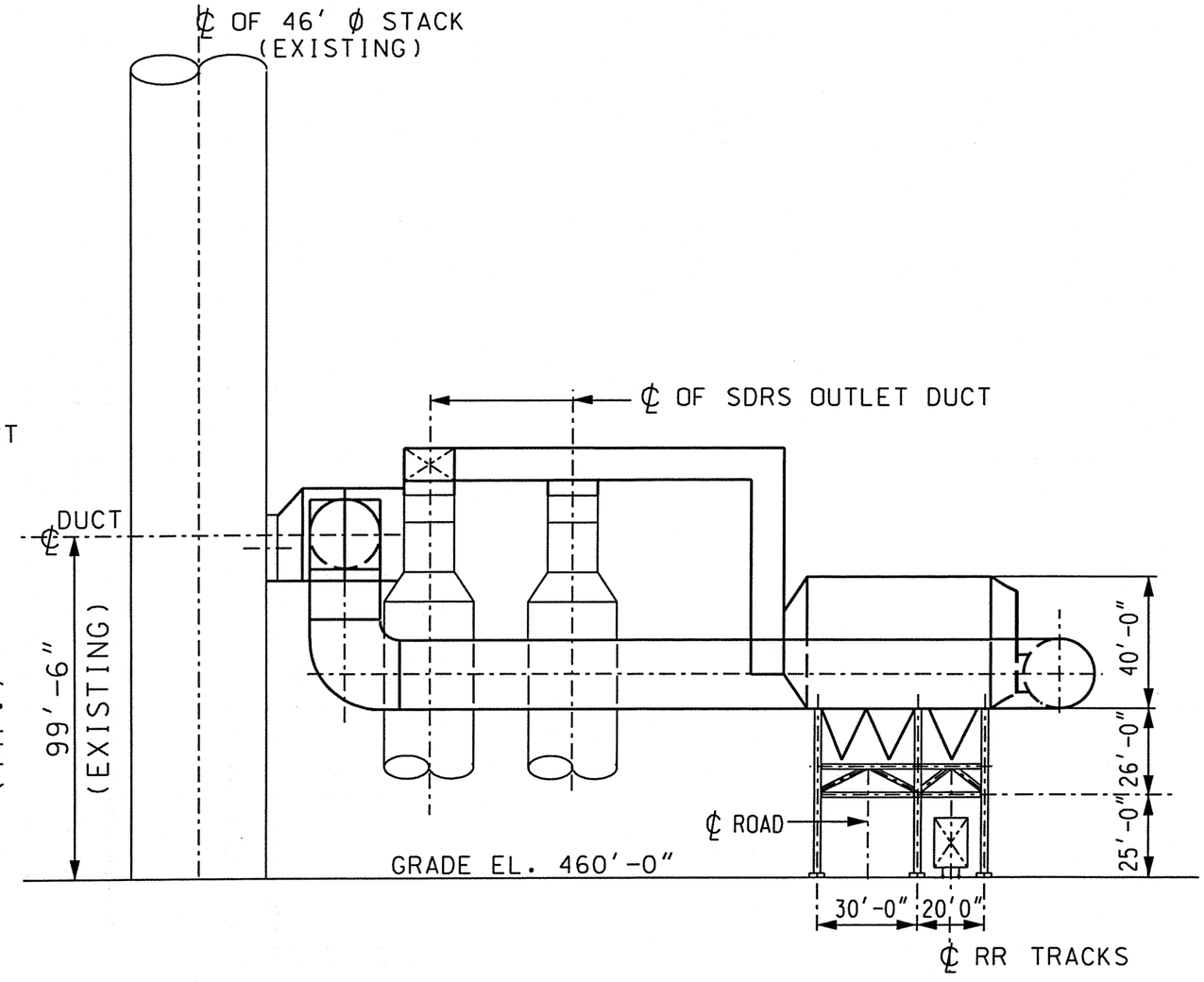
General Arrangement
Cross Section "B-B" Looking North
Precipitators & S.D.R.S.

