Exhibit 5.1

Siemens Operations and Maintenance Operating Cost Assessment Report

SIEMENS

Rev01

Operations and Maintenance

Operating Cost Assessment Report

Taylorville Energy Center

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Statements made in this document that may predict, forecast, indicate or imply future results, performance or achievements, and may contain the “believe, “anticipate”, “expect”, “estimate”, “project”, “will be”, will continue”, will likely result”, “plan”, or words or phrases of similar meaning, involves risks, uncertainties or other factors which may cause actual results to differ materially from the future results, performance or achievement expressed or implied by the statements. These statements are based on Siemens’ belief and assumptions.

Siemens has utilized what it considered to be current information provided on the Taylorville Energy Center and internal and industry data to provide this report. Although we believe that the estimates and projections reflected in this document are reasonable, our expectations may prove to be incorrect. Important factors that could cause actual results to differ materially from the results and events anticipated or implied by such forward-looking statements include (but are not limited to):

- Plant detailed design may be different
- Equipment specified may be different
- Automation and controls may be different

As discussed above, this list of risk factors is not comprehensive.

Accordingly, the information, analyses, conclusions, recommendations and descriptions in this document: (i) are provided for information only, (ii) are based on Siemens' experience and judgment with respect to the Siemens’ equipment and/or services to which this pertains, (iii) should not be considered as all inclusive or covering all contingencies, and (iv) ARE FURNISHED WITHOUT ANY WARRANTY WHATSOEVER, WHETHER EXPRESS OR IMPLIED, OF FITNESS FOR PURPOSE, MERCHANTABILITY, FROM COURSE OF DEALING OR USAGE OF TRADE, AS TO ADEQUACY, ACCURACY, COMPLETENESS OR USEFULNESS, OR OTHERWISE.

*The attached indicative information reflects preliminary projections and is based on various assumptions including proposed plant configuration, anticipated plant operating requirements as noted, and experience combined with historical data. Actual values will be different than what is presented above pending actual conditions and the prices listed herein are subject to change

Chapter I
Operation and Maintenance Cost

Siemens Energy, Inc. Energy Services Division based in Orlando, Florida completed an assessment of operating costs for the Taylorville Energy Center (TEC) at the request of Tenaska in preparation for a report to the Christian County Generation, L.L.C. Owners. This report was prepared in accordance with the contract between Siemens Energy, Inc and Tenaska for TEC and the study quote letter dated 2/26/2009 for phase A.

This cost assessment for the TEC was prepared in summary form for the purposes of providing an independent assessment of the cost of operating this facility to be located in the state of Illinois on a site near the city of Taylorville, Illinois.

This cost estimate addresses expected operating and maintenance costs on an annualized basis for an assumed operating period of 30 years. The basis of this report covers a period of 12 years following plant commissioning. During this period, the plant will operate through a least one complete cycle of outage repair and inspection cycles recommended by the original equipment manufacturers. Projections for the remainder of the 30-year period of operation need to be subject to review of the operating results following plant inspections and incorporation of plant operating experience during the initial 12 years of service. For years 12, though 30 plant maintenance costs historically have increased approximately 1 per cent per year. In addition to this base projection, a capital improvement budget can be set up and used to fund plant improvements or upgrades during the life of the plant. The capital improvements would target those sections of the plant where performance, availability or increased maintenance problems are occurring. Business case evaluation of the cost of these projects would be weighted against the loss of performance or increased cost of maintenance. The assessment includes a plant maintenance outage for each year of service. If a capital improvement budget was employed a reduction of the annual plant maintenance cost could be achieved depending on the amounts budgeted. Every 3 years a major maintenance outage is included. A cash flow analysis is included for the initial 12-year period. This cycle is repeated for the remaining 18 years of the period. The cash flow is included to identify the variation in operating costs that are projected to increase during the major maintenance years.

The cost assessment consists of two distinct and separate Chapters. Chapter No. 1 is the, “Operation and Maintenance Cost Assessment”. Chapter No. 2 is the, “Pre-Operation Cost Assessment’. Each assessment consists of three major steps. These steps are:

1) Data gathering,
2) Implementation of the cost assessment process,
3) Presentation of results.
All numbers applied to this estimate are in 2009 dollars.

Chapter No. 1 Operation and Maintenance Cost Assessment

I. Data Gathering

Siemens Energy O&M Service Group has actively participated in the development of new integrated Coal Gasification and combined cycle projects since early 2006. Each project contributes to an accumulated database of equipment vendor information. This library of vendor data is available for reference regarding maintenance issues and operating experience in a variety of industrial environments. During the first week of September 2009 Siemens O&M was requested to identify the necessary information required to develop an operating cost assessment of the cost to operate the TEC Coal Gasification plant.

Data from six coal gasification O&M projects were selected for reference to develop the Taylorville project estimate. An early telephone conference call with the Tenaska staff initiated the process for the development of a preliminary plant operating staffing plan. This preliminary staffing plan typically forms the starting point for an O&M cost estimate. Specific lists of plant design documents were requested from Tenaska. Assistance was requested from Internal Siemens Divisions including Siemens Water Technology and Siemens Transmission and Distribution to address particular project scope areas.

A trip to Kansas City on November 11, 2009 was critical to provide open access to plant design documents and allowed the Siemens O&M team direct access to the plant design and construction teams of Burns and McDonnell and Kiewit Construction, the designated design build team for the project. These meetings were attended by Owner representatives and by the engineering and construction team members. Siemens O&M received unlimited access to design documents and attended an open meeting with each of the design discipline teams.

Telephone contact with owner representatives has been unrestricted and Informative regarding response to questions and providing requested information and documentation of the plant design.

Chapter No. 1 Operation and Maintenance Cost Assessment

II. Implementation of the Operating Cost Assessment Process

TEC O&M Cost Estimate Summary Description

Introduction

The Siemens O&M cost forecast model has been utilized for this report. This model reflects twenty-five years of operating experience on plants in a variety of geographical settings and climate conditions. Experience gained in the operation and maintenance of a variety of equipment including large rotating apparatus, high voltage distribution equipment, process instrumentation, material handling, fuel analysis, electric power generation, steam generation, environmental discharge monitoring, plant performance testing, condition based maintenance and process chemistry control were included in the Siemens cost model.

Description of the Base Assessment Model

The O&M cost forecast model consists of ten distinct parts. These parts are:

1) Plant staff
2) Plant Consumable materials
3) Plant maintenance
4) Facility Administrative Systems and Equipment
5) Plant Equipment, tools and Materials
6) Plant Management
7) Switchyard
8) Water Treatment Plant (see Account 3.9 & 3.9.1)
9) Waste transport and disposal
10) Utilities

Additional costs not included in the Siemens O&M cost model are typical Owner incurred costs including of the categories below in parts 11 through 12.

11) Insurance
12) Capital Improvement Allowance Cost of product sales

Parts 13 and 14 (Fuel and Corp Taxes) are not provided in this report.
Parts 15 and 16 Budget Summary and Cash Flow are included in this chapter.

The Siemens cost model approach has a number of built in features that are intended to provide flexibility in the selection of inputs during the early stages of a project. This is important during the initial stages of a project when process designs

are preliminary and in many cases, selection of equipment vendors is not complete. The basic configuration of the cost model is to divide the plant into a series of fourteen individual work breakdown structure (WBS) accounts. An experienced based relationship between these work structures was determined for both the Combined Cycle plant and the Gasification plant based on field experience gained through the many years of operation of a variety of power plants and power plant equipment. A list of the major equipment in the Taylorville design is included in each WBS account contained in Section 3 of this report. Knowing the relationship between the cost structures and the type of equipment in the model provides a number of options for verifying the total maintenance cost estimate.

In the case of an Integrated Gasification Combined Cycle (IGCC) plant, Siemens applies an experienced based maintenance cost to each cost structure component of the Combined Cycle plant. Applying the same work breakdown structure to the Gasification plant facilitates identification of systems that are common between the Combined Cycle plant and the Gasification plant. Examples of these common systems are the cooling water system or the power distribution system. This use of proven maintenance costs for similar equipment in these shared systems provides confidence in the resulting cost estimate for each of these systems.

Placing the Gasification plant WBS side by side with the combined cycle plant identifies that six of these WBS accounts are common to both plants. These accounts have common maintenance costs as adjusted for number of major components, size, volume and application of the equipment. This same comparison also shows three of the Gasification plant WBS accounts do not have a corresponding system in the other plant. An example is that the gasification plant does not have a combustion turbine, a steam turbine or a HRSG. Experienced operations and design engineers completed a “bottoms up” maintenance assessment for three of the remaining five Gasification WBS accounts. These WBS accounts include the Gasification System, Coal Handling System, Coal Prep System, and Feed System. The remaining two cost structures for the gasification plant tend to be plant specific and require a separate cost evaluation for each new project. These two cost structures, the Syn Gas Cleanup and the Slag and Sludge Handling System represent approximately 15 percent of the total plant O&M cost. Accordingly, more conservative maintenance costs were applied to the estimate for these two systems. A detailed listing of the major equipment included in each of the 14 WBS accounts is included in Section 3 of this report.

In addition to the maintenance of equipment, other features of the model examined for each project evaluated include the methods planned for selection and training of personnel for around the clock operation, plant safety programs, effective use and management of consumable materials, plant performance monitoring and application

of effective administrative plans and programs. The assessment of these features is based on a subjective assessment of the owner operator level of commitment to invest in these management programs and to implement them on the project.

The following paragraphs include expanded descriptions of each of the ten sections of the base O&M cost model. The Taylorville O&M Assessment scope contain elements that are not estimated by our basic cost model in a number of additional key areas. Sections 11 thru 12 of the cost summary address these additional areas in projecting the TEC cost of operation.

Methodology Applied to each Section of the Assessment

Section 1 Labor. - A significant first step in the assessment process is the development of a comprehensive plant operating organization structure. Development of this task is performed by senior O&M personnel and is based on the type of plant and plant equipment proposed for the project. The size and distribution of this workforce is sized to accommodate specific design and plant layout factors at this preliminary stage of the project. Plant operation will consist of two classes of employees. First is permanent staff for year around plant operation and maintenance. The second class is outside labor force determined based on the predicted amount of required plant scheduled maintenance required for the annual complete facility outages. These outages are established in Section 3 of the model. The projected permanent plant staff requirements for the TEC consists of the 128 persons that are shown in organization form (see Fig 1.1).

In August 2009, System One, an independent labor outsourcing company, located at 12001 Research Parkway, Suite 100, Orlando, Florida 32826 conducted an independent wage and salary survey of the Southern Illinois area at the request of Siemens to verify both expected salary levels and personnel availability. Wage and salary data from that survey are included in Exhibit 1.1.1. The conclusion of this survey is that qualified labor is available and agreeable to work at this facility at the salary levels established and reported in this estimate.

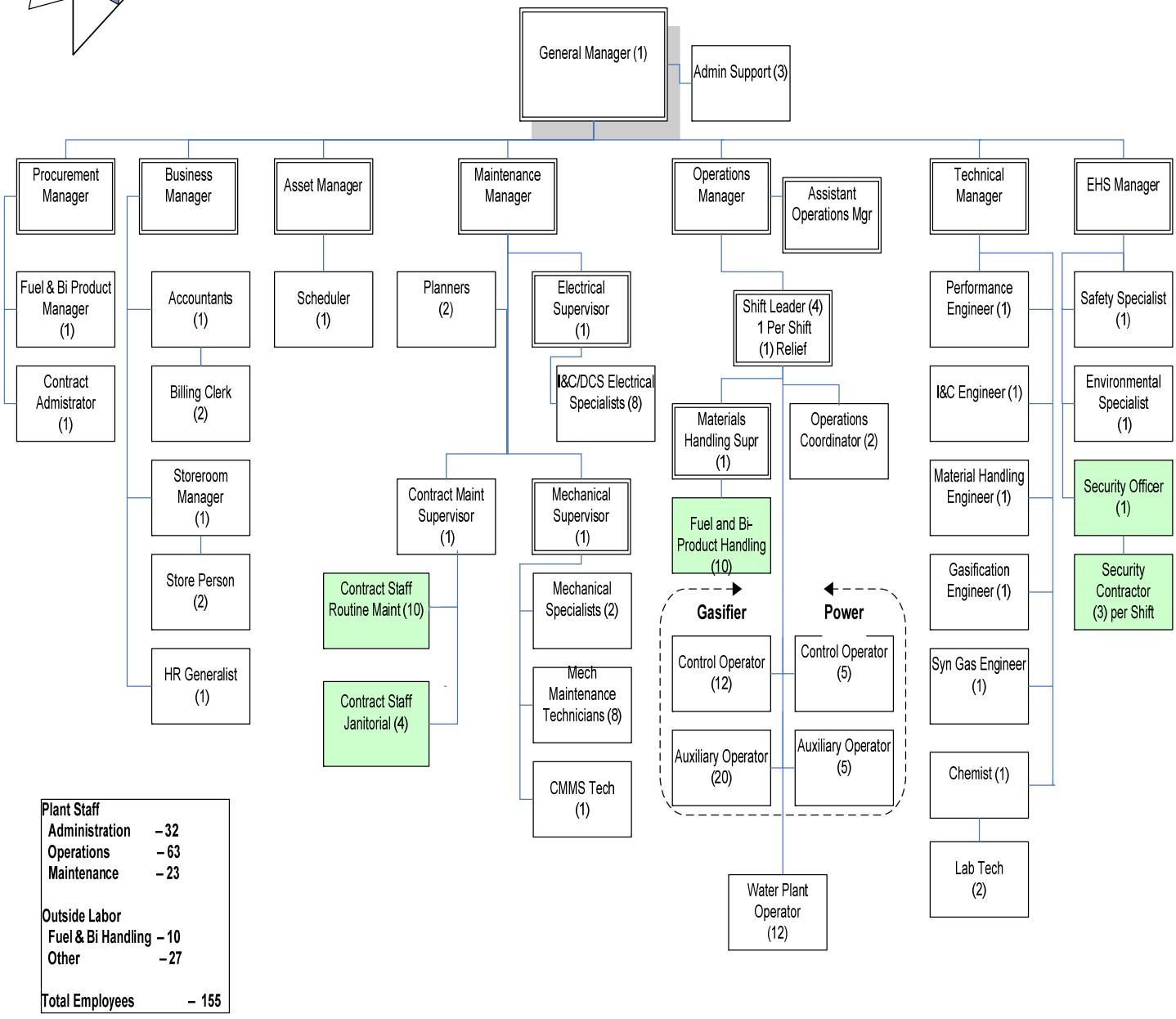
Labor costs are identified in two separate parts of the model. Fixed annual labor cost for the permanent workforce is determined based on the maintenance personnel identified on the staffing plan shown on TEC Organization chart (see Fig 1.1). The wages and salary for the permanent staff is $13,607,785. Included in this amount is $1,703, 072 for overtime and performance incentives and $3,440,590 for all “socials” including social security, Medicare, workers compensation etc. Overtime is allocated for each labor category based on a four-shift rotation. The overtime hours range from a high of 20 per cent for the plant engineers to zero for the General Manager. These costs are based on manpower being provided by an established organization that will provide overhead and management personnel to support the ongoing hiring, training, benefits, health and safety support to the plant. Not included are costs for recruitment, hiring, initial training and other initial costs for staffing plant of this size and complexity. These costs are estimated in the pre-operational chapter 2.

Coal Yard operation is planned to be preformed by an outside contractor using 10 employees. The cost for this operation is estimated to be $841,123 and is shown as a line item on the section 15 summary budget as an outside contracted labor

Fig 1.1
Rev 1

Taylorville Energy Center

2/3/2010



Plant Staff	
Administration	– 32
Operations	– 63
Maintenance	– 23
Outside Labor	
Fuel & Bi Handling	– 10
Other	– 27
Total Employees	**– 155**

page 1

Exhibit 1.1.1
Taylorville Energy Pay rates

System One Labor Rates 8-14-09		
	Qty	**Total**
General Manager	1	$[redacted]
Business Manager	1	$[redacted]
Technical Mgr	1	$[redacted]
Performance Engineer	1	$[redacted]
I&C Engineer	1	$[redacted]
Material Handling Engineer	1	$[redacted]
Gasification Engineer	1	$[redacted]
Syn Gas Engineer	1	$[redacted]
Asset Mangr	1	$[redacted]
Asset Scheduler	1	$[redacted]
Contract Administrator	1	$[redacted]
Fuel and Bi-product Manager	1	$[redacted]
Procurement Manager	1	$[redacted]
Accountants	1	$[redacted]
EH&S Manager	1	$[redacted]
Environmental Specialist	1	$[redacted]
Safety Specialist	1	$[redacted]
Storeroom Manager	1	$[redacted]
Maintenance Planner	2	$[redacted]
Store Person	2	$[redacted]
CMMS Technician	1	$[redacted]
Admin Support	3	$[redacted]
HR Generalist	1	$[redacted]
Billing Clerk	2	$[redacted]

Plant Chemist	1	[redacted]
Lab Tech	2	[redacted]
Operations Manager	1	[redacted]
Asst Ops Mgr	1	[redacted]
Shift Supervisors (Plant)	5	[redacted]
Control Operators (Power)	5	[redacted]
Auxiliary Operators (Power)	5	[redacted]
Control Operators (Gasifier)	12	[redacted]
Operations coordinator	2	[redacted]
Auxiliary Operators (Gasifier)	20	[redacted]
Auxiliary Operators(Water Treat)	12	[redacted]
Maintenance Mgr	1	[redacted]
Plant Mechanics	8	[redacted]
I&C/DCS Specialists	8	[redacted]
Mechanical Supervisor	1	[redacted]
Electricrical supervisor	1	[redacted]
Mechanical Specialists	2	[redacted]
Material Handling Supervisor	1	[redacted]
Contract Maint Super	1	[redacted]
Total	118	[redacted]
Outside Contracted Labor (for Coal Yd)	10	[redacted]
Total Annual Wages	**128**	**$13,838,908**

Outside Labor

A second cost category for labor is included in Section 3 of the model and identifies labor required to supplement the permanent maintenance staff. The size of this labor group is determined based on the estimated volume of plant maintenance activity determined from analysis of the scope of each of the individual WBS accounts. This second labor component is a temporary labor force required to implement maintenance outages and to load level the work force during non-outage periods. This outside work force provides a variety of maintenance activities. These activities require personnel specialized in specific maintenance skills and involve tasks in excess of the workload performed by the permanent maintenance staff.

Costs associated with recruiting, hiring and relocation of permanent employees are included in the Pre-operation Section of this cost report. Cost for hiring and moving outside contracted employees to the plant site are included in the outside labor rate. (Ref Exhibit 2)

Composite pay rates established for this cost assessment are as follows:

10-hour day, 7 days per week work schedule	$79 per hour
10-hour day, 6 days per week work schedule	$65 per hour
8-hour day 5 days per week work schedule	$30 per hour

A composite labor rate includes a typical turnaround maintenance crew including Superintendent, Engineer, Data takers, Craft and Clerical workers and includes travel and living costs for all temporary labor.

Supplemental Operations Staff

This cost assessment is valid for year three of plant operation. The initial two years of operating a new plant facility require considerable additional administrative and management effort that effect the long term operating budget. This incremental effort is required to mitigate the numerous startup problems encountered with the initial operation of a large new facility. This initial effort requires supplemental personnel to establish numerous technical and business practices, policies and procedures. A partial listing of the activities required of this supplemental staff includes: resolve construction warranty issues, establish legal reporting formats for safety and environmental reports, develop a strong culture of plant safety among employees, formalize preventive maintenance practices, finalize the plant document control system, set up the plant purchasing practices and address operating plant technical concerns.

A supplemental staff of personnel required to formalize and document procedures and practices to address these “new plant” challenges is identified in Exhibit 1.1.2. This supplemental staffing will assist the primary plant staff to accomplish this additional workload. It is reasonable to plan that this staff will complete these activities during the initial two years of plant operation. At the end of this two-year period, the staff size will revert to that shown on Fig 1.1.

Exhibit 1.1.2

Supplemental Personnel		**Qty**	**Salary**
Staff support for initial 2 yr period			
Purchasing - set up		1	[redacted]
Warranty engineer		2	[redacted]
Environmental Health & Safety		1	[redacted]
Training coordinator		1	[redacted]
Safety & Medical		1	[redacted]
CMMS Techs		2	[redacted]
Document control Techs		2	[redacted]
Annual Sub total			**$1,131,487**

Section 2 Consumables. - Consumable plant materials consist of those materials that are used in the production process or change in state in plant processes. Examples of these materials include water treatment chemicals, flu gas catalysts or reagents, plant filter media, fuel for rolling stock, chemical or oil spill absorbents, etc. A list of the consumable materials for this plant is included in this report. (See Exhibit 1.2.1)

	Exhibil 1.2.1						
Taylorville Energy Center Consumable Material		Rev 3 - Feb 6, 2010					
Gas Catalyst							
Material Function	**Service**	**Units**	**Material**	**Bed Size**		**Vol**	**Annual Cost**
Shift	Chloride Guard Bed	3					$131,238
Shift	Arsenic Guard Bed	3					$374,566
Shift	First Shift Reactor	1					$728,247
Shift	Second Shift Reactor	1					$728,247
Shift	Mercury Guard Bed	2					$321,264
SRU	Claus Reactor 1	1					$7,392
SRU	Claus Reactor 1	1					$1,727
SRU	Claus Reactor 2	1					$2,465
SRU	Hydrogenation Reactor	1					$20,266
Methanation	Sulfur Guard Beds	2					$261,250
Methanation	First bulk Reactor	2					$1,160,424
Methanation	Second Bulk Reactor	2					$1,048,125
Methanation	Trim (third) Reactor	1					$494,336
CO2 System	Methonal Removal	1					$10,742
CO2 System	Oxidation for Vent	1					$288,889
Replacement supports							$119,670
Total Syn Gas plant Consumables							$5,698,848
Flare Fuel	Fuel for the flare is Syn gas allocated in revenue stream						$0

Water Treatment Consumables							
Cost of Raw water from SDD	Grey water from Decatur	gal					$327,000
Grey water pipeline maint cost	Not Available from SDD						$60,000
Total Water Treatment Chemicals							$1,567,780
Power Block Consumables							
Remove NOX from CT exhaust	NOX Catalyst			950000 for 4 yrs			$237,500
Remove CO from CT Exhaust	CO Catalyst	NA					0
Remove NOX from CT exhaust	19% Aqueous Ammonia						$250,000
Rolling Stock Fuel	**Equipment definition**	**Units**	**Hrs/day**	**Diesel Gal/yr**	**Propane**		
Push Coal to maintain coal pile	D9 Catapillar Crawler	2	8				
Site Dust Control	Water Wagon	1	8	77,500			
Maintaining Coal Pile	Front End Loader	1	8				
Routine lifts on graveled surface	10,000 lb fork lift w/large tires	1	6	24,635			
Slag Handling Front end loader	10 ton Front End Loader	1	13.5	49,275			
Warehouse work to move pallet racks	Warehouse forklift 10,000 lb lift	2			600	4.00	$2,400
25 ton capacity	Dump Truck	1		4,563			
Perform maintenance work in coal yard	Utility Boom truck	1					
Mobile crane for maintenance lifts	30 ton mobile boom crane	1		2200			
Hauling plant equipment for maintenance	2 1/2 ton stake bed truck	1		2200			
Transport men & tools around site	Golf Cart Mules	10			electric		
Light trench work and loading materials	Bob Cat skid loader	1		1100			
Elevated Maint work	Man Lift	2		1100			
Total Diesel fuel use				162,573		3.00	$487,719
Total							$8,631,247

Section 3 Plant Maintenance - This portion of the cost assessment covers all plant maintenance including preventive, corrective, planned, unscheduled,and contingency for all permanently installed plant equipment. For purposes of this assessment, the plant is divided into 14 separate WBS accounts. These accounts are numbered 3.1 through 3.14. Each account is comprehensive and includes a list of major equipment included or associated with the scope (See major equipment list for each account number). The items included on these account lists comprise the principle focus of the maintenance activity for the account. The maintenance allocation includes equipment inspections, preventative maintenance and corrective maintenance consistent with manufacturer's recommendations, design codes and industry accepted plant practices. The maintenance allocations provide a comprehensive maintenance program to accomplish this purpose. Allowances are included for all parts, tools and materials associated with maintenance, inspection and repair of the major equipment for routine, scheduled and unscheduled maintenance. Exhibit 1.3.1 displays the planned outage schedule for each major component of the plant. Outages will reoccur on a 12-year cycle.

A fleet of rolling stock to support plant operation and maintenance supplements operation of permanently installed plant equipment. The rolling stock includes slag and sludge transport trucks, man lifts, mobile cranes, coal pushers, front-end loaders, forklifts, etc. directly related to operating the plant. Costs for maintenance of this rolling stock are included in the individual WBS accounts. The purchase of this rolling stock is estimated to cost $5,000,000. Funds for periodic replacement of this rolling stock are included in the cash flow exhibit in year 11 and again in year 22 (Reference Section 16).

A heavy lift crane allowance for annual maintenance outages of $1,375,000 is also included in the maintenance budget.

All labor for routine, scheduled and unscheduled maintenance are included for each of these accounts. The labor account includes Supervision, inspections, engineers, data takers, safety monitoring, schedulers and craft labor. This account also includes allowances for travel expense, meals and lodging for required temporary labor forces. The WBS accounts listed below include all permanent installed equipment in the plant.

The total plant maintenance cost is estimated at $28,550,690. This cost consists of $20,538,000 for parts and materials, and $8,012,690 for outside labor. This does not include $2,644,791 for the permanent plant maintenance staff.

Exhibit 1.3.1

IGCC Energy Plant - Scheduled Maintenance Outages — **Dec 31, 2009**

Year	1	2	3	4	5	6	7	8	9	10	11	12
Annual Plant Turnaround												
Gasification Plant	10	10		10	10		10	10		10	10	
Major Plant Outage (Production 0%)			14			20			14			20
Minor Gasifier Outage	6	6	6	2	2	2	2	2	2	2	2	2
Power plant												
Steam Turbine			7			15			35			7
C T 1		8	21	8	8	35		8	21		8	35
CT2			8	21	8		35	8		21	8	35

Number in colored block is number of scheduled outage days

Power Plant	**Gasification Plant**
CT Combustor Inspection (Every 12,500 hours)	One Gasification Train Maintenance
CT Hot Gas Path Inspection (Every 25,000 Hours)	Gas Plant Maintenance Shutdown
CT Major Inspect/Repair (Every 50,000 Hours)	Gas Plant Maintenance Shutdown
ST Valve Inspection	3 burner inspection outages (First 3 Years) (perform during oppurtinty outages)
ST Minor Inspection	Burner Inspection Outage (perform during oppurtinty outages)
ST Major Inspection/Repair (Repeats at 75,000 hours)	

Plant Work Breakdown Structure Accounts

3.1 Coal Handling System
3.2 Coal Prep & Feed
3.3 Feedwater & Misc BOP Systems
3.4.1 Gasifier & Accessories
3.4.2 Air Separation Unit
3.5 Syn Gas Cleanup
3.6 Combustion Turbine & Accessories
3.7 HRSG, Duct & Stack
3.8 Steam Turbine Generator
3.9 Cooling Water System
3.9.1 Balance of Water Treatment
3.10 Slag / Sludge Handling System
3.11 Auxiliary Electric Plant
3.12 Instrumentation & Control
3.13 Site Improvements
3.14 Building & Structures

Account 3.1 – Coal Handling System

Account 3.1 Coal Yard – The function of the coal handling system is to provide a continuous supply of fuel to the plant in a form that is compatible with the coal preparation system. The systems remove foreign material and provide periodic sampling of the delivered fuel for verification of the delivered fuel quality. The account provides for receiving coal from truck delivery and serves as a repository for storing coal in the event of outages in the transportation system or other unplanned events that may interrupt continued transportation service.

Maintenance – The estimated maintenance cost for this account is $1,023,000 per year. This is composed of $409,000 for labor and $614,000 for parts and materials.

TAYLORVILLE ENERGY CENTER

Account 3.1 Coal Handling System

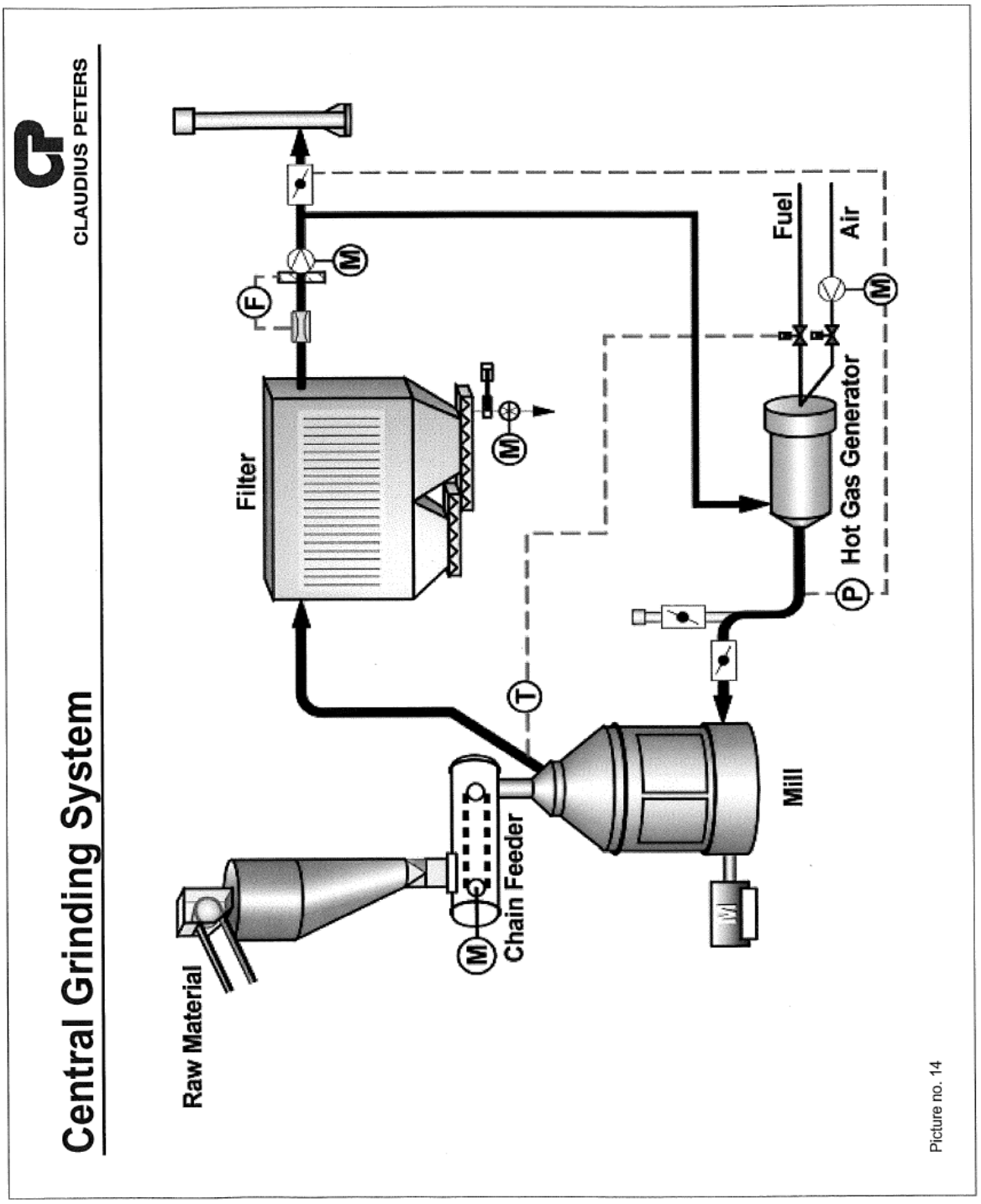
Equipment No	Description	Type	Design Condition	Qty.
1				
2				
3	Unldg Bldg Dust Collector	Baghouse		
4	Truck UL Hoppers			
5	UL Hopper Electr Gates			
6	Truck Auger Sampling			
7	Truck Unldg Fdrs	Belt	1000-2000 TPH Ea	
8	Unldg Flow Chute/Spray	Flow Control		
9	Truck Unldg Conv #1	Belt 72 " Wide	3000 TPH	
10	Truck Unldg Scales	Belt		
11	Unldg Conv #1 Sample Syst	As Received		
12	Unldg Conv #1 Splitter Gate			
13	Unldg Conv #1 Chute/Spray	Flow Control		
14	Unldg Conv #1 Separator	Magnet		
15	Stockout Conv #3	Belt	3000 TPH (72" Wide)	
16	Stockout Conv #3 Chute/Spray	Flow Control		
17	Stockout Conv #3 Lower'g Well			
18	7 Day Storage Disch Hoppers	Motorized Gates		
19	7 Day Storage Disch Feeders	Belt	250-550 TPH	
20	Feeder Disch Chute w/o Spray	Flow Control		
21	Conv # 4A (Feeds Crushers)		1060 TPH (42" Wide)	
22	Conv #4A Separators	Magnetic		
23	Conv #4A Belt Scale			
24	7 Day Stor. Dome Vent Syst	Baghouse		
25	Crusher Surge Bin		300T	
26	Crusher Feeders	Belt	550-1060 TPH, Ea	
27	Crushers		1060 TPH, Ea	
28	Grizzlies	Self Cleaning		
29	Ring Granular Crushers		1.5 X 0 Output Size	
30	Crusher Surge Bin Flow Chute	Flow Contr w/o Spray		
31	Crusher Surge Bib Vent Syst			
32	Crusher Tower Dust Collector	Baghouse		

33	Ring Crusher Flow Chute/Spray	Flow Control		
34	Ring Crusher Discharge Gates	Diverter		
35	Crushed Coal Conv 5A&5B		1060 TPH, Ea (42" Wide)	
36	Belt Scales for Conv 5A&5B			
37	Conv 5A&5B Sampling Sys	As Fired		
38	Conv 5A&5B Disch Chute	Flow Control W/O Spray		
39	Crushed Coal Surge Bin			
40	Surge Bin Disch Gates	Motorized		
41	En-Masse Conv w/Disch Gates	Motorized Gates	1060 TPH, Ea	
42	Coal Grinding Feed Dust Coll	Baghouse		
43	Duplex Sump Pumps	Heavy Duty Pumps/Mtrs		

Account 3.2 - Coal Prep & Feed

Account 3.2 Coal Prep & Feed – The function of this account is to convey crushed coal (See Account 3.1) to the Grinding Mills and then to the gasification coal storage. The mills reduce the size of the coal and dry it to the required coal specifications for the Gasification System. A Baghouse separates the drying gas and coal dust, venting the gas to the stack utilizing an exhaust fan and damper to control exhaust volume. The fine coal is fed from the Baghouse via Collecting Screw & Rotary Feeders and pneumatic conveying system to the Dried Coal Bunkers, which are a part of the Gasification Island. This account includes the Crushed Coal Bunkers, Crushed Coal Feeders, Conveyors, Grinding Mills, Classifiers, Hot Gas Generators, Collecting Screw & Rotary Feeders, pneumatic conveying system and Stacks. See enclosed reference document entitled, Central Grinding System, Dwg 1.3.2.1

Maintenance - The estimated maintenance cost for this account is $1,598,000 per year. This is divided into $639,000 for labor and $959,000 for parts and materials.