Pioneer Service	317279	M201 U4	D

317279 - M201 C



PLAN



ELEVATION "A-A"

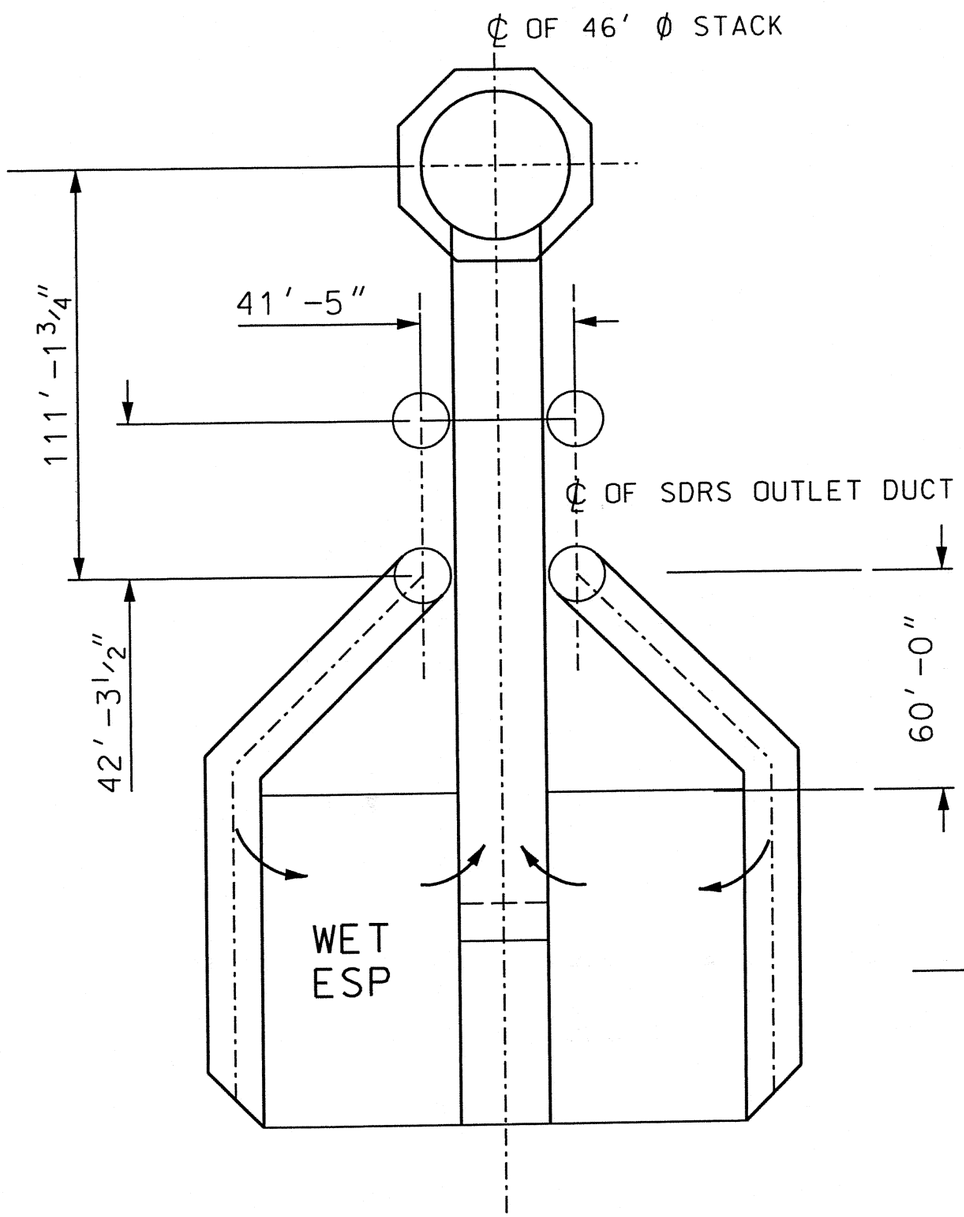
NOTE:
1. SUPPORTS FOR NEW DUCT NOT SHOWN.

SO3 MITIGATION STUDY
EQUIPMENT ARRANGEMENT
MILL CREEK PLANT UNIT 4

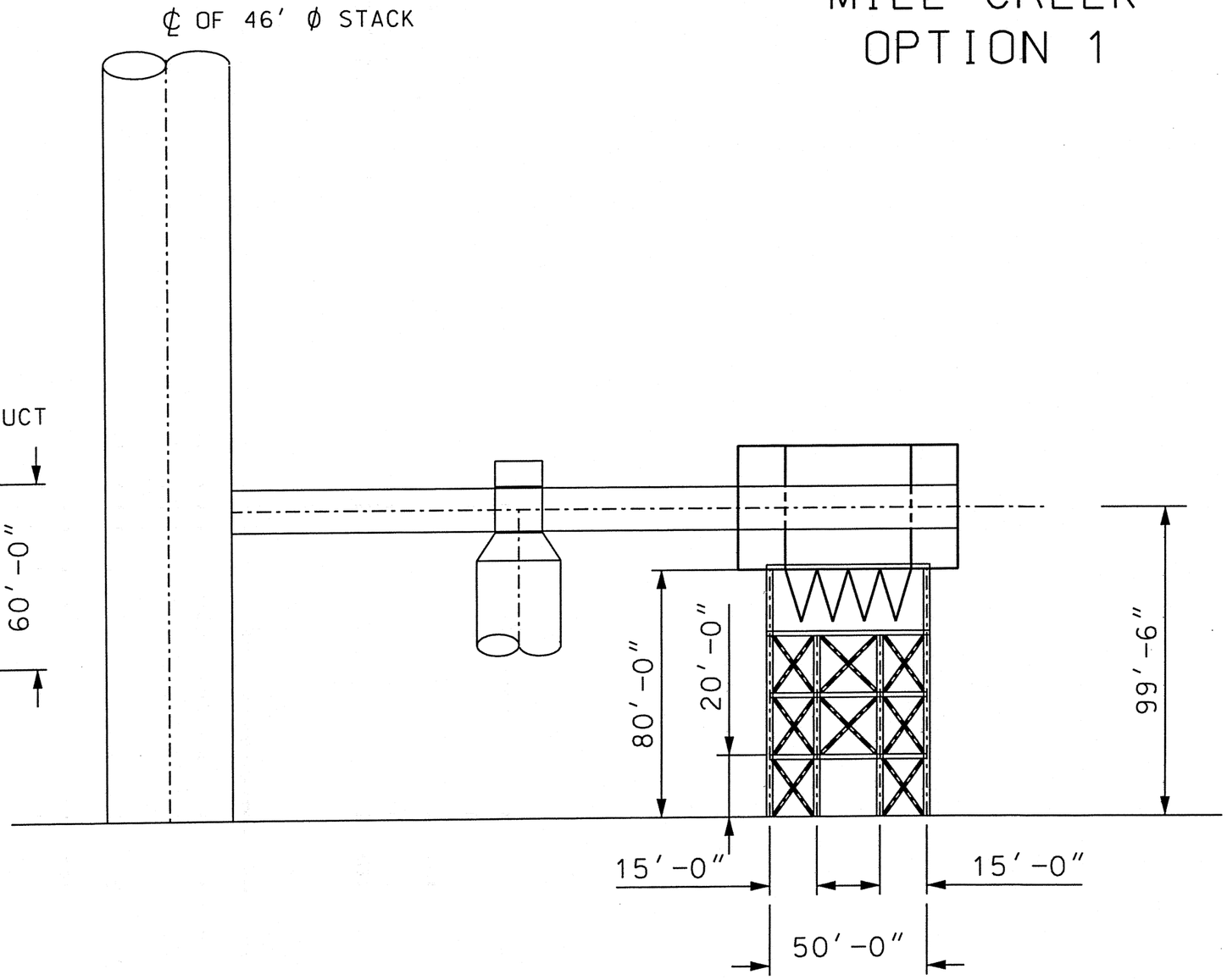
Sargent & Lundy

DRAWING NO.	REV.
MILLGA04	0
SHEET OF	

MILL CREEK
OPTION 1



PLAN



ELEVATION

SO3 MITIGATION STUDY
EQUIPMENT ARRANGEMENT
MILL CREEK PLANT UNIT 4

Sargent & Lundy LLC

DRAWING NO.	REV.
MILLCA01	0
SHEET OF	

9: Drawings

Trimble County 1

NOTES:

WORK THIS DRAWING WITH DRAWING TC-M10018
FOR REFERENCE DRAWINGS SEE DRAWING
TC-M10018

T.P. FAN

TURBINE BUILDING

TOWER CRANE FDN.

PRECIPITATOR

WALKWAY

℄ OF INJ. PORTS

2" ø SCH. 40 (TYP.)

3'-0"

4" ø SCH. 40

BOILER

CONTROL BLDG. AT EL.542'-6" SEE DWG. TC-M10026

℄ OF INJECTION GRID

60'-0"

℄ OF INJECTION GRID

85'-0"

FAN ROOM ROOF AT EL.509'-0"

6" ø SCH. 40

ELECTRICAL ROOM AT EL.475'-0" SEE DWG. TC-M10026

8" ø SCH. 40

MONORAIL

MONORAIL W/ HOIST

MONORAIL

SILO

EQUIPMENT DROP AREA

16'-0"

12'-0"

ROAD ℄ E 20+69

ROAD ℄ E 21+70

℄ MH #32-21B

℄ MH #32-21A

℄ FLY ASH SILO

℄ OF SILO

75'-0"

ROAD ℄ N 32+10

N 32+50

SERVICE BUILDING

24'-9⅜"

24'-9⅜"

29'-6¾"

29'-6¾"

106'-0"

106'-0"

20'-0"

14'-9"

14'-9"

20'-0"

20'-0"

21'-8¼"

30'-0"

30'-0"

100'-0"

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

PLAN

SCALE: ⅛" = 1'-0"