Drawing 1.3.2.1

TAYLORVILLE ENERGY CENTER

Account 3.2 Coal Prep & Feed

Equipment No	Description	Type	Design Condition	Qty.
1	Crushed Coal Bunkers			
2	Crushed Coal Feeders	Vibratory		
3	Conveyor-Crushed Coal to Grinding Mills	Belt		
4	Grinding Mills			
5	Hot Gas Generators			
6	Conveyor-to Gasifier Inlet Storage Silos	Pneumatic-CO2		
7	Grinding Mill Gas/Coal Dust Separator	Baghouse		
8	Ground Coal Classifiers			
9	Collecting Screw @ Rotary Feeders			
10	Exhaust Stack for Dust Coll. Gases			

Account 3.3 - Feed-water & Misc BOP Systems

Account 3.3 Feed-water & Misc BOP Syst. – The function of the **Boiler Feedwater System** is the pumping of treated feedwater streams from the HRSG LP steam drum to the respective steam drums. The **Process Boiler Feed System** pumps treated deaerated condensate to the SNG Island. This portion of the account includes all required pumps, tanks, heaters, deaerators w/vacuum system, chemical treatment, controls and I/C piping.

The function of the **Condensate BOP System** is to transfer condensate from the ACC to the Condensate Storage Tank and then through the STG Gland Steam Condenser, HRSG Feedwater Preheaters to the HRSG LP Steam Drum. Process condensate returns are treated with Condensate Polishers and routed to the Deaerator. This portion of the account includes all required tanks, pumps, condensate polishers, controls and interconnecting (I/C) piping.

The function of the **Auxiliary Boiler BOP System** is to provide steam for startup. This portion of the account includes the shop assembled Auxiliary boiler complete with controls, low-NOX burners, stack, and I/C piping.

The function of the **Natural Gas BOP System** is to provide an available fuel for startup and as backup fuel for the Power Island. This portion of the account includes Natural Gas Startup Heaters, Controls, Local Gas Chromatograph and a Check Flow Meter.

The function of the **Chemical Storage/Feed BOP System** is to provide a safe storage area and forwarding system to transport the chemicals to the required plant systems. This portion of the account includes all required Pumps, Controls and I/C Piping.

The function of the **Potable Water BOP System** is to provide service from the City of Taylorville municipal potable water tie-in location to the various buildings/offices requiring potable water. The portion of this account includes necessary Controls, Metering and I/C piping.

The function of the **Compressed Air/Instrument Air BOP System** is to provide compressed air for startup and the operation of plant systems/controls. This portion of the account includes the Air Compressor Subsystem Package, the duplex regenerative Instrument Air Dryer and all required Controls and I/C piping.

The function of the **Sanitary Wastewater BOP System** is to provide the on-site treatment of sanitary wastewater through a Packaged Extended Aeration Sewage Treatment System, where the treated effluent is piped to the Clarifier inlet.

Remaining sludge is trucked to a suitable off-site landfill. This portion of the account includes the Extended Aeration Sewage Treatment Package along with required Controls and I/C Piping.

Maintenance – The estimated maintenance cost for this account is $379,000 per year. This is divided into $152,000 for labor and $227,000 for parts and materials.

TAYLORVILLE ENERGY CENTER

Account 3.3 Feedwater & Misc BOP System

Equipment No	Description	Type	Design Condition	Qty.
1	Condensate Stor. Tank	Vertical, Outdoor		
2	Condensate Pumps	Vertical, Canned	300 HP Ea	
3	Deaerator (DA)	Horizontal Spray Type		
4	DA Aux Vacuum Syst			
5	Feedwater Prehtrs			
6	Condensate Polishers	Ion Exch/Mixed Bed		
7	HP BFW Pumps	Centrifugal, Electr Mtr	2150 HP EA	
8	Process BFW Pumps			
9	Water Makeup/Pretreat	2 Stage R.O. Syst		
10	Na Bisulfate Feed Pkg			
11	Serv Wtr Pumps/ Syst	Horiz/Centrifugal	700 GPM	
12	Potable Water Syst			
13	Serv Air Compr & Syst	Recip	450 cfm @ 100 psig	
14	IP BFW Pumps			
15	LP BFW Pumps			
16	Air Compressor	For Start-up Service		
17	Demin Wtr Stor Tank	1 Million Gal/Tank	55' D X 57' H	
18	Demin Wtr Xfr Pumps			
19	Instr Air Dryer & Syst	Duplex/ Regenerative	450 cfm	
20	Control Air Syst			
21	Aux Boiler for S.U.	Nat Gas Fired	Low NOX Burners, Shop Fab	
22	Nat Gas (N.G.)Syst	For S.U. and Back-up		
23	N.G.Start-up Heaters			

24	N.G. Chromatograph	Local w/ Flow Meter		
25	Chem Storage/Feed Syst			
26	Sanitary Waste Wtr Syst	On-site Ext'd Aeration		

Account 3.4.1 Gasifier & Accessories

Account 3.4.1 Gasifier & Accessories – The function of the Siemens gasifier is to convert coal entering through its upper section into a Syngas consisting of H2, CO, CO2, and small quantities of nitrogen, argon, ammonia and water. During gasification, the sulfur compounds, in the fuel will be converted to H2S and COS. Mineral materials form a molten slag in the bottom section of the gasifier. The syngas and slag will be cooled and saturated in the quench chamber section. The coarse slag exits the bottom of the quench chamber via a hopper system for transfer to trucks or rail for offsite sale or disposal at either an onsite or an offsite landfill. A black water blowdown stream is continuously removed and treated in another account. Syngas exits the side of the vertical gasifier and is further processed into SNG.

Maintenance – The estimated maintenance cost for this account is $4,554,000 per year. This is divided into $1,822,000 for labor and $2,732,000 for parts and materials.

Taylorville Energy Center

Account 3.4.1 Gasifier & Accessories

Description	Qty.
Gasifier Island System (E9611 cost)	
Agitator BWT Sump	
Agitator Sludge Drum	
Agitator Slag Sump	
Main Burner	
Pilot Burner	
Pilot Burner flare	
Flare Ignitor	
Chain Conveyor + Tank	
Vent Fan	
N2 Buffer 2 (Pressurising)	
N2 Buffer 3	
N2 Buffer 4	
Cooling screen circuit Drum	
Burner cooling circuit Drum	
Quenchwater Vessel	
Emergency QW-Vessel	
CJ Drum	
Slag Hopper	
Flushing Tank	
Raw Gas K/O Drum	
Gas Condensate Buffer	
Flash 1	
Flash 2	
Separator Drum 1	
Separator Drum 3	
Separator Drum 2	
Flocculant Dosing Station	
Cycle Water Tank	
Waste Water Tank	
NaOH-Tank	
Floccolating Drum	
BWT Sump	

Sludge Drum	
Slag Sump	
N2 Buffer O2 purge1	
N2 Buffer O2 purge2	
N2 Buffer gas purge	
Buffer gas purge	
Flare Drum (optional)	
Liquid Seal of flare	
Soft Water Buffer	
Cooling Screen Cycle Steam Drum	
Burner Cooling Cycle Cooler	
Cooling Jacket Cooler	
Wash Water Cooler	
Partial Condenser	
Flash Cooler 2	
Flash Cooler 1	
Flash Bypass Cooler	
Cycle Water Heater for CO shift	
O2 Heater	
Coal Bunker Filter	
Lock Hopper Filter	
Feeder Vessel Filter	
Quench Water Filter	
BCC Finefilter	
Filter Press Unit	
Filter Gas Purge	
Filter O2 Purge	
Flare	
Black Water Mixer	
Wash Water Mixer	
Quench Water Pump	
CSC Pump	
BCC Pump	
CJ Pump	
Slag Water Pump	
Slag Circulating Pump	
Venturi Scrubber Pump	
Gas Condensate Pump	
Vacuum pump	

BWT Sump Pump	
Sludge Pump	
Waste Water Pump	
Flocculant Dosing Pump 1	
NaOH-Cycle Pump	
NaOH-Dosing Pump	
Cycle Water Pump	
Filter Feeding Pump	
Slag Sump Pump	
Soft water Pump	
Flare Pump 1	
Flare Pump 2	
Flocculant Dosing Pump 2	
Reactor (pressure shell)	
Reactor (cooling screen)	
Guide tube	
Quench nozzles	
Quench chamber	
Slag Crusher	
Venturi Scrubber 1	
Venturi Scrubber 2	
Venturi K/O Drum 1 (cyclone)	
Venturi K/O Drum 2 (cyclone)	
Settlement Basin incl all	
Coal Bunker	
Lock Hopper	
Feeder Vessel	
Agitator	
Fluidizing elements	
Agitator Filter N2	
Large Bore Ball Valves (Slag)	
Large Bore Ball Valves (Feed)	
High Performance Ceramic control valves	
Automated Valves (solid duty)	
Automated Valves (non solid duty)	

Account 3.4.2 - Air Separation Unit

Account 3.4.2 ASU and Oxygen Compression- The function of the ASU and Oxygen Compression system is to separate atmospheric air into its primary constituents, oxygen and nitrogen, for use in various processes in the plant.

The ASU has been deleted from the scope of the project for the purpose of this report. Costs associated with ASU gas products are therefore not included in this report. Representative costs from commercial agreements for instrument air, nitrogen, and oxygen, at required process conditions are included in the owner's pro-forma

Account 3.5A - Syn Gas Cleanup

Account 3.5A Syngas Cleanup – The function of the Syngas Cleanup is to prepare the Syngas as fuel (SNG) for the combined cycle power plant as well as transporting surplus SNG to an existing interstate natural gas pipeline for purchase.

Particulates in the raw Syngas exiting the Gasifiers are removed in the particulates scrubbers. Hg is absorbed in the activated guard beds while the acid gases, CO2 and H2S are separated in the Rectisol unit, which is the Acid Gas Removal (AGR) system for further processing and disposal. Cleaned Syngas is converted to SNG through a catalytic methanation system. SNG is then transported to the Power Island where it becomes the fuel for two CTGs.

The function of CO2 Removal account is to recover CO2 from the Syngas being processed in the Rectisol train. I/C piping transports the CO2 from the Re-Absorbers CO2 discharge connections to the CO2 header going to transport.

Maintenance – The estimated maintenance cost for this account is $2,935,000 per year. This is divided into $1,438,000 for labor and $1,497,000 for parts and materials.

TAYLORVILLE ENERGY CENTER

Account 3.5A Syngas Cleanup **Fuel Gas Cleanup**

Equipment No	Description	Type	Design Condition	Qty.
1	Rectisol AGR Train			
2	Absorbers			
3	MP Flash Tower			
4	Reabsorber			
5	Regenerator			
6	MeOH/H2O columns			
7	I/C Ppg-Reabosorbers to CO2 HDR			
8	SRU Burners			
9	Acid Gas/LP Stm Ht Exchr			
10	Acid Gas/IP Stm Ht Exchr			
11	SRU Molten Sulfur Reservoir			
12	SRU Acid Gas Reactor			
13	Sulfur Degass Drums&Pumps			
14	Sulfur Quinoline Drum			
15	Sulfur Stor Tk & Loadout	205,000 Gal		
16	Tailgas Hydrogenation Reactor			
17	Tailgas Quench Tower Unit			
18	Tailgas Thermal Oxidizer/Stack			
19	Tailgas Recycle Blowers			
20	Tailgas I/C Piping to AGR			
21	Gas Scrubber Pkg's	Wet		
22	Partial Condenser			
23	Raw Gas Knock Out Drum			
24	I/C Ppg frm Scrubbers to Shift Reactor			
25	Raw Syngas Guard Bed			
26	Raw Syngas Shift Reactor			
27	Raw Syngas Heat Exchangers			
28	Cooled Syngas Mercury Beds			
29	Sour Water Stripper			
30	Cooled Shifted Syngas Ht Exchgr			
24	Black Water Vacuum Compressor			
25	Black Water Solids Separation Unit			
26	Black Water Spray Vessel			
27	Black Water Forwarding Pump			

28	Black Water I/C Piping			
29	Methanation Booster Compressor			
30	Methanation Sulfur Guard Bed			
31	Methanation Recycle Ht Exch			
32	First Bulk Methanator			
33	First Bulk HP Stm Ht Exch			
34	First Bulk HP BFW Ht Exch			
35	Second Bulk Methanator			
36	Second Bulk HP Stm Ht Exch			
37	Second Bulk HP BFW Ht Exch			
38	Second Bulk IP Stm Ht Exch			
39	Second Bulk Dwnstream HP BFW Ht			
40	Trim Methantor			
41	TEG Drying Unit			
42	Methanation Recycle Compressor			
43	Methanation Recycle LP Stm Ht Exch			
44	Methanation Recycle HP BFW Ht Exch			
45	Methanation Recycle Grd Bed Eff Ht Exch			

Account 3.5B – CO2 Removal

Account 3.5B1 CO2 Removal - The function of CO2 Removal account is to recover CO2 from the Syngas being processed in the Rectisol train. I/C piping transports the CO2 from the Re-Absorbers CO2 discharge connections to the CO2 header going to transport.

Maintenance – The estimated maintenance cost for this account is $1,317,000 per year. This is divided into $579,000 for labor and $738,000 for parts and materials.

Account 3.5B2 – CO2 Compression

Account 3.5B2 CO2 Compression - The function of CO2 Compression account is to compress the larger portion of the CO2 product separated by the Rectisol system along with the recovered CO2 from the coal lock hopper system vents, to the CO2 Product Compressors. From the compressors the CO2 is set for transport and for use in the Enhanced Oil Recovery or for Geologic Storage. A portion of the CO2 is recycled through a bladder tank, CO2 recycle compressor, and methanol sleeves enroute to the Gasification system.

Maintenance – The estimated maintenance cost for this account is $1,347,000 per year. This is divided into $579,000 for labor and $768,000 for parts and materials.

TAYLORVILLE ENERGY CENTER

Account 3.5B2 CO2 Compression

Equipment No	Description	Type	Design Condition	Qty.
1	CO2 Recycle Compressor			
2	CO2 Bladder Tank	705,000 Gal	50'D X 48'H	
3	CO2 Product Compressors	2 X 50%		
4	CO2 Backflow Preventer			
5	I/C Ppg to SRU/AGR Systems			
6	Recycle Methanol Sieves			

Account 3.6 - Combustion Turbine & Accessories

Account 3.6 Combustion Turbine/Accessories - The function of the two Combustion Turbines (CT) and their Accessories is to utilize SNG as primary fuel for the CT along with natural gas for start-up/back-up, to drive the 60 Hz CT Generators to produce electrical power. The hot exhaust gases from the CTs are routed to the HRSG Inlets where they convert water to steam. Each CT & Generator is furnished with its Inlet & Exhaust Syst, Electrical Package, Mechanical Package, Walk-in Enclosure, Lube Oil Cooling Syst, Starting Package, Fuel SNG System, Water Wash Package, etc

Maintenance - The estimated maintenance cost for this account is $8,800,000 per year. This is divided into $1,839,000 for labor and $6,961,000 for parts and materials.

TAYLORVILLE ENERGY CENTER

Account 3.6 Combustion Turbine/ Accessories

Equipment No	Description	Type	Design Condition	Qty.
1	Combustion Turbine (CT)	F Series, Single Shaft		
2	CT Generator		220MVA, 16.5KV, 60 HZ	
3	Inlet Air Evap Cooler			
4	Lube Oil Coolers			
5	Mechanical Package			
6	Electrical Package			
7	Rotor Air Cooling Syst			
8	Water Wash Skid			
9	Fuel Gas Filter			
10	Pilot Gas Filter			
11	CT Starting Package			
12	CTG Enclosures			
13	Hydraulic Skid			
14	Fire Protection Systems	FM200 & CO2		

Account 3.7 - HRSG, Duct & Stack

Account 3.7 HRSG, Duct & Stack – The function of the two site erected HRSGs is to utilize the hot exhaust gases from the Combustion Turbines to convert water to steam which will drive the single Steam Turbine. This account includes the NOX reduction system (SCR), the CEMS for the exhaust stacks and the HRSG drain system including Blowdown.

Maintenance – The estimated maintenance cost for this account is $844,000 per year. This is divided into $338,000 for labor and $506,000 for parts and materials.