NORTH

DRAWING RELEASE RECORD

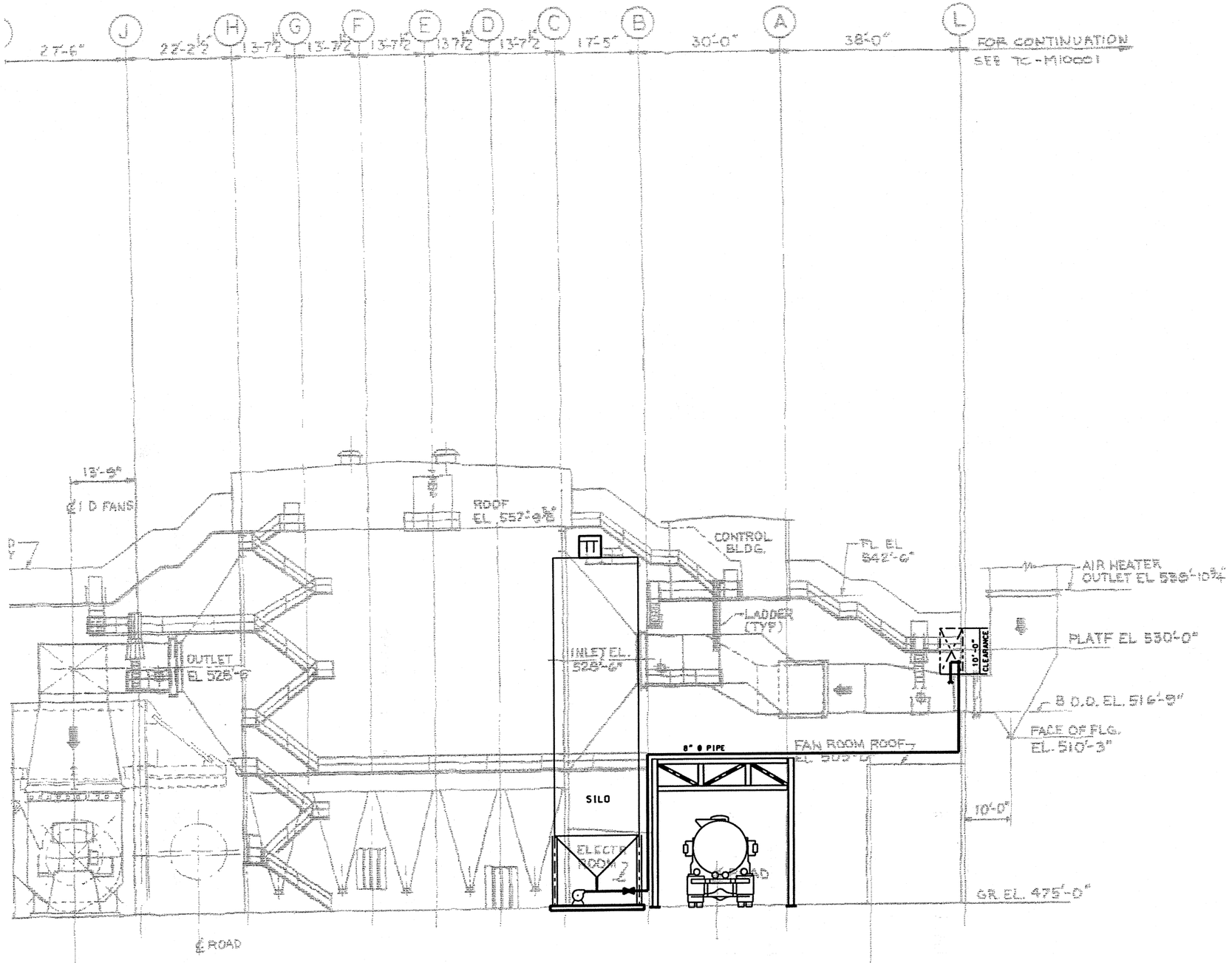
REV	DATE RELEASED	PURPOSE	
			PREPARED
			REVIEWED
			APPROVED
0A	12-14-05		N.PATEL
			G. SWITAK

GENERAL ARRANGEMENT
SITE PLAN
SO3 MITIGATION STRATEGY STUDY
EQUIPMENT ARRANGEMENT
TRIMBLE COUNTY UNIT 1

Sargent & Lundy

DRAWING NO.	REV.
TRISO3GA01	0A

SHEET OF



ELEVATION - LOOKING NORTH

(DWG. TC-M10017)

SCALE: 1/8" = 1'-0"

(L9)