TAYLORVILLE ENERGY CENTER

Account 3.7 HRSG, Duct and Stack

Equipment No	Description	Type	Design Condition	Qty.
1	HRSG		Inlet Gas: 1100 F, Outlet:200 F	
2	HRSG Structures			
3	CEMS		Measures NOX, CO and O2	
4	HP Stm Safety Valves			
5	Blow Down System			
6	HRSG Exhaust Stack			
7	BD Tank Stack Silencer			
8	SCR System	NOX Reduction		
9	Ammonia Skid		19% Aqueous Ammonia	

Account 3.8 - Steam Turbine Generator

Account 3.8 Steam Turbine Generator - The function of the Steam Turbine and its Generator is to utilize the steam produced in the HRSGs and recovered in the process units, which is then expanded in the Steam Turbine, driving the hydrogen-cooled generator to produce electric power. Steam leaving the Steam Turbine is piped to an air-cooled condenser (ACC), where it will be condensed and recycled to the HRSGs. This account also includes the vacuum system to remove noncondensible gases from the ACC.

Maintenance _ The estimated maintenance cost for this account is $1,157,000 per year. This is divided into $463,000 for labor and $694,000 for parts and materials.

TAYLORVILLE ENERGY CENTER

Account 3.8 Steam Turbine Generator

Equipment No	Description	Type	Design Condition	Qty.
1	Steam Turbine (ST)	Tandem Compound	1825 psig, 1050 Deg F Stm Inl	
2	Steam Turb Generator	H2 Cooled	60 HZ, 3600 RPM	
3	Condenser	Sgle Pass, Air Cooled	1X100%	
4	Condenser Vac Pumps			
5	ST Bearing L.O. Clrs			
6	ST Bearing L.O. Condit			
7	H2 Seal Oil System	Closed Loop		
8	Generator Coolers			
9	Gland Stm Condenser			
10	ST HP Steam Valves			
11	ST LP Steam Valves			
12	ST LP Steam Valves			
13	HP Exp Jts	Condenser Inlets		

Account 3.9 - Cooling Water System

Account 3.9 Cooling Water System – The function of the **Cooling Water System** is to deliver water from the Cooling Tower to the cooling loads and return the water back to the Cooling Tower. This portion of the account includes the Cooling Tower, Vertical Circ Water Pumps, Large Valves & Expansion Joints at the Cooling Tower and Circ Water Pumps, Controls and I/C Piping.

The function of the **Closed Cooling Water System** is to provide water-cooling to the Generator Coolers, L.O. Coolers, Sample Cooler, BF Pump Coolers and all cooling loads in the Syngas islands. This portion of the account includes CCW Heat Exchangers, CCW Pumps, Controls and I/C piping.

The function of the **Cooling Tower Makeup & Chem Treatment System** is to control dissolved solids concentration in the Cooling Water blowdown. This will be accomplished through the addition of sulfuric acid for alkalinity control, a polymer blend as a dispersant, organic phosphonates for corrosion control and sodium hypochloride/biocide for algae growth. Required Pumps, Tanks, Controls and I/C are included.

The function of the **Fire Protection System** is to protect required areas of the plant in the event of an emergency fire condition. The fire water for the U.G. plant fire water loop header with Hydrants/Post Indicator Valves/Hose Stations will be fed from Fire Water Pumps, which include one Electric Motor Driven, one Diesel Engine Driven and one Motor Driven Jockey Pump. Branch lines will be fed from the UG Header to Wet and Dry Sprinkler Systems for selected plant areas and equipment. CO2 and FM200 will be used in special areas of the plant along with hand held Fire Extinguishers. FP Master Control Panel will be located in the control room. A Diesel Fuel Storage Tank is included for the Diesel Driven Fire Pump. This portion of the account includes all required Tanks, Pumps, Controls and Piping

The function of the **Raw Water System** is to store SDD Raw Water in the Raw Water Stor Tanks and then pump to the Clarifier, after which the clarified water is collected in the Clearwell and then pumped to the Service Water Treatment or to the Cooling Tower. This portion of the account includes all Storage Tanks, Clarifier, Clearwell, Pumps, Controls and I/C Piping.

The function of the **Safety Shower/Eye Wash System** is to treat plant personnel in the event of an emergency situation where toxic chemicals are stored or handled.

Maintenance – The estimated maintenance cost for this account is $717,000 per year. This is divided into $287,000 for labor and $430,000 for materials.

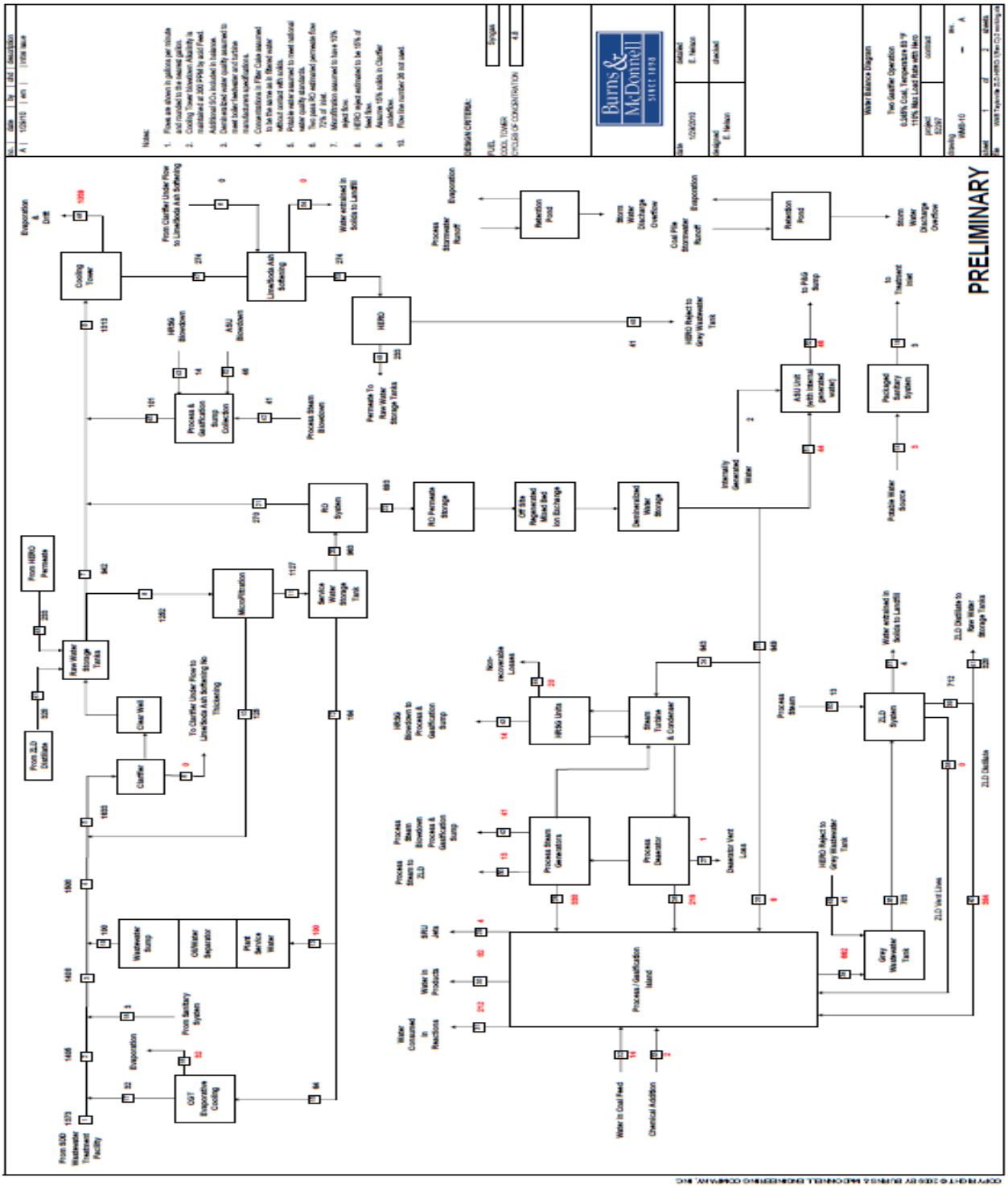
Account 3.9.1 – Balance of Water Treatment

The TEC water treatment facility is a considerably larger water treatment plant than found in a typical power plant. Secondary water or “Grey Water” is supplied from the Sanitary District of Decatur or SDD. Treatment of this water to the quality required for plant operation requires a large facility with numerous treatment steps and processes. A water balance and a plant layout of this facility is included in Section 3.9 of this report. Due to the size of this plant, only a portion of the water treatment system is included in section 3.9 Discussion of additional treatment capacity that is considered outside of the typical water treatment facility is included in this Section 3.9.1.

The additional treatment required as a result of the water quality of the raw water supply is addressed utilizing experienced based maintenance factors to the additional cost of the water treatment plant. This labor cost is included in the outside labor identified in the maintenance budget.

The maintenance numbers identified here do not include the cost of the raw water from SDD or the chemical treatment, resins, RO membranes and filter media required. These materials are considered plant consumable materials, which are included in Section 2 Consumables. See enclosed reference documents entitled Water Balance Diagram, Dwg No's 1.8.1 respectively.

A total of $1,355,000 includes $542,000 for labor and $813,000 for parts and materials for the ZLD.


PRELIMINARY
Burns & McDonnell
Water Balance Diagram
Two Gasifier Operation
Cooling Tower
Raw Water Storage Tanks
Clear Well
Clarifier
Wastewater Sump
Oil/Water Separator
Plant Service Water
Evaporation & Drift
From Clarifier Under Flow to Limeslurry Ash Softening
Water entrained in Solids to Landfill
Limeslurry Ash Softening
HRSG
HRSG Blowdown
ASU Blowdown
Process & Gasification Sump Collection
Process Steam Blowdown
Permeate To Raw Water Storage Tanks
HRSG Reject to Grey Wastewater Tank
Process Stormwater Runoff
Retention Pond
Storm Water Discharge Overflow
Coal Pile Stormwater Runoff
ASU Unit (with internal generated water)
Packaged Sanitary System
To Potable Water Storage
To Treatment Inlet
Potable Water Source
Internally Generated Water
RO System
RO Permeate Storage
Off Site Regenerated Mixed Bed Ion Exchange
Demineralized Water Storage
From HRSG Permeate
From ZLD Distillate
From SGS Wastewater Treatment Facility
From Sanitary System
Microfiltration
Service Water Storage Tank
To Clarifier Under Flow to Limeslurry Ash Softening Thickening
Non-recoverable Losses
HRSG Units
Steam Turbine & Condenser
Process Steam Generators
Process Deaerator
Deaerator Vent Loss
Process Steam
ZLD System
ZLD Distillate
ZLD Vent Loss
Process Steam to ZLD
Process Steam Blowdown
Process / Gasification Island
Water in Products
Water Consumed in Reactions
Water in Coal Feed
Chemical Addition
Grey Wastewater Tank
CDT Evaporative Cooling
Evaporation
Water Balance Diagram
Two Gasifier Operation
6,045t/d Coal, Temperature 59 °F
115% MCR Load Rate with Spray
Siemens Energy, Inc.
Burns & McDonnell Engineering Company, Inc.

Drawing 1.8.1

TAYLORVILLE ENERGY CENTER

Account 3.9 Cooling Water System

Equipment No	Description	Type	Design Condition	Qty.
1	Cooling Tower	Induced Dft/Multi Cell		
2	Circ Water Pumps	Vertical, Wet Pit		
3	Circ Water Syst Auxil			
4	CCW Heat Exchangers			
5	CCW Pumps		550 HP, Ea	
6	Clg Twr MU/Chem Treat			
7	Fire Water Pump	Diesel Engine Driven	125 psig Disch Pressure	
8	Fire Water Pump	Electr Motor Driven	125 psig Disch Pressure	
9	Fire Wtr JockeyPump	Electr Motor Driven		
10	Master Fire Alarm Panel			
11	UG Fire Wtr Loop Syst			
12	Main&Aux Xfmr Sprinkler Syst	Deluge		
13	Admin, FW Pump Hse FP Syst	Wet Pipe Sprinkler		
14	Cooling Tower FP Syst	Dry Pipe Sprinkler		
15	L.O. Stor Tks FP Syst	Dry Pipe Sprinkler		
16	Hydraulic Oil Equip FP Syst	Dry Pipe Sprinkler		
17	Mtnce & Warehouse FP Syst	Dry Pipe Sprinkler		
18	STG Bearings/Batt Rm FP Syst	Dry Pipe Sprinkler	Preaction Design	
19	Control Rm FP Syst	Fire Detection	Fire Extinguishers	
20	Elect Equip Rms FP Syst	Fire Detection	Fire Extinguishers	
21	Safety Shower/Eye Wash Sta's			
22	Clg Twr Blowdown Treatment	Lime/Soda Ash Trtmt		
23	Diesel Fuel Stor Tank	For Diesel Fire Pump	1000 Gal (6'D X 8'H)	
24	Raw Water Stor Tank	2 Million Gal/Tank	134'D X 48'H	
25	Service/Fire Water Stor Tank	2 Million Gal/Tank	70'D X 72'H	
26	Raw Water Pumps/Fwrdg Syst	Horiz, Centrifugal	Single Suction	

Account 3.10 - Slag / Sludge Handling System

Account 3.10 Slag and Sludge System – The function of the Slag and Sludge System is to collect the slag from the four outlets of the Gasifiers, through slag crushers, slag hoppers and chain conveyors for transport to trucks or rail cars for removal from site. See Section 9.0 for the forecasted costs associated with actual hauling costs of slag and sludge to the waste disposal site.

Maintenance – The estimated maintenance cost for this account is $331,000 per year. This is divided into $132,000 for labor and $199,000 for parts and materials.

TAYLORVILLE ENERGY CENTER

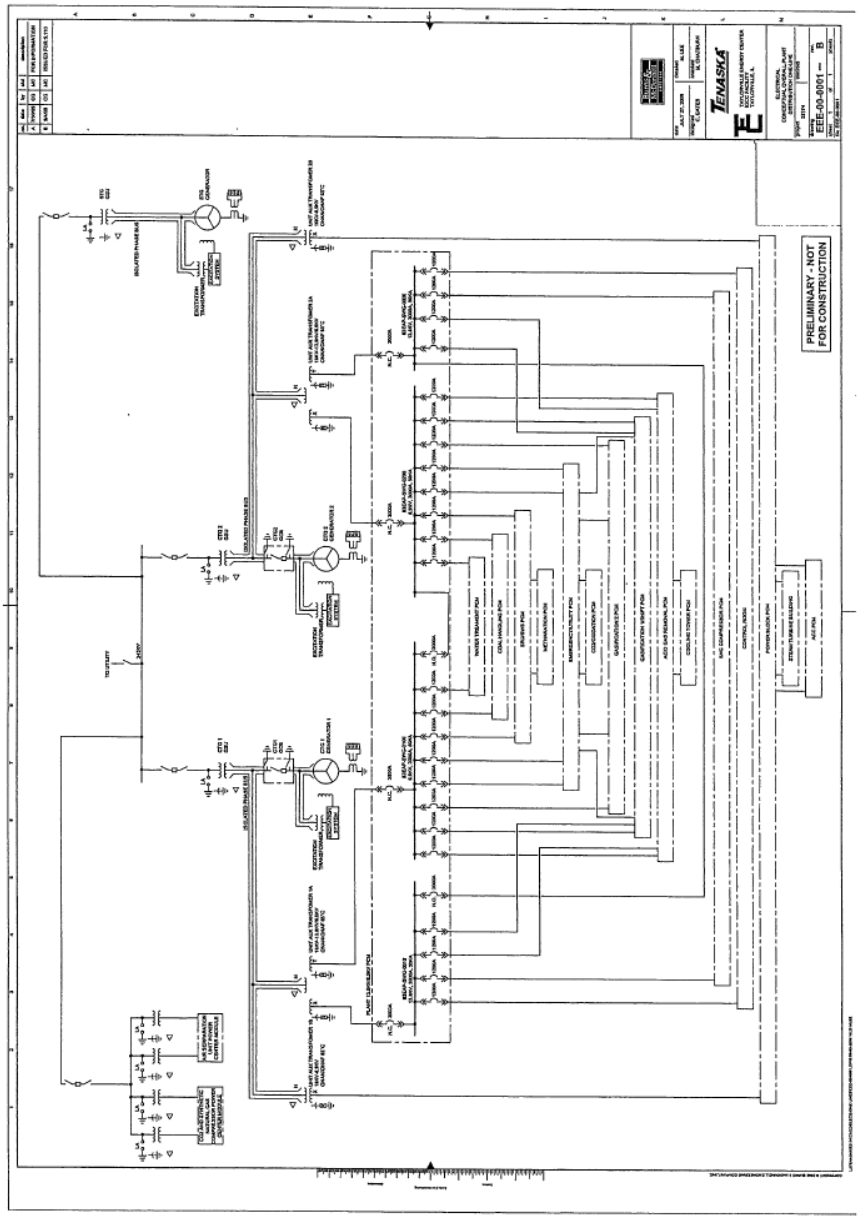
Account 3.10 Slag and Sludge System

Equipment No	Description	Type	Design Condition	Qty.
1	Agitator BWT Sump	Gasifier Island		
2	Agitator Sludge Drum	Gasifier Island		
3	Agitator Slag Sump	Gasifier Island		
4	Slag Hopper	Gasifier Island		
5	Flushing Tank	Gasifier Island		
6	Flocculant Dosing Station	Gasifier Island		
7	Cycle Waste Tank	Gasifier Island		
8	Waste Water Tank	Gasifier Island		
9	Floccolating Drum	Gasifier Island		
10	BWT Sump	Gasifier Island		
11	Sludge Drum	Gasifier Island		
12	Slag Sump	Gasifier Island		
13	Wash Water Cooler	Gasifier Island		
14	Filter Press Unit	Gasifier Island		
15	Filter Gas Purge	Gasifier Island		
16	Filter O2 Purge	Gasifier Island		
17	Slag Water Pump	Gasifier Island		
18	Slag Circulating Pump	Gasifier Island		
19	Sludge Pump	Gasifier Island		
20	Waste Water Pump	Gasifier Island		
21	Slag Sump Pump	Gasifier Island		
22	Slag Crusher	Gasifier Island		
23	Settlement Basin Incl All	Gasifier Island		
24	Agitator	Gasifier Island		

Account 3.11 - Accessory Electric Plant

Account 3.11 Accessory Electric Plant - The function of this account is to provide 345 kV electrical power to, but not including, the 345 kV Substation and to provide lower voltage electric power (69kV, 13.8kV and 480V) to energize the various systems that make up the entire plant. This account includes the Gas Turbine and Steam Turbine Generator stepup transformers, the Unit Auxiliary Transformers, Isophase and Non-seg Bus, Generator Circuit Breakers, and the Emergency Power Generators. It also includes the electrical equipment contained within the various system PCMs along with Switchgear, MCC's, Breakers, Control Equipment, Station Service Equipment, Conduit/Cable Trays Electric Heat Tracing, and Cable and Wire. See enclosed reference document entitled Electrical Conceptual Overall Plant Distribution One-Line, Dwg 1.3.11.1.