DRAWING RELEASE RECORD

REV	DATE RELEASED	PURPOSE	
			PREPARED
			REVIEWED
			APPROVED
0A	12-14-05		N. PATEL
			C. SWITAK

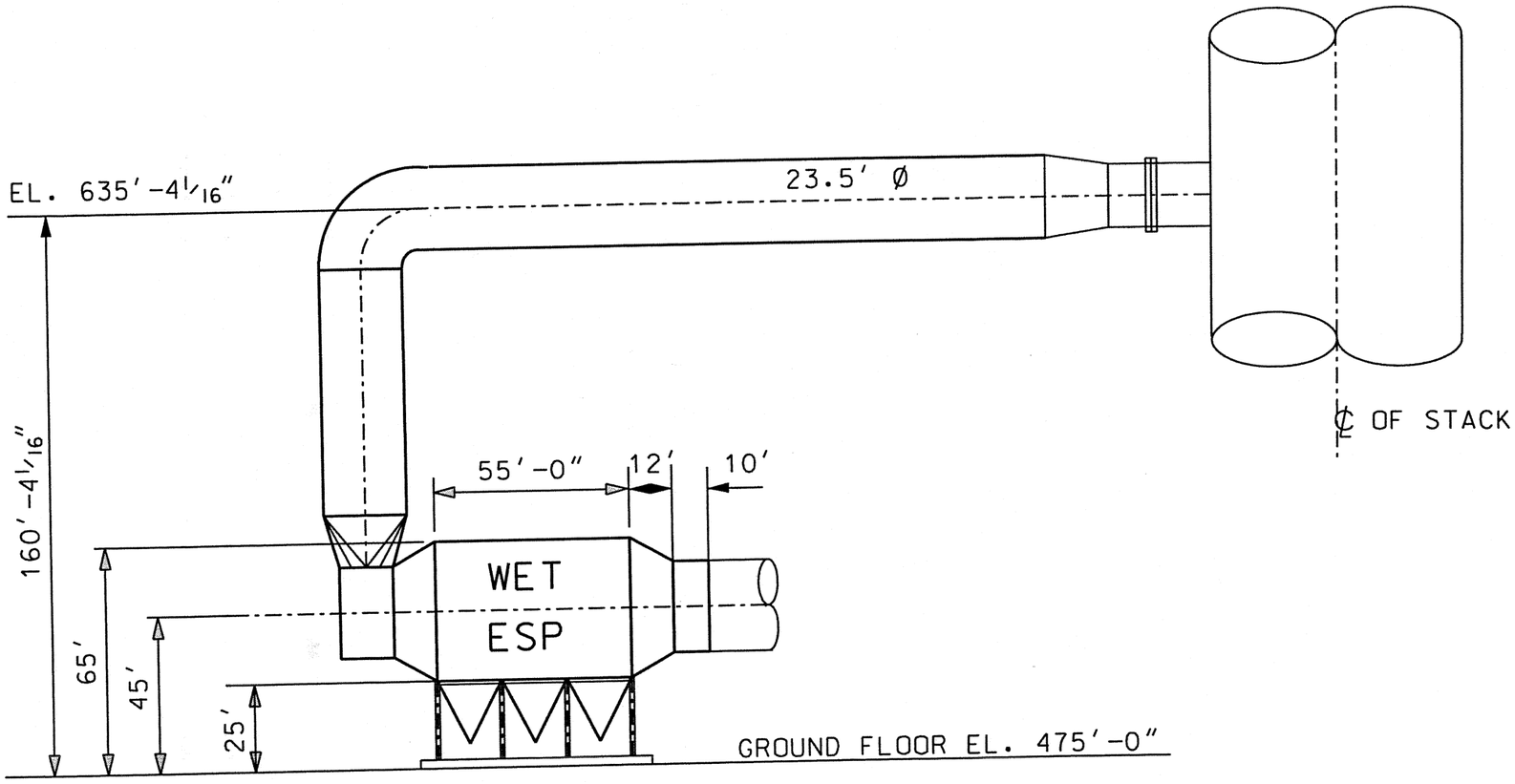
GENERAL ARRANGEMENT
SITE PLAN
SO3 MITIGATION STRATEGY STUDY
EQUIPMENT ARRANGEMENT
TRIMBLE COUNTY UNIT 1

Sargent & Lundy LLC

DRAWING NO. TRISO3GA02 REV. 0A

SHEET OF

TRIMBLE COUNTY UNIT 1



ELEVATION
LOOKING WEST

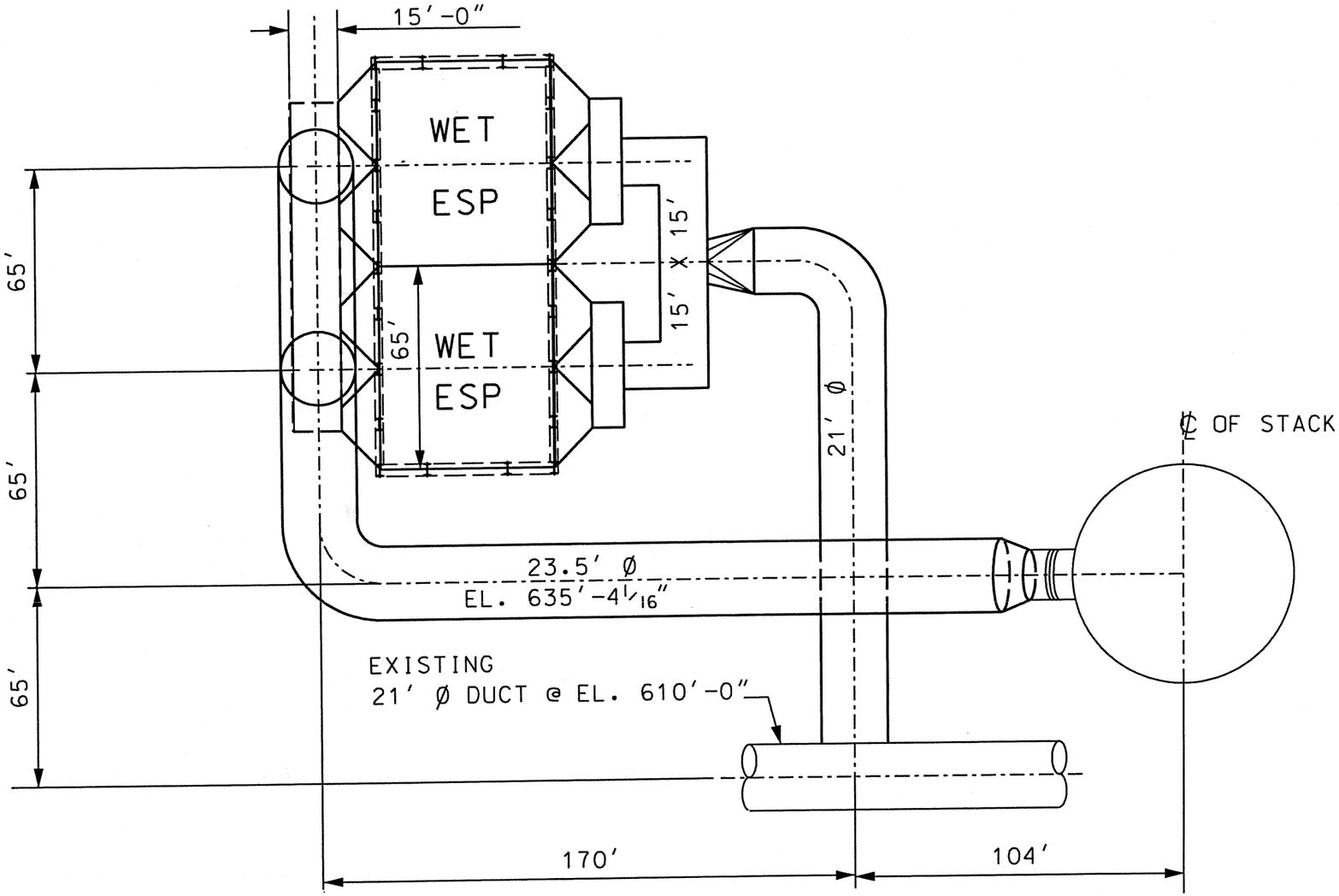
FOR PLAN SEE DWG. TRIMBLEGA01

SO3 MITIGATION STUDY
EQUIPMENT ARRANGEMENT
TRIMBLE COUNTY UNIT 1

Sargent & Lundy

DRAWING NO.	REV.
TRIMBLEGA02	0
SHEET OF	

TRIMBLE COUNTY UNIT 1



PLAN

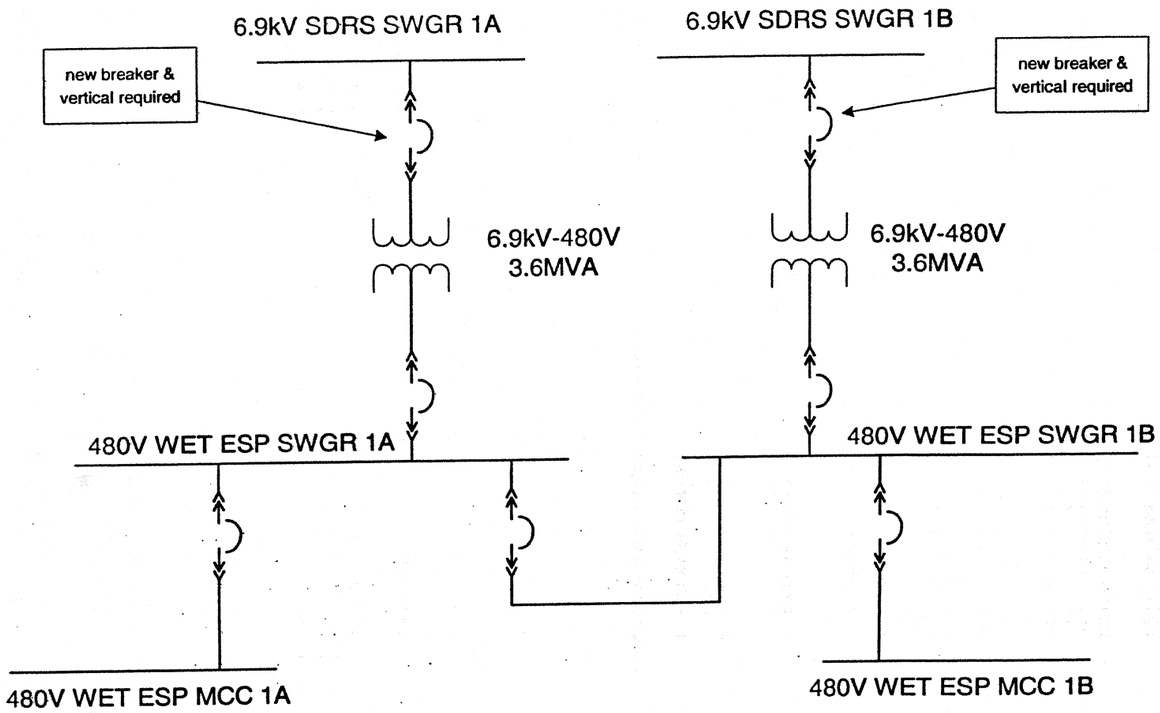
FOR SECTION SEE DWG. TRIMBLEGA02

NORTH

SO3 MITIGATION STUDY
EQUIPMENT ARRANGEMENT
TRIMBLE COUNTY UNIT 1

Sargent & Lundy

DRAWING NO.	REV.
TRIMBLEGA01	0
SHEET OF	



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DRAWING RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	APPROVED	PURPOSE
0	12-09-05	BTC			RELEASED FOR PRELIMINARY LAYOUT

SCALE	NONE
PROJECT NUMBER	10584-022