Maintenance – The estimated maintenance cost for this account is $1,430,000 per year. This is divided into $572,000 for labor and $858,000 for parts and materials.


PRELIMINARY - NOT FOR CONSTRUCTION

TAYLORVILLE ENERGY CENTER

Account 3.11 Accessory Electric Plant

Equipment No	Description	Type	Design Condition	Qty.
1	IPBD- ST Gen to GSU Xfmr		13000A @ 40 Deg C, 18kV	
2	IPBD- CT Gen to GSU Xfmr		8000A @ 40 Deg C, 16.5kV	
3	CTG Circuit Breakers		8000A @ 40 Deg C, 16.5kV	
4	ST GSU Xfmr		18kV-345kV, 228/304/380 MVA	
5	CT GSU Xfmr		16.5kV-345kV, 150/200/250 MVA	
6	CTG & STG Grounding Cubicals			
7	Tap Bus to STG Excit. Cubical		1200A, 18kV	
8	STG Excitation Xfmr		2500kVA, 18kV-700V	
9	STG Grounding Cubicle			
10	STG Excitation Cubicle			
11	CTG Grounding Cubicle			
12	CTG Excitation Cubicle			
13	Tap Bus to CTG Excit. Xfmr		1200A, 16.5kV	
14	CTG Excitation Xfmr		2500kVA, 18kV-700V	
15	Tap Bus from IPBD to Aux Xfmr		3000A, 16.5kV	
16	Auxiliary Xfmrs		16.5kV-13.8/6.9kVA	
17	Non-Seg Bus frm Aux Xfmr to Plt	3000A	13.8kV/6.9kV PCM	
18	Tap Bus from IPBD to UAT Xfmr		1200A, 16.5kV	
19	Tap Bus frm IPBD to VT /Surge Cube		1200A, 16.5kV	
20	Non-Seg Bus to MVSG/MCC		6.9kV, 2000A	
21	Med. Voltage SWG		6.9kV, 2000A, 50KA	
22	BOP Xfmrs		6.9kV-480V, 2500/3333/kVA	
23	Non-Seg Bus, BOP Xfmr to LVSG		4000A, 600V	
24	Low Voltage SWG		480V, 4000A, 65KA	
25	ACC Xfmr		2000/2666kVA, 6.9kV-480V	
26	Non-Seg Bus from ACC Xfmr to ACC MCC		3200A, 65KA	
27	ACC MCC		3200A, 65KA	
28	HRSG Xfmr		6.9kV-480V, 2000/2666kVA	
29	Non-Seg Bus frm HRSG Xfmr to MCC		600V, 3200A	
30	HRSG MCC		3200A, 65KA	
31	UAT SWG ("X" Windings)		13.8kV, 3000A, 3 PH, 50KA	
32	UAT SWG ("Y" Windings)		6.9KV, 3000A, 50KA	
33	SNG Compressor MCC's			

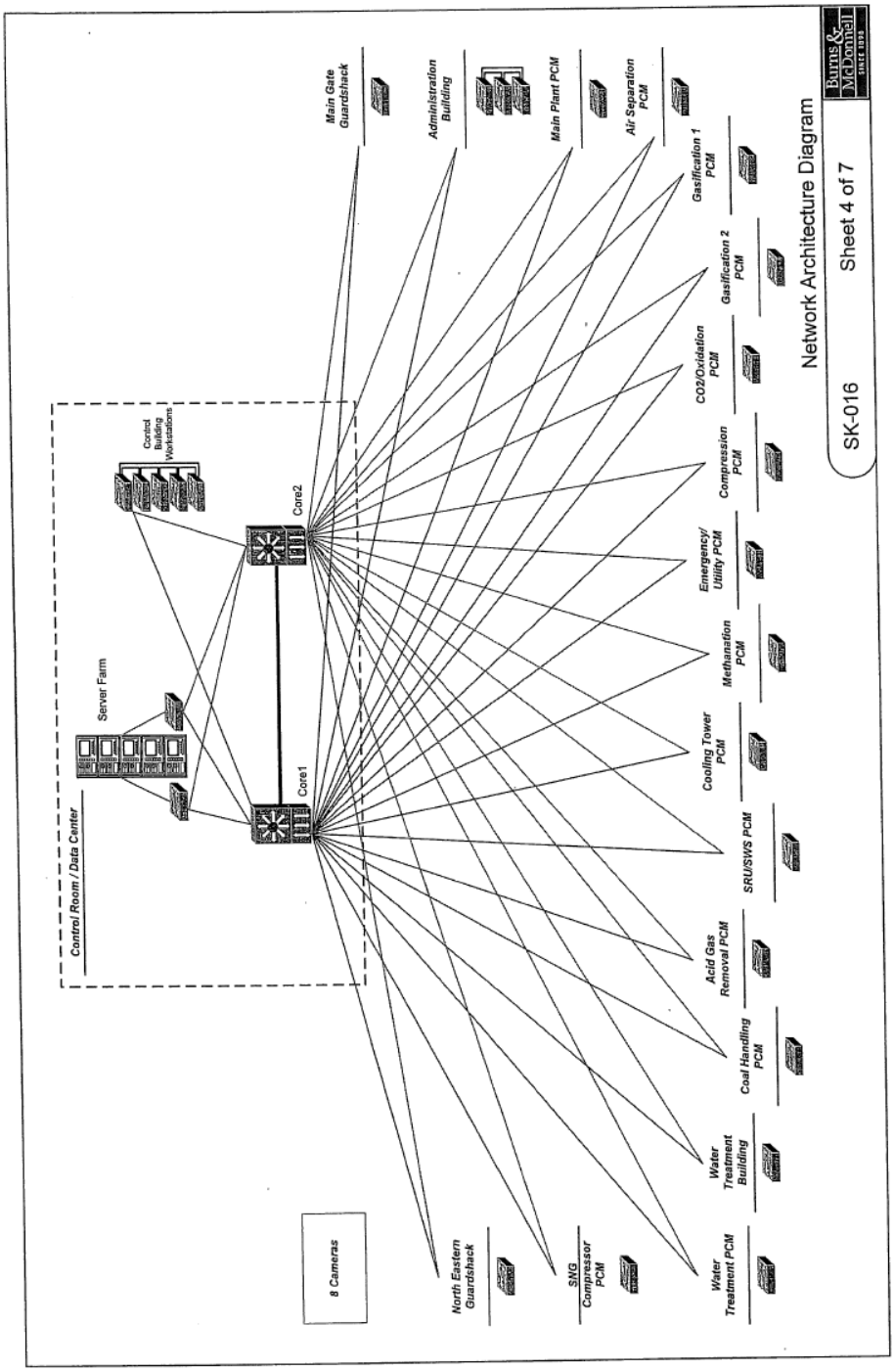
34	SNG Essential MCC			
35	Auto Transfer Switch			
36	SNG-Compressor Xfmr		13.8-0.45 KV, 1500/2000KVA	
37	SNG 480V SWG		480V, 3200A, 65 KA	
38	SNG 13.8KV SWG		1200A, 50KA	
39	Gasification 2 Xfmr		13.8-0.48KV, 1500/2000 KVA	
40	Gasification 2 SWG		480V, 3200A, 65 KA	
41	Gasification 1Shift Xfmr		13.8-0.48KV, 1500/2000 KVA	
42	Gasification 1 Shift SWG		480V, 3200A, 65 KA	
43	Gasification 1 Shift SWG		6.9KV, 1200A, 50KA	
44	Gasification 1 Shift Xfmr		6.9-0.48KV, 1500/2000 KVA	
45	Gasification 1 Shift SWG			
46	Gasification 1 Shift Station Battery Syst	DC	125V	
47	Gasification 1 Shift Inverter Package		30KVA	
48	Gasification 2 Xfmr		6.9-0.48KV, 1500/2000KVA	
49	Gasification 2 SWG		6.9KV, 1200A, 50KA	
50	Gasification 2 SWG		480V, 3200A, 65 KA	
51	Gasification 2 Auto Transfer Switch			
52	Gasification Cooling Xfmr		13.8-0.48KV, 1500/2000 KVA	
53	Gasification Cooling SWG		480V, 3200A, 65 KA	
54	Acid Gas Removal SWG		6.9KV, 1200A, 50KA	
55	Acid Gas Removal Xfmr		6.9-0.48, 1500/2000 KVA	
56	Acid Gas Removal SWG		480V, 3200A, 65 KA	
57	Acid Gas Removal Station Battery Syst	DC	125V	
58	Acid Gas Removal Inverter Pkg		30KVA	
59	Acid Gas Removal SWG		13.8KV, 1200A, 50KA	
60	SRU/SWS SWG		6.9KV, 1200A, 50KA	
61	SRU/SWS Xfmr		6.9-0.48KV, 1500/2000	
62	SRU/SWS SWG		480V, 3200A, 60 KA	
63	SRU/SWS Auto Transfer Switch			
64	SRU/SWS Station Battery Syst	DC	125V	
65	SRU/SWS Inverter Pkg		30KVA	
66	Water Treatment SWG		6.9KV, 1200A, 50KA	
67	Water Treatment Xfmr		6.9-0.48KV, 1500/2000 KVA	
68	Water Treatment SWG		480V, 3200A, 65KA	
69	Water Treatment Auto Transfer Switch			
70	Water Treatment Xfmr for Emerg Utility Rm		6.9-0.48KV, 500/750 KVA	
71	Water Treatment Station Battery Syst	DC	125V	
72	Water Treatment Inverter Pkg		30KVA	
73	Cooling Tower Xfmr		13.8-0.48KV, 1500/2000 KVA	

74	Cooling Tower SWG		480V, 3200A, 65 KA	
75	Cooling Tower Auto Transfer Switch			
76	Utility SWG		6.9KV, 1200A, 50KA	
77	Utility Xfmr		6.9-0.48, 1500/2000 KVA	
78	Utility SWG		480V, 3200A, 65KA	
79	Utility Auto Transfer Switch			
80	Utility BOP MCC		480V	
81	Utility Station Battery Syst	DC	125V	
82	Utility Inverter Pkg		30KVA	
83	Emergency Power SWG		6.9KV, 1200A, 50KA	
84	Emergency Power Generators		3 MW	
85	Emergency Power Xfmr		6.9-0.48KV, 1500/2000 KVA	
86	Emergency Power SWG		480V, 3200A, 65 KA	
87	Emergency Power SWG for Gasification 2		480V, 3200A, 65KA	
88	Emergency Power Xfmr for Gasification 1/2		6.9-0.48KV, 1500/2000 KVA	
89	Control Room Xfmr		13.8-0.48KV, 1500/2000 KVA	
90	Control Room SWG		480V, 3200A, 65KA	
91	Control Room Auto Transfer Switch			
92	Control Room Station Battery Syst	DC	125V	
93	Control Room Inverter Pkg		30KVA	
94	Control Room Xfmr for Emergcy Utility PCM		6.9-0.48KV, 500/750 KVA	
95	Coal Handling SWG		6.9KV, 1200A, 50KA	
96	Coal Handling Xfrm		6.9-0.48KV, 1500/2000 KVA	
97	Coal Handling SWG		480V, 3200A, 65KA	
98	Coal Handling Auto Transfer Switch			
99	Coal Handling Xfmr for Emergcy/Utility PCM		6.9-0.48KV, 500/750 KVA	
100	Coal Handling Station Battery Syst	DC	125V	
101	Coal Handling Inverter Pkg		30KVA	
102	Coal Handling ByPass Xfmr		480-120V, 37.5 KVA	
103	Freeze Protection	Electr Ht Trace	Apply to Req'd Vessels/Piping	
104	Diesel Fuel Stor Tk/Fill (Emerg. Generators)		TBD	

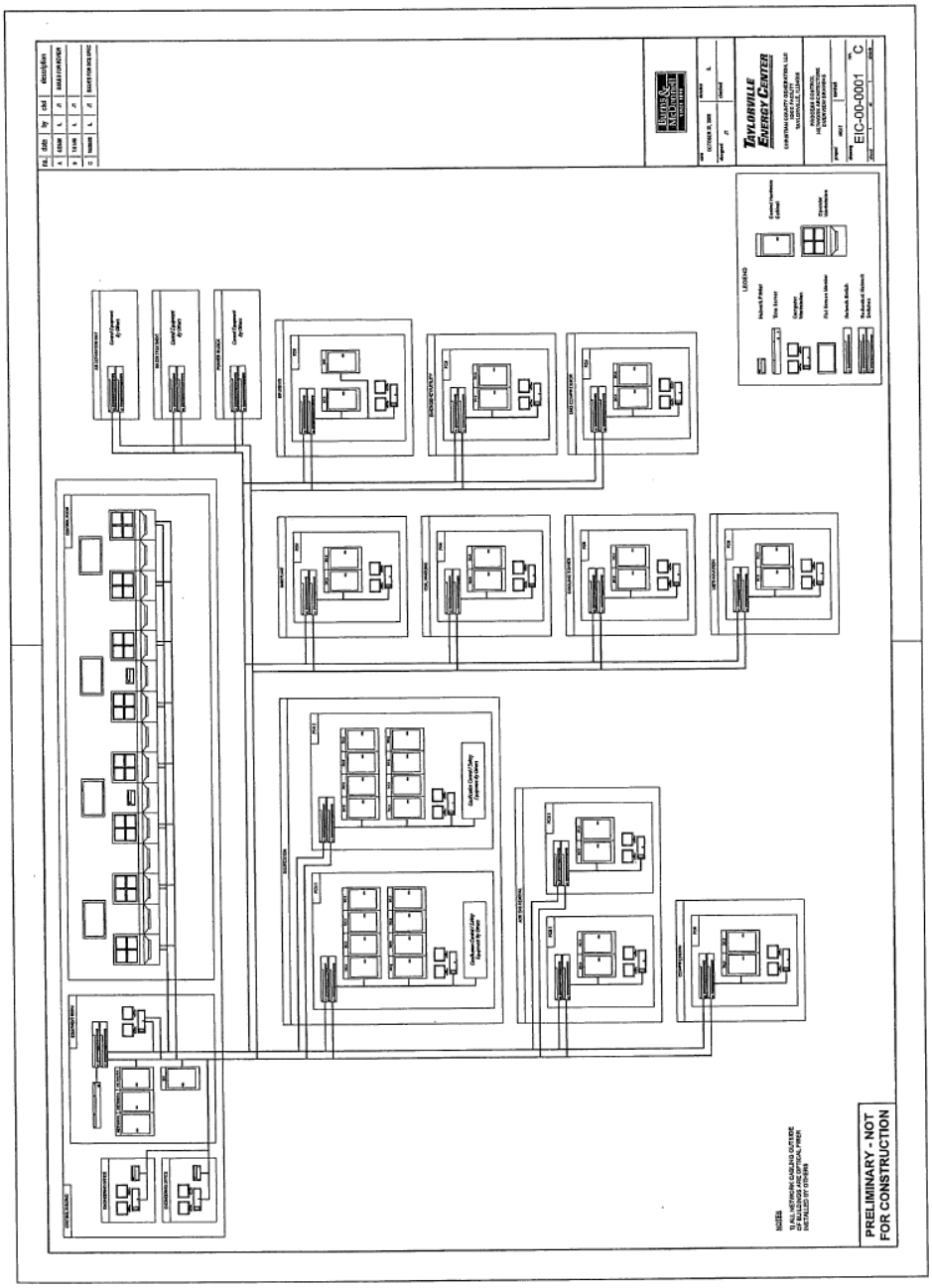
Account 3.12 - Instrumentation & Control

Account 3.12 Instrumentation & Control – The function of the Instrumentation & Control account is to provide a combined plant control system. This control is accomplished through system Control Hardware Cabinets located in the system PCMs. Redundant network switches and computer work stations are also contained in the PCMs. Fiber Optic data highway cable connects the PCMs to the Control Room, which houses operator stations, computer work stations, flat screen monitors, network printers, time servers, CEMS DAS and its network printer. In addition to the above, various transmitters, controllers, recorders and gauges are included. See enclosed reference documents entitled Network Architecture Diagram and Process Control Network Architecture Overview, Dwgs 1.3.12.1 and 1.3.12.2, respectively.