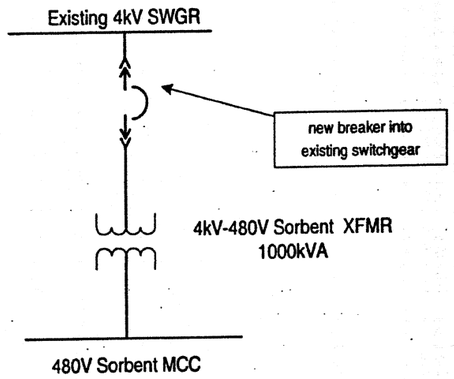
PRELIMINARY LAYOUT

TRIMBLE COUNTY UNIT 1

WET ESP SYSTEM

Sargent & Lundy LLC

DWG CLASS:	REV.
SK-TC-WE-22	0
SHEET 1 OF 1	



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Hydraulic Standby Motor	25	hp	1
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Dust Collector Rotory Feeder Motor	10	hp	1
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Airlock Rotory Feeder Motor	10	hp	2
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DRAWING RELEASE RECORD

REV	DATE	PREPARED	REVIEWED	APPROVED	PURPOSE
0	12-09-05	BTC			RELEASED FOR PRELIMINARY LAYOUT

SCALE	NONE
PROJECT NUMBER	10584-022

PRELIMINARY LAYOUT

TRIMBLE COUNTY UNIT 1

SORBENT INJECTION SYSTEM

Sargent & Lundy LLC

DWG CLASS:	REV.
SK-TC-SI-22	0
SHEET 1 OF 1	