Maintenance – The estimated maintenance cost for this account is $1,090,000 per year.
This is divided into $436,000 for labor and $654,000 for parts and materials.



Drawing 1.3.12.1



Drawing 1.3.12.2

TAYLORVILLE ENERGY CENTER

Account 3.12 Instrumentation & Control

Equipment No	Description	Type	Design Condition	Qty.
1	Coal Hdlg Comp Work Station	In PCM		
2	Coal Hdlg DCS Control Cabinets	In PCM		
3	Coal Hdlg PLC Control Cabinets			
4	Coal Hdlg Redundant Network Switch			
5	WW Trtmnt Computer Work Station			
6	WW Trtmnt DCS Control Cabinets	In PCM		
7	WW Trtmnt PLC Control Cabinets			
8	WW Trtmnt Redundant Network Switch			
9	Power Blk DCS Control Cabinets	In PCM		
10	Power Blk Computer Work Sta	In PCM		
11	Power Blk Redundant Network Switch	In PCM		
12	Power Blk Turbine Control Cabinets			
13	ASU DCS Control Cabinets	In PCM		
14	ASU SIS Control Cabinets	In PCM		
15	ASU Computer Work Station	In PCM		
16	ASU Redundant Network Switch	In PCM		
17	Shift DCS Control Cabinets	In PCM		
18	Shift SIS Control Cabinets	In PCM		
19	Shift Computer Work Statation	In PCM		
20	Shift Redundant Network Switch	In PCM		
21	Gasification DCS Control Cabinets	In PCM		
22	Gasification DCS Control Cabinets			
23	Gasification Computer Work Statation			
24	Gasification Redundant Network Switch			
25	Gasification SPPA Control Cabinets			
26	Scrubber DCS Control Cabinets	In PCM		
27	Scrubber SIS Control Cabinets	In PCM		
28	Scrubber Computer Work Stataion	In PCM		
29	Scrubber Redundant Network Switch	In PCM		
30	SNG/Meth DCS Control Cabinets	In PCM		
31	SNG/Meth SIS Control Cabinets	In PCM		
32	SNG/Meth Redundant Network Switch	*In PCM*		
33	SNG/Meth Computer Work Station			
34	CEMS Bldg Computer Work Station			

35	CEMS Bldg Network Printer			
36	CO2 SNG DCS Control Cabinet	In PCM		
37	Emergency DCS Control Cabinet	In PCM		
38	Thermal Oxidizer PLC Control Cabinet			
39	Aux Blr PLC Control Cabinet			
40	Control Rm Operator Station			
41	Control Rm Computer Work Station			
42	Control Rm Flat Screen Monitors			
43	Control Rm Network Printers			
44	Control Rm Time Servers			
45	Engrg Offices Computer Work Station			
46	Admin Bldg CEMS DAS			
47	Admin Bldg CEMS Network Printer			
48	Equipmt Rm Time Servers			
49	Equipmt Rm Computer Work Station			
50	Equipmt Rm Network Switch			
51	Equipmt Rm Redundant Network Switch			
52	Equipmt Rm DCS Control Cabinet			
53	Equipmt Rm SIS Control Cabinet			
54	Equipmt Rm T3000 Control Cabinet			
55	Data Highway Cable	Fiber Optic		
56	Control Boards, Panels & Racks			
57	Instrument Tubing & Wiring			
58	Instruments- Transmitters/Controllers			
59	Instruments-Gauges/ Recorders			

Account 3.13 - Site Improvements

Account 3.13 Site Improvements – The function of Site Improvements is to either improve or maintain certain plant common components, areas or systems. Such items include plant roadways/sidewalks, outdoor plant lighting, ponds (leachate, storm water and process water), on-site landfills (sulfur and slag), roadway bridges, microwave tower, process drains collection system including oil/water separator, plant sumps, process wastewater treatment/recycle, ZLD system, mobile equipment diesel fuel oil storage tank and the open coal pile area dust control using polymer sealants.

Maintenance – The estimated maintenance cost for this account is $276,000 per year. This is divided into $110,000 for labor and $166,000 for parts and materials.

TAYLORVILLE ENERGY CENTER

Account 3.13 Site Improvement

Equipment No	Description	Type	Design Condition	Qty.
1	Site Preparation			
2	Site Improvements			
3	Site Facilities			
4	Roadway Walkway Mtnce/Rpr	Due to Coal Truck Traffic		
5	Mtnce of Leachate Pond			
6	Mtnce of Storm water Ponds			
7	Mtnce of Process Wtr Ponds			
8	Mtnce of Sulfur Landfill			
9	Plant Oil/Water Separator			
10	Plant Drains/ Trtmt Syst			
11	Site Lighting Mtnce			
12	Mtnce of Roadway Bridges	Over E-W Site Ditch		
13	Mtnce of Strm Wtr Syst/MHs	Flood Prevention		
14	Diesel Fuel Stor Tank	For Mobile Equipment	20,000 Gal, 10'-6"D 31"H	
15	Site Fence/Gates Mtnce			
16	Microwave Tower Mtnce			
17	Snow Removal/Grass Cutting			

Account 3.14 - Building & Structures

Account 3.14 Buildings & Structures – The purpose for the Buildings & Structures account is to provide upkeep and maintenance for all the various Buildings and Structures that will be constructed on the plant site. This includes roof and siding repair, painting, maintenance of building HVAC , roof drains, ventilators, floor drains, spill prevention pads and curbs, hazardous material storage, etc.

Maintenance – The estimated maintenance cost for this account is $578,000 per year.
This is divided into $231,000 for labor and $347,000 for tools and materials.

TAYLORVILLE ENERGY CENTER

Account 3.14 Buildings and Structures

Equipment No	Description	Type	Design Condition	Qty.
1	Admin Bldg			
2	Control Bldg			
3	Train/Truck Unldg Bldg			
4	Coal Yard Mtnce Bldg			
5	Crusher Tower Structure			
6	Coal Grinding Bldg			
7	Gasif. Grey Water Bldg			
8	Water Treatment Bldg			
9	Clg Tower B.D. Bldg			
10	Switchyard Control Bldg			
11	Switchyard Structures			
12	Turbine Bldg			
13	Comb Turbine Encl's			
14	HRSG Structures			
15	W.W. ZLD Trtmnt Bldg			
16	Circ Wtr Pump House			
17	HRSG Stk CEMS Bldg			
18	Warehouse			
19	Tag-out Offices			
20	Plant Security Bldg			
21	Outside Pipe Racks			
22	Flammable Mat't Storage			
23	Truck Unloading Ramps			
24	Machine Shop			

Section 4 - Facility Administrative Systems and Equipment

This section of the Assessment includes non-plant equipment used for office and facility support. These systems enable the facility to conduct normal office and business functions and includes office furniture, computer based systems and business related activities. A summary listing of the types of equipment and systems included in this section is included in the table below.

Administrative Expense		
Environmental Monitoring	$57,200	
Human Resources	$36,000	
Computer Lan & Licenses	$50,000	
Compute replacement	$12,805	
Prima Vera support	$40,000	
Work Permit (lock out Tag out)	$40,000	
Computer Managed Maint Syst	$25,000	
Postage & Fed Ex	$76,875	
Public Relations	$60,000	
Office Repair & supplies	$75,000	
Uniforms	$57,820	
Misc Advertising, frieght, customs	$181,900	
Personnel Protective Equipment	$24,000	
Wireless Communications (field)	$12,500	
Professional membership Dues	$3,000	
		$752,100

Section 5 – Plant Equipment, Tools and Materials – This Section includes plant tools, maintenance support equipment, and operation of the warehouse.

Routine Plant Materials		
Auto & Truck lease	$73,440	
Test Equipment	$25,000	
Equipment Rental	$82,500	
Special tools & hand tools	$41,000	
Warehouse operation	$20,000	
Industrial Gases Analyzers Lab	$98,500	
Operational Plant Gases	$103,000	
		$443,440

Section 6 – Plant Management

This Section includes those systems and processes used to provide the operational methods and means to operate the plant safely and efficiently. This includes procedures and programs to operate the plant, diagnostic tools for monitoring equipment operation, training of personnel in plant operation procedures, plant safety, security, housekeeping and business travel.

Plant Management		
Power Diagnostics (WIN TS)	$ 70,000	
Gas Plant Diagnostics	$ 150,000	
Training systems Course -Gas	$ 186,925	
Training systems Course -Power	$ 68,640	
Training Safety	$ 88,586	
Make-up training	$ 8,800	
NERC Training	$ 25,000	
Environmental Protection Training	$ 20,000	
Travel Expense (domestic)	$ 60,000	
Travel Expense (international)	$ 36,000	
Janitorial	$ 102,000	
Security	$ 557,840	
		$1,373,791

Section 7 - Switch Yard

Power generated by the plant is fed to a 345,000 volt switchyard. Auxiliary power is supplied from the switchyard during periods when the power plant is idle. Tenaska requested that maintenance costs for the switchyard be included in the cost assessment. Siemens transmission and distribution group provided input regarding the cost for operation and maintenance service for this switchyard.

Equipment covered in this proposal included the following:

Reference Drawing EEE-61-00002

Qty	Type of equipment
5	230kV breakers
3	345 kV Power transformers
5	345 kV Disconnect switches
	230 kV CVTs
	Battery Banks, Chargers

The costs listed below are for annual Inspection and testing.

Cost for years 1-5	$68,800
Cost for year 6	$81,900
Cost for year 7-11	$69,250
Cost for year 12	$85,995
Average annual cost	$71,510

The above costs do not cover relay setting and testing. Costs for setting and testing relays are typically paid by Utility Company Transmission and Distribution Services and are not included here.

Repair and maintenance costs for the yard are included at $45,000 per year.

Total annual cost for the switchyard is $116,510 per year.

Section 8 - Section Not Used

Section 9 – Slag and Sludge Disposal

Slag and sludge from the gasification plant is loaded onto dump trucks at the discharge chute of the Slag and Sludge Handling System described in Maintenance Section Account 3.10 of the maintenance Section of this report. Trucks then haul the material from the discharge chute to the landfill disposal area located on the project site. An estimate of the cost of the hauling and spreading of the waste material to be buried is shown on the attached estimate sheet.

The waste disposal site is scheduled for periodic grading and sealing to meet environmental containment measures. The cost is estimated at $5 million in year 5 and again in year 10. An additional $2 million is included for year 15. This is annualized at $800,000 per year for Waste disposal maintenance over the life of the project.

The hauling cost of the slag and sludge is forecast at $60,000 per year.

TEC slag and sludge disposal cost.

Total slag production is 16% of fuel consumed.
Fuel usage is 341,580 lbs per hour
Slag and sludge produced is 54,652 lbs per hour or 27.3 tons per hour dry
Wet slag and sludge is 1.3 x dry or 35.5 tons per hour
Tons per year = 292,900

Use dump trucks to haul 20 tons of material per trip or 1.7 trips per hour
Assuming one truck in maintenance or broke down three trucks are required to maintain reliable flow 24 hours per day 7 days per week.
Required number of trips is1.7 x 8250 hrs per year = 14,025 trips

Each trip is assumed to be 2.5 miles of travel
Total travel = 35, 060 miles

Maintenance = $1 per mile
Fuel =$0.50 per mile

Maintenance	$35,000
Fuel	$17,500
Cost	$52,500

Section 10 – Utilities

This section covers the estimated utility cost for operating the plant.

Utilities		
Telephone / Fax / E-mail	$35,000	
Trash Hauling	$88,200	
Hazarous Waste transport & Burial	$300,000	
Aux Electric Power (Energy)	$125,000	
Sanitary Service (Pkg unit)	$72,000	
Potable Water Service	$18,000	
		$638,200

Note: Sections 11 thru 12 are listed as a separate group of items as they are unique to each project. The numbers identified in these sections are reflective of specific features of the TEC Plant included in this assessment to achieve a comprehensive cost of plant operation.

Section 11 – Insurance (number provided by Owner)

Property	$ 4,375,000	
Excess EQ Coverage	$ 2,000,000	
Business Interuption	$ 2,100,000	
Liability	$ 200,000	
Auto	$ 25,000	
Brooker, Legal, Professional	$ 750,000	
Pollution	$ 500,000	
		$9,950,000

Section 12 - Capital Improvement Allowance

This allowance is to provide funds for capital equipment projects to replace worn out equipment and to implement design upgrades on a continuing basis over the life of the plant.

Capital Improvement Allowance	$1,500,000	
		$1,500,000

Chapter No. 1 Operation and Maintenance Cost Assessment

III. Presentation of O&M Operating Cost Results

The results of the Siemens Energy, Inc. Assessment for plant operation are included in both a cash flow format and in a budget format. A second assessment is included in Chapter 2 for the pre operation costs associated with mobilizing and training the operations and maintenance staff including participation in commissioning of the plant facility.

Cost Summary:	
1. Admin, Operations, Maint Staff , & Coal Yard Contract Labor	**$14,448,908**
2. Consumables	**$ 8,640,245**
3. Maintenance	**$ 28,550,690**
4. Administrative & Facility Support	**$ 752,100**
5. Plant Materials	**$ 443,440**
6. Plant Management	**$ 1,373,790**
Operating Costs for Expanded Scope	**$54,209,173**
7. 345 Volt Switch Yard	**$ 116,510**
8. Large Scope Water Treatment Facility (Cost included in Accounts 3.9 & 3.9.1)	**$ 0**
9. Slag & Sludge Waste Burial	**$ 860,000**
10. Utilities	**$ 638,200**
Total (O&M Base)	**$55,823,883**
11. Insurance	**$ 9,950,000**
12 Capital Improvement Allowance	**$ 1,500,000**
Note* Fuel and Corporate Taxes are not Included	
Total	**$67,273,883**

Section 15 - O&M Budget Summary

Taylorville Energy Center Operating & Maintenance Budget				
2/11/2010 - Rev 1	2 gasifier configuration			
Account Description	Cost	Extension	Fixed	Variable
Labor				
Administration	$3,793,513			
Operations	$7,169,481			
Maintenance (permanent staff)	$2,644,791			
Overtime and Incentive Adjustment				
Coal Yard Contract Labor	$841,123			
		$14,448,908	$14,448,908	
Administrative Expense				
Environmental Monitoring	$57,200			
Human Resources	$36,000			
Computer Lan & Licenses	$50,000			
Compute replacement	$12,805			
Prima Vera support	$40,000			
Work Permit (lock out Tag out)	$40,000			
Computer Managed Maint Syst	$25,000			
Postage & Fed Ex	$76,875			
Public Relations	$60,000			
Office Repair & supplies	$75,000			
Uniforms	$57,820			
Misc Advertising, frieght, customs	$181,900			
Personnel Protective Equipment	$24,000			
Wireless Communications (field)	$12,500			
Professional membership Dues	$3,000			
		$752,100	$752,100	
Outside Labor (Ref Section 3)				
Outside Contracts Operational				
Building and Facility Maintenance	$231,000		$231,000	
Site Roads, Grounds, Ponds	$110,000		$110,000	
Outside Contracts Maint Labor	$7,671,690			$7,671,690
		$8,012,690		

Maintenance Parts and Materials				
Building and structures Maint	$347,000		$347,000	
Site roads, bridges, ponds, etc	$166,000		$166,000	
Rroutine Replacement Parts	$5,595,000		$5,595,000	
Operational Replacement Parts	$13,055,000			$13,055,000
Heavy Lift Crane Allowance	$1,375,000		$375,000	$1,000,000
		$20,538,000		
Routine Plant Materials				
Auto & Truck lease	$73,440			
Test Equipment	$25,000			
Equipment Rental	$82,500			
Special tools & hand tools	$41,000			
Warehouse operation	$20,000			
Industrial Gases Analyzers Lab	$98,500			
Operational Plant Gases	$103,000			
		$443,440	$443,440	
Operational Plant Consumables				
Water chemistry chemicals	$1,567,780			
(See Section 1.2 for detail)				
Purchase water from SDD	$327,000			
Maintenance of Water pipe line	$60,000			
NOX Calalyst replacement	$237,500			
Ammonia for NOX control	$250,000			
Catalyst Replacements	$5,698,848			
(See Section 2 for detail)				
Propane for fork lift trucks	$2,400			
Gas & Oil for Rolling stock	$496,719			
(see Section 1.2 for detail)				
NOX Emmissions allowance	$0			
		$8,846,945		$8,846,945

Plant Management				
Power Diagnostics (WIN TS)	$70,000		$70,000	
Gas Plant Diagnostics	$150,000		$150,000	
Training systems Course -Gas	$186,925		$186,925	
Training systems Course -Power	$68,640		$68,640	
Training Safety	$88,586		$88,586	
Make-up training	$8,800		$8,800	
NERC Training	$25,000		$25,000	
Environmental Protection Training	$20,000		$20,000	
Travel Expense (domestic)	$60,000		$60,000	
Travel Expense (international)	$36,000		$36,000	
Janitorial	$102,000		$102,000	
Security	$557,840		$557,840	
		$1,373,791		
Switchyard	$116,510		$116,510	
Slag & Sludge Waste Burial Sealing			$800,000	
Slag & Sludge hauling	$60,000			$60,000
sub total		$976,510		
Utilities				
Telephone / Fax / E-mail	$35,000			
Trash Hauling	$88,200			
Hazarous Waste trasport & Burial	$300,000			
Aux Electric Power	$125,000			
Sanitary Service (Pkg unit)	$72,000			
Potable Water Service	$18,000			
Sub Total		$638,200	$638,200	

Insurance				
Property	$4,375,000			
Excess EQ Coverage	$2,000,000			
Business Interuption	$2,100,000			
Liability	$200,000			
Auto	$25,000			
Brooker, Legal, Professional	$750,000			
Pollution	$500,000			
		$9,950,000	$9,950,000	
Capital Improvement allowance		$1,500,000	$1,500,000	
Total		$67,273,883	$36,846,948	$30,426,935

Section 16 - Cash Flow Summary

Assessment of the Pre-operation phase of the plant is reported in "Chapter 2 of the Taylorville Energy Center Cost Assessment."

Taylorville Energy Center Cash Flow Analysis	Exhibit 1.16.1									
O&M Budget Details ($) Rev 01										
Account Description	Base Est	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Parts and Materials	Avg annual									
3.1 Coal Handling	$ 614,000	$ 614,000	$ 614,000	$ 614,000	$ 614,000	$ 614,000	$ 614,000	$ 614,000	$ 614,000	$ 614,000
3.2 Coal Preparation	$ 959,000	$ 959,000	$ 959,000	$ 959,000	$ 959,000	$ 959,000	$ 959,000	$ 959,000	$ 959,000	$ 959,000
3.3 Feedwater & Misc BOP System	$ 227,000	$ 227,000	$ 227,000	$ 227,000	$ 227,000	$ 227,000	$ 227,000	$ 227,000	$ 227,000	$ 227,000
3.4.1 Gasifier Routine Maintenance	$ 683,000	$ 683,000	$ 683,000	$ 683,000	$ 683,000	$ 683,000	$ 683,000	$ 683,000	$ 683,000	$ 683,000
3.4.1Gasifier Major Maintenance	$ 2,049,000	$ 1,049,000	$ 1,049,000	$ 3,049,000	$ 1,049,000	$ 1,049,000	$ 3,049,000	$ 1,049,000	$ 1,049,000	$ 3,049,000
3.4.2 ASU & O2 Compression	$ -									
3.5 Syn Gas Cleanup & CO2 Trtmt	$ 3,003,000	$ 3,003,000	$ 3,003,000	$ 3,003,000	$ 3,003,000	$ 3,003,000	$ 3,003,000	$ 3,003,000	$ 3,003,000	$ 3,003,000
3.6 Comb Turbine & Accessories	$ 6,961,000	$ 6,961,000	$ 6,961,000	$ 6,961,000	$ 6,961,000	$ 6,961,000	$ 6,961,000	$ 6,961,000	$ 6,961,000	$ 6,961,000
3.7 HRSG Duct & Stack	$ 506,000	$ 506,000	$ 506,000	$ 506,000	$ 506,000	$ 506,000	$ 506,000	$ 506,000	$ 506,000	$ 506,000
3.8 Steam Turbine Generator	$ 694,000	$ 694,000	$ 694,000	$ 694,000	$ 694,000	$ 694,000	$ 694,000	$ 694,000	$ 694,000	$ 694,000
3.9 Cooling Water System	$ 430,000	$ 430,000	$ 430,000	$ 430,000	$ 430,000	$ 430,000	$ 430,000	$ 430,000	$ 430,000	$ 430,000
3.9.1 Balance of Water Treament	$ 813,000	$ 813,000	$ 813,000	$ 813,000	$ 813,000	$ 813,000	$ 813,000	$ 813,000	$ 813,000	$ 813,000
3.10 Slag and Sludge System	$ 199,000	$ 199,000	$ 199,000	$ 199,000	$ 199,000	$ 199,000	$ 199,000	$ 199,000	$ 199,000	$ 199,000
3.11 Electrical Equipment	$ 858,000	$ 858,000	$ 858,000	$ 858,000	$ 858,000	$ 858,000	$ 858,000	$ 858,000	$ 858,000	$ 858,000
3.12 Instrumentation & Control	$ 654,000	$ 654,000	$ 654,000	$ 654,000	$ 654,000	$ 654,000	$ 654,000	$ 654,000	$ 654,000	$ 654,000
3.13 Site Improvements	$ 166,000	$ 166,000	$ 166,000	$ 166,000	$ 166,000	$ 166,000	$ 166,000	$ 166,000	$ 166,000	$ 166,000
3.14 Buildings and Structures	$ 347,000	$ 347,000	$ 347,000	$ 347,000	$ 347,000	$ 347,000	$ 347,000	$ 347,000	$ 347,000	$ 347,000
Sect. 7.0--345 KV Switchyard	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510
Crane Rental Allowance	$ 1,375,000	$ 1,000,000	$ 1,000,000	$ 1,500,000	$ 1,000,000	$ 1,000,000	$ 2,750,000	$ 1,000,000	$ 1,000,000	$ 1,500,000
Sect. 9.0--Slag & Sludge Disposal	$ 860,000	$ 60,000	$ 60,000	$ 60,000	$ 60,000	$ 5,060,000	$ 60,000	$ 60,000	$ 60,000	$ 60,000
Administrative Expense	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100
Routine Plant Materials	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440
Consumables/Catalysts	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245
Plant Management	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791
Utilities	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200
Plant Capital Expenditures	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000
Rolling Stock Capital Expenditures	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sub Total	$34,862,286	$32,687,286	$32,687,286	$35,187,286	$32,687,286	$37,687,286	$36,437,286	$32,687,286	$32,687,286	$35,187,286
Permanent Maintenance Labor	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914
Permanent Operations & Admin	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994
Outside Maintenance Labor	$ 8,012,690	$ 7,744,230	$ 8,144,230	$10,839,830	$ 6,125,000	$ 6,125,000	$10,864,000	$ 7,025,000	$ 6,325,000	$11,470,600
Supplemental Staff	$ -	$ 1,131,000	$ 1,131,000							
Sub Total Labor	$22,461,598	$23,324,138	$23,724,138	$25,288,738	$20,573,908	$20,573,908	$25,312,908	$21,473,908	$20,773,908	$25,919,508
Insurance	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000
Total Labor, Materials, & Insurance	**$67,273,884**	**$65,961,424**	**$ 66,361,424**	**$70,426,024**	**$ 63,211,194**	**$ 68,211,194**	**$ 71,700,194**	**$64,111,194**	**$ 63,411,194**	**$71,056,794**

Account Description	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18
Parts and Materials									
3.1 Coal Handling	$ 614,000	$ 614,000	$ 614,000	$ 623,210	$ 623,210	$ 623,210	$ 623,210	$ 623,210	$ 623,210
3.2 Coal Preparation	$ 959,000	$ 959,000	$ 959,000	$ 973,385	$ 973,385	$ 973,385	$ 973,385	$ 973,385	$ 973,385
3.3 Feedwater & Misc BOP System	$ 227,000	$ 227,000	$ 227,000	$ 230,405	$ 230,405	$ 230,405	$ 230,405	$ 230,405	$ 230,405
3.4.1 Gasifier Routine Maintenance	$ 683,000	$ 683,000	$ 683,000	$ 693,245	$ 693,245	$ 693,245	$ 693,245	$ 693,245	$ 693,245
3.4.1Gasifier Major Maintenance	$ 1,049,000	$ 1,049,000	$ 3,049,000	$ 1,064,735	$ 1,064,735	$ 3,094,735	$ 1,064,735	$ 1,064,735	$ 3,094,735
3.4.2 ASU & O2 Compression									
3.5 Syn Gas Cleanup & CO2 Trtmt	$ 3,003,000	$ 3,003,000	$ 3,003,000	$ 3,048,045	$ 3,048,045	$ 3,048,045	$ 3,048,045	$ 3,048,045	$ 3,048,045
3.6 Comb Turbine & Accessories	$ 6,961,000	$ 6,961,000	$ 6,961,000	$ 7,065,415	$ 7,065,415	$ 7,065,415	$ 7,065,415	$ 7,065,415	$ 7,065,415
3.7 HRSG Duct & Stack	$ 506,000	$ 506,000	$ 506,000	$ 513,590	$ 513,590	$ 513,590	$ 513,590	$ 513,590	$ 513,590
3.8 Steam Turbine Generator	$ 694,000	$ 694,000	$ 694,000	$ 704,410	$ 704,410	$ 704,410	$ 704,410	$ 704,410	$ 704,410
3.9 Cooling Water System	$ 430,000	$ 430,000	$ 430,000	$ 436,450	$ 436,450	$ 436,450	$ 436,450	$ 436,450	$ 436,450
3.9.1 Balance of Water Treament	$ 813,000	$ 813,000	$ 813,000	$ 825,195	$ 825,195	$ 825,195	$ 825,195	$ 825,195	$ 825,195
3.10 Slag and Sludge System	$ 199,000	$ 199,000	$ 199,000	$ 201,985	$ 201,985	$ 201,985	$ 201,985	$ 201,985	$ 201,985
3.11 Electrical Equipment	$ 858,000	$ 858,000	$ 858,000	$ 870,870	$ 870,870	$ 870,870	$ 870,870	$ 870,870	$ 870,870
3.12 Instrumentation & Control	$ 654,000	$ 654,000	$ 654,000	$ 663,810	$ 663,810	$ 663,810	$ 663,810	$ 663,810	$ 663,810
3.13 Site Improvements	$ 166,000	$ 166,000	$ 166,000	$ 168,490	$ 168,490	$ 168,490	$ 168,490	$ 168,490	$ 168,490
3.14 Buildings and Structures	$ 347,000	$ 347,000	$ 347,000	$ 352,205	$ 352,205	$ 352,205	$ 352,205	$ 352,205	$ 352,205
Sect. 7.0–345 KV Switchyard	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510
Crane Rental Allowance	$ 1,000,000	$ 1,000,000	$ 2,750,000	$ 1,000,000	$ 1,000,000	$ 1,500,000	$ 1,000,000	$ 1,000,000	$ 2,750,000
Sect. 9.0–Slag & Sludge Disposal	$ 5,060,000	$ 60,000	$ 60,000	$ 60,000	$ 60,000	$ 2,060,000	$ 60,000	$ 60,000	$ 60,000
Administrative Expense	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100
Routine Plant Materials	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440
Consumables/Catalysts	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245
Plant Management	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791
Utilities	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200
Plant Capital Expenditures	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000
Rolling Stock Capital Expenditures	$ -	$ 5,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Sub Total	$37,687,286	$37,687,286	$36,437,286	$32,959,731	$32,959,731	$37,489,731	$32,959,731	$32,959,731	$36,739,731
Permanent Maintenance Labor	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914
Permanent Operations & Admin	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994
Outside Maintenance Labor	$ 6,675,000	$ 6,125,000	$11,664,000	$ 5,925,000	$ 6,325,000	$ 9,320,600	$ 6,125,000	$ 6,125,000	$13,764,000
Supplemental Staff									
Sub Total Labor	$21,123,908	$20,573,908	$26,112,908	$20,373,908	$20,773,908	$23,769,508	$20,573,908	$20,573,908	$28,212,908
Insurance	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000
Total Labor, Materials, & Insurance	**$68,761,194**	**$68,211,194**	**$72,500,194**	**$63,283,639**	**$63,683,639**	**$71,209,239**	**$63,483,639**	**$63,483,639**	**$74,902,639**

Account Description	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27
Parts and Materials									
3.1 Coal Handling	$ 623,210	$ 623,210	$ 632,558	$ 632,558	$ 632,558	$ 632,558	$ 632,558	$ 632,558	$ 632,558
3.2 Coal Preparation	$ 973,385	$ 973,385	$ 987,986	$ 987,986	$ 987,986	$ 987,986	$ 987,986	$ 987,986	$ 987,986
3.3 Feedwater & Misc BOP System	$ 230,405	$ 230,405	$ 233,861	$ 233,861	$ 233,861	$ 233,861	$ 233,861	$ 233,861	$ 233,861
3.4.1 Gasifier Routine Maintenance	$ 693,245	$ 693,245	$ 703,644	$ 703,644	$ 703,644	$ 703,644	$ 703,644	$ 703,644	$ 703,644
3.4.1Gasifier Major Maintenance	$ 1,064,735	$ 1,064,735	$ 3,141,156	$ 1,080,706	$ 1,080,706	$ 3,141,156	$ 1,080,706	$ 1,080,706	$ 3,141,156
3.4.2 ASU & O2 Compression									
3.5 Syn Gas Cleanup & CO2 Trtmt	$ 3,048,045	$ 3,048,045	$ 3,093,766	$ 3,093,766	$ 3,093,766	$ 3,093,766	$ 3,093,766	$ 3,093,766	$ 3,093,766
3.6 Comb Turbine & Accessories	$ 7,065,415	$ 7,065,415	$ 7,171,396	$ 7,171,396	$ 7,171,396	$ 7,171,396	$ 7,171,396	$ 7,171,396	$ 7,171,396
3.7 HRSG Duct & Stack	$ 513,590	$ 513,590	$ 521,294	$ 521,294	$ 521,294	$ 521,294	$ 521,294	$ 521,294	$ 521,294
3.8 Steam Turbine Generator	$ 704,410	$ 704,410	$ 714,976	$ 714,976	$ 714,976	$ 714,976	$ 714,976	$ 714,976	$ 714,976
3.9 Cooling Water System	$ 436,450	$ 436,450	$ 442,997	$ 442,997	$ 442,997	$ 442,997	$ 442,997	$ 442,997	$ 442,997
3.9.1 Balance of Water Treament	$ 825,195	$ 825,195	$ 837,573	$ 837,573	$ 837,573	$ 837,573	$ 837,573	$ 837,573	$ 837,573
3.10 Slag and Sludge System	$ 201,985	$ 201,985	$ 205,015	$ 205,015	$ 205,015	$ 205,015	$ 205,015	$ 205,015	$ 205,015
3.11 Electrical Equipment	$ 870,870	$ 870,870	$ 883,933	$ 883,933	$ 883,933	$ 883,933	$ 883,933	$ 883,933	$ 883,933
3.12 Instrumentation & Control	$ 663,810	$ 663,810	$ 673,767	$ 673,767	$ 673,767	$ 673,767	$ 673,767	$ 673,767	$ 673,767
3.13 Site Improvements	$ 168,490	$ 168,490	$ 171,017	$ 171,017	$ 171,017	$ 171,017	$ 171,017	$ 171,017	$ 171,017
3.14 Buildings and Structures	$ 352,205	$ 352,205	$ 357,488	$ 357,488	$ 357,488	$ 357,488	$ 357,488	$ 357,488	$ 357,488
Sect. 7.0–345 KV Switchyard	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510	$ 116,510
Crane Rental Allowance	$ 1,000,000	$ 1,000,000	$ 1,500,000	$ 1,000,000	$ 1,000,000	$ 2,750,000	$ 1,000,000	$ 1,000,000	$ 1,500,000
Sect. 9.0–Slag & Sludge Disposal	$ 60,000	$ 5,060,000	$ 60,000	$ 60,000	$ 60,000	$ 60,000	$ 5,060,000	$ 60,000	$ 60,000
Administrative Expense	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100	$ 752,100
Routine Plant Materials	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440	$ 443,440
Consumables/Catalysts	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245	$ 8,640,245
Plant Management	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791	$ 1,373,791
Utilities	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200	$ 638,200
Plant Capital Expenditures	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000	$ 1,500,000
Rolling Stock Capital Expenditures	$ -	$ -	$ -	$ 5,000,000	$ -	$ -	$ -	$ -	$ -
Sub Total	$32,959,731	$37,959,731	$35,796,713	$38,236,263	$33,236,263	$37,046,713	$38,236,263	$33,236,263	$35,796,713
Permanent Maintenance Labor	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914	$ 3,485,914
Permanent Operations & Admin	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994	$10,962,994
Outside Maintenance Labor	$ 7,025,000	$ 6,325,000	$ 8,270,600	$ 6,675,000	$ 6,125,000	$11,964,000	$ 5,925,000	$ 6,325,000	$12,220,600
Supplemental Staff									
Sub Total Labor	$21,473,908	$20,773,908	$22,719,508	$21,123,908	$20,573,908	$26,412,908	$20,373,908	$20,773,908	$26,669,508
Insurance	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000	$ 9,950,000
Total Labor, Materials, & Insurance	**$64,383,639**	**$68,683,639**	**$68,466,221**	**$69,310,171**	**$63,760,171**	**$73,409,621**	**$68,560,171**	**$63,960,171**	**$72,416,221**

Account Description	Year 28	Year 29	Year 30
Parts and Materials			
3.1 Coal Handling	$ 632,558	$ 632,558	$ 632,558
3.2 Coal Preparation	$ 987,986	$ 987,986	$ 987,986
3.3 Feedwater & Misc BOP System	$ 233,861	$ 233,861	$ 233,861
3.4.1 Gasifier Routine Maintenance	$ 703,644	$ 703,644	$ 703,644
3.4.1Gasifier Major Maintenance	$ 1,080,706	$ 1,080,706	$ 3,141,156
3.4.2 ASU & O2 Compression			
3.5 Syn Gas Cleanup & CO2 Trtmt	$ 3,093,766	$ 3,093,766	$ 3,093,766
3.6 Comb Turbine & Accessories	$ 7,171,396	$ 7,171,396	$ 7,171,396
3.7 HRSG Duct & Stack	$ 521,294	$ 521,294	$ 521,294
3.8 Steam Turbine Generator	$ 714,976	$ 714,976	$ 714,976
3.9 Cooling Water System	$ 442,997	$ 442,997	$ 442,997
3.9.1 Balance of Water Treament	$ 837,573	$ 837,573	$ 837,573
3.10 Slag and Sludge System	$ 205,015	$ 205,015	$ 205,015
3.11 Electrical Equipment	$ 883,933	$ 883,933	$ 883,933
3.12 Instrumentation & Control	$ 673,767	$ 673,767	$ 673,767
3,13 Site Improvements	$ 171,017	$ 171,017	$ 171,017
3.14 Buildings and Structures	$ 357,488	$ 357,488	$ 357,488
Sect. 7.0--345 KV Switchyard	$ 116,510	$ 116,510	$ 116,510
Crane Rental Allowance	$ 1,000,000	$ 1,000,000	$ 2,750,000
Sect. 9.0--Slag & Sludge Disposal	$ 60,000	$ 60,000	$ 2,060,000
Administrative Expense	$ 752,100	$ 752,100	$ 752,100
Routine Plant Materials	$ 443,440	$ 443,440	$ 443,440
Consumables/Catalysts	$ 8,640,245	$ 8,640,245	$ 8,640,245
Plant Management	$ 1,373,791	$ 1,373,791	$ 1,373,791
Utilities	$ 638,200	$ 638,200	$ 638,200
Plant Capital Expenditures	$ 1,500,000	$ 1,500,000	$ 1,500,000
Rolling Stock Capital Expenditures	$ -	$ -	$ -
Sub Total	$33,236,263	$ 33,236,263	$39,046,713
Permanent Maintenance Labor	$ 3,485,914	$ 3,485,914	$ 3,485,914
Permanent Operations & Admin	$10,962,994	$ 10,962,994	$10,962,994
Outside Maintenance Labor	$ 6,125,000	$ 6,125,000	$10,564,000
Supplemental Staff			
Sub Total Labor	$20,573,908	$ 20,573,908	$25,012,908
Insurance	$ 9,950,000	$ 9,950,000	$ 9,950,000
Total Labor, Materials, & Insurance	**$63,760,171**	**$ 63,760,171**	**$74,009,621**

Chapter II

Pre-Operation Cost Assessment

The period prior to Commercial Operation of the plant is referenced in this report as the Pre-Operation phase of the project. This Pre-Operation phase is the period where operating staff is hired, operating procedures specific to the plant are developed, personnel training is completed and the plant operating support infrastructure is developed. Plant operation in accordance with design plant availability and optimum economic return is dependent on the planning and implementation of a robust and thorough Pre-Operation Program.

Activities and functions outlined in this chapter of the O&M Cost Assessment are critical to achieving a smooth transition from plant construction through the plant commissioning process into commercial operation. When available a brief summary description or vendor brochure of the service or commodity is included at the end of each section. These summaries and brochures are included to describe a specific plant function or service and provide an indicative price of the function. Siemens makes no claim with respect to these items regarding price or quality. The items are typical of those used in plants currently operated by Siemens and perform the intended function. There are numerous alternatives for the majority of these items available on the commercial market. Pre-operation plans and budgets developed for this estimate are included in the following Sections:

Section 1 – Labor
Section 2 – Administrative Material
Section 3 – Maintenance Outside Labor
Section 4 – Maintenance (Vendor Equipment Parts and Materials)
Section 5- Plant Material
Section 6 – Plant Management
Section 7 – Utilities
Section 8 – Insurance and Taxes
Section 9 – Summary Budget
Section 10 – Spare Parts

Section 1 – Labor – Recruiting and hiring a quality work force consistent with the requirements of the plant commissioning schedule is the key to effective plant operation. A reference hot commissioning schedule template is included along with recommended man loading of plant operators required to support commissioning activities. Operator participation in plant commissioning activities is required for the training of plant operators, the verification of operating procedures and the building of the required operating plant infrastructure. A primary ingredient in this process is the need to recruit and hire a quality workforce on a schedule that allows the operators to complete necessary training in a timely manner and to allow operators to participate with the commissioning engineers and vendor representatives during equipment checkout. A hiring schedule is included (Ref Exhibit 2.1) that provides the recommended time required to perform all of the activities considered critical to achieving optimum plant operation when the plant is accepted for operation from construction. The primary cost for this activity is the salaries paid to the employees during the commissioning process. The estimated cost of this activity is $9,694,193 over a period of 27 months.

Wage & Salary prior to Plant Acceptance	$9,694,193	
Recruit & Hire work force	$1,010,000	
Mgmt relocation 10 @ $65,000	$650,000	
Professionals relocation 16 @ $20,000	$230,000	
Exempt employees relocation 40@ $5000	$20,000	
		$11,604,193

			Exhibit 2.1							
Taylorville Plan (Number of Employees) for Pre-Operation Staffing					Commercial Power Operation					Commercial Gas Operation
Power plant is to be operational in month 33 of a 48 month schedule					Month 33					Month 48
Quarters prior to commercial operation		**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	
Calander Months	Jan-Mar 2013	Apr-Jun 2013	Jul-Sep 2013	Oct-Dec 2013	Jan-Mar 14	Apr-Jun 14	Jul-Sep 14	Oct-Dec 14	Jan-Mar 2015	
Power Plant Staff	2	8	18	23	Plant Operational					
Water Plant Staff			4	12	Plant Operational					
Power Plant Total Support Staff	2	8	22	35	35	35	35	35	35	
Gasification Plant Staff	1	1	1	1	9	17	48	73	83	
Coal yard Staff							4	6	10	
Gasification Plant Staff	1	1	1	1	9	17	52	79	93	
IGCC Plant Total Support Staff	3	9	23	36	44	52	87	114	128	

Exhibit 2.1.2					
Pre-op Hiring schedule					
Employee		No	Mo pay	Mos	
General Manager		1	[redacted]	27	[redacted]
Operations Manager		1	[redacted]	26	[redacted]
Asst Ops Managergr		1	[redacted]	11	[redacted]
Maintenance Manager		1	[redacted]	14	[redacted]
Business Manager		1	[redacted]	4	[redacted]
Technical Manager		1	[redacted]	21	[redacted]
Performance Engineer		1	[redacted]	3	[redacted]
Syn Gas Engineer		1	[redacted]	5	[redacted]
Material Handling Engineer		1	[redacted]	7	[redacted]
Gasification Engineer		1	[redacted]	5	[redacted]
I&C Engineer		1	[redacted]	3	[redacted]
Asset Manager		1	[redacted]	4	[redacted]
Asset Scheduler		1	[redacted]	2	[redacted]
Procurement Manager		1	[redacted]	2	[redacted]
Contract Administrator		1	[redacted]	3	[redacted]
Fuel and Bi-product Manager		1	[redacted]	5	[redacted]
Accountants		2	[redacted]	3	[redacted]
EH&S Manager		1	[redacted]	6	[redacted]
Environmental Specialist		1	[redacted]	3	[redacted]
Safety Specialist		1	[redacted]	6	[redacted]
Storeroom Manager		1	[redacted]	20	[redacted]
Maintenance Planner		3	[redacted]	2	[redacted]
Store Person		2	[redacted]	10	[redacted]
CMMS Technician		1	[redacted]	3	[redacted]
Administrative Support		1	[redacted]	11	[redacted]
Administrative Support		2	[redacted]	6	[redacted]
HR Generalist		1	[redacted]	2	[redacted]
Billing Clerk		2	[redacted]	1	[redacted]
Shift Lead		4	[redacted]	13	[redacted]
Shift Lead (relief)		1	[redacted]	10	[redacted]
Control Operators (Power)		5	[redacted]	7	[redacted]
Auxiliary Operators (Power)		5	[redacted]	6	[redacted]
Control Operators (Gasifier)		6	[redacted]	12	[redacted]
Control Operators (Gasifier)		6	[redacted]	9	[redacted]
Auxiliary Operators (Gasifier)		6	[redacted]	10	[redacted]
Auxiliary Operators (Gasifier)		6	[redacted]	6	[redacted]
Auxiliary Operators (Gasifier)		8	[redacted]	4	[redacted]
Auxiliary Operators(Water Plant)		8	[redacted]	4	[redacted]
Auxiliary Operators(Water Plant)		4	[redacted]	2	[redacted]
Mech Maintenance Technicians - Power		1	[redacted]	3	[redacted]
Mech Maintenance Technicians - Power		3	[redacted]	5	[redacted]
Mech Maintenance Technicians		4	[redacted]	2	[redacted]
I&C/DCS Eelectrical Specialist -Power		2	[redacted]	4	[redacted]
I&C/DCS Eelectrical Specialist		2	[redacted]	6	[redacted]
I&C/DCS Eelectrical Specialist		2	[redacted]	4	[redacted]
I&C/DCS Eelectrical Specialist		2	[redacted]	3	[redacted]
Chemist		1	[redacted]	10	[redacted]
Lab Tech		2	[redacted]	4	[redacted]
Mechanical Supervisor		1	[redacted]	8	[redacted]
I&C/Electrical Supervisor		1	[redacted]	7	[redacted]
Mechanical Specialists		2	[redacted]	6	[redacted]
Material Handling Supervisor		1	[redacted]	4	[redacted]
Contract Maintenance Supervisor		1	[redacted]	2	[redacted]
Total		118			**$7,732,426**
Outside Contracted Labor (for Coal Yd)		4	[redacted]	9	[redacted]
Outside Contracted Labor (for Coal Yd)		4	[redacted]	5	[redacted]
Outside Contracted Labor (for Coal Yd)		2	[redacted]	2	[redacted]
Total Coal Yard		10	[redacted]		[redacted]
Total Wages		**128**			**$8,134,702**

Section 2 – Administrative Material

The material and services required to operate the business of the Energy Center is outlined in this section along with a budget value for each of the identified services.

Administrative Material		
Local Area network 2ea T-1 lines	$18,000	
Install primary T-1 capability	$50,000	
WAN connection & Servers	$50,388	
PC hardware &software		
Lap top Computers	$21,600	
Desk Top Computers	$17,255	
Cell Phones	$12,500	
Desk phones	$8,000	
Printers & copiers		
28-20 ppm Color duplex & large format	$32,250	
35 ppm B&W duplex & large format	$33,400	
Faxes	$9,450	
Plotter	$5,000	
Office Furnishings	$300,000	
Human Resources	$14,300	
Postal & Fed Ex	$50,000	
Predictive Maintenance PMs	$150,000	
Public Relations	$300,000	
Safety/ Enviornmental Program		
Safety/ Enviornmental Plan	$40,000	
Safety Manual	$122,600	
Personnel Protective Equipment	$136,500	
Safety Procedures	$165,000	
Software Licenses		
Work Permit (License, installtion, training)	$91,500	
Computer Mg Maint (License, installation)	$135,000	
Prima Vera Scheduling	$65,000	
Electronic Document Program and software	$34,550	
		$1,862,293

Section 3 – Outside Labor

Outside labor is other than direct hire employees. This section includes outside labor contracts that are not covered elsewhere in this report. Training by outside personnel is addressed in Section 5.

Outside labor		
Janitorial for operations facilities	$84,000	
Operatios Consulting Services	$450,000	
Security (by Construction)	0	
Coal Yard operation (prior to Com Op)	$670,460	
		$1,204,460

Section 4 – Permanent Plant Equipment Parts and Materials

Parts and materials for plant equipment during the per-operation period are provided by the construction contractor or by the equipment vendors. Preparation of a parts program for operation is covered in Section 5 of this report (Ref Plant Material).

Section 5 – Plant Material

This section addresses providing the plant with operational furnishings not typically provided by the EPC contract. These include laboratory furnishings, major machine shop tooling, hand tools, special tools and test equipment for conducting operation equipment and system tests. In addition, this section includes the development of an inventory list of plant spare parts inventory listing that supports rapid turnaround of forced outages where critical parts are important to minimize plant down time.

Plant Material		
Develop Renewal Parts Program	$298,400	
Furnishings, lab equip & Appliances	$30,000	
Maintenance shop	$700,000	
Mules	$60,000	
Special tools and hand tools	$455,000	
Test Equipment	$75,000	
Rolling Stock	$5,000,000	
		$6,618,400

Section 6 – Plant Management

Summary

This Section includes those systems and processes used to provide the operational methods and means to operate the plant safely and efficiently. This includes procedures and programs to operate the plant, diagnostic tools for monitoring equipment operation, training of personnel in plant operation procedures, plant safety, security, housekeeping and business travel.

Plant Management		
Training		
Systems Training (Gas Plant)	$330,000	
Systems Training (Power Plant)	$192,000	
TK3 Control system	$360,000	
Repeat systems Course -Gas		
(5 added classes @ $115,500)	$577,500	
Maintenance PMs	$450,000	
Install WIN TS (Power Plant)	$70,000	
Install Diagnostics for Gas plant	$140,000	
Operating Procedures		
Power plant	$185,000	
Gas plant	$250,000	
Water plant	$40,000	
Coal yard	$25,000	
NERC	$25,000	
Setup Warehouse	$225,000	
Electronic Document Implementation	$750,000	
Safety Training	$194,888	
NERC Training	$75,000	
Temporary office facility for Operations	$298,305	
Travel International	$80,000	
Travel Domestic	$54,000	
Professional Memberships	$6,000	
		$4,327,693

Section 7 – Utilities

Utilities		
Trash Haul (by construction)	0	
Hazardous Waste transport & burial	0	
(by Construction Contractor)		
Telephone	$130,000	
Electric service	$180,000	
Potable Water	$10,800	
Sanitary Service	$21,600	
		$342,400

Section – 8 Insurance and Taxes

These items are by owner during construction and not considered in this estimate.

Section 9 – Summary Budget

Taylorville Energy Center Pre-Operation Budget		
2/8/2010 - Rev 1	Cost	Extension
2 gasifier configuration		
Wage & Salary prior to Plant Acceptance	$7,732,426	
Recruit & Hire work force	$1,010,000	
Mgmt relocation 10 @ $65,000	$650,000	
Professionals relocation 16 @ $20,000	$320,000	
Exempt employees relocation 40@ $5000	$20,000	
		$9,732,426
Administrative Material		
Local Area network 2ea T-1 lines	$18,000	
Install primary T-1 capability	$50,000	
WAN connection & Servers	$50,388	
PC hardware &software		
Lap top Computers	$21,600	
Desk Top Computers	$17,255	
Cell Phones	$12,500	
Desk phones	$8,000	
Printers & copiers		
28-20 ppm Color duplex & large format	$32,250	
35 ppm B&W duplex & large format	$33,400	
Faxes	$9,450	
Plotter	$5,000	
Office Furnishings	$300,000	
Human Resources	$14,300	
Postal & Fed Ex	$50,000	
Predictive Maintenance PMs	$150,000	
Public Relations	$300,000	
Safety Program		
Safety Plan	$40,000	
Safety Manual	$122,600	
Personnel Protective Equipment	$136,500	
Safety Procedures	$165,000	
Software Licenses		
Work Permit (License, installtion, training)	$91,500	
Computer Mg Maint (License, installation)	$135,000	
Prima Vera Scheduling	$65,000	
Electronic Document Program and software	$34,550	
		$1,862,293

Outside labor		
Janitorial for operations facilities	$84,000	
Operatios Consulting Services	$450,000	
Security (by Construction)	0	
Coal Yard operation (prior to Com Op)	$402,276	
		$936,276
Parts and materials (by EPC contract)	0	
Plant Material		
Develop Renewal Parts Program	$298,400	
Funishings, lab equip & Appliances	$30,000	
Machine shop	$700,000	
Mules	$60,000	
Special tools and hand tools	$455,000	
Test Equipment	$75,000	
Rolling Stock (by Owner)	$5,000,000	
		$6,618,400
Plant Management		
Training		
Systems Training (Gas Plant)	$330,000	
Systems Training (Power Plant)	$192,000	
TK3 Control system	$360,000	
Repeat systems Course -Gas		
(5 added classes @ $115,500)	$577,500	
Maintenance PMs	$450,000	
Install WIN TS (Power Plant)	$70,000	
Install Diagnostics for Gas plant	$140,000	
Operating Procedures		
Power plant	$185,000	
Gas plant	$250,000	
Water plant	$40,000	
Coal yard	$25,000	
NERC	$25,000	
Setup Warehouse	$225,000	
Electronic Document Implementation	$750,000	
Safety Training	$194,888	
NERC Training	$75,000	
Temporary office facility for Operations	$298,305	
Travel International	$80,000	
Travel Domestic	$54,000	
Professional Memberships	$6,000	
		$4,327,693

Utilities		
Trash Haul (by construction)	0	
Hazardous Waste transport & burial	0	
(by Construction Contractor)		
Telephone	$130,000	
Electric service	$180,000	
Potable Water	$10,800	
Sanitary Service	$21,600	
		$342,400
Insurance & Taxes	0	
To be provided By Owner		
Totals	$23,819,488	$23,819,488
Spare Parts Inventory (details to be provided later)	$19,800,000	
Parts inventory is considered a capital investment)		
Grand Total	$43,619,488	

Section 10 – Spare Parts Inventory

Completion of a spare parts inventory is dependent on information provided by vendors and by design and plant availability inputs. An approximate parts inventory budget for a plant of this size and complexity is expected to be in the range of $15-$25 million. This number will vary depending on contract maintenance agreements.