BEFORE THE PUBLIC SERVICE COMMISSION

OF

THE STATE OF MISISSIPPI

MPSC Docket No. 2013-UA-189

Surrebuttal Testimony

of

POWER Burns and Roe

on Behalf of

Mississippi Public Utilities Staff

Date: July 21, 2014

Contents

SUMMARY, SCOPE OF TESTIMONY

Q. Please state your name and business address.

A. My name is Gregory F. Zoll. My business address is 800 Kinderkamack Road, Oradell, New Jersey 07649.

Q. By whom are you employed and what is your position?

A. I am employed by POWER Burns and Roe, a Division of POWER Engineers, as Director of Strategic Consulting.

Q. Have you previously testified before the Mississippi Public Service Commission ("MPSC" or "Commission")?

A. No.

Q. Please describe your educational background and professional experience.

A. I graduated from the University of Vermont in 1977 with a Bachelor of Science degree in Mechanical Engineering, *cum laude*. I am a Licensed Mechanical Engineer in the State of New Jersey. I am currently the Director of Strategic Consulting at POWER Burns and Roe, a Division of POWER Engineers, which acquired my prior employer, Burns and Roe Enterprises, Inc. ("BREI") in June 2014. I began my career at BREI in 2001 as a Project Manager in the Power Consulting Division. My experience with BREI has included over 25 Independent Engineering Due Diligence assignments in the Independent Power, Utility and Advanced Technology areas for project financing and project acquisitions. I have conducted independent evaluations of power projects including coal, gas-fired combined cycle facilities, Integrated Gasification Combined Cycle ("IGCC"), coal to liquids technologies, and projects that have included CO_2 separation and sequestration. While at BREI I led an Australian IGCC development program which included

Front End Engineering and Design ("FEED") for a 400 MW commercial IGCC project with CO_2 removal and sequestration. The FEED study included gasifier technology and commercial readiness assessments and technology selection. Prior to BREI, I spent 15 years as an Independent Power Project developer for GPU International where I was responsible for the engineering, design, permitting, project management, commissioning and startup of over 2,000 MWs of combined cycle power projects. My experience also includes over eight years as an engineer at the Exxon Research and Engineering Company where I participated in refinery process FEED studies and field assignments including commissioning and startup of refinery process plants. My *curriculum vita* is attached as Exhibit 1.

Q On whose behalf are you testifying?

A. I am testifying on behalf of the Mississippi Public Utilities Staff ("Staff").

Q. Is POWER Burns and Roe the same firm as Burns and Roe Enterprises, Inc. that Mr. Al Ferrer was employed by when he submitted Direct Testimony in this proceeding?

A. No. As noted above, since Mr. Ferrer testified, Burns and Roe Enterprises, Inc. was acquired by POWER Engineers Inc. For consistency with Mr. Ferrer's prior testimony, and to avoid confusion, POWER Burns and Roe will be referred to as "BREI" in the balance of this testimony.

Q. Please explain why Mr. Ferrer is not presenting this surrebuttal testimony?

A. Following the acquisition of Burns and Roe Enterprises, Inc., Mr. Ferrer assumed a new position within the POWER Burns and Roe organization.

Q. How long have you been involved with the Kemper Project?

A. Since February 2011. I was assigned as Independent Monitor by the Staff in February 2011, first in my capacity as Project Manager for Burns and Roe Enterprises, Inc. and now as Project Manager for POWER Burns and Roe.

Q. What is the purpose of this surrebuttal testimony?

A. The purpose of my testimony is to respond to specific points made in the Rebuttal Testimony filed in this Docket on May 23, 2014, by Mississippi Power Company ("MPC" or "Company") that was provided by witnesses Dr. Patricia D. Galloway ("Galloway"), Mr. John C. Huggins and Mr. Steven K. Owen ("Huggins and Owen" or "Huggins-Owen"), and Mr. Geno Armstrong ("Armstrong").

Q. What specific subjects will you cover in your testimony?

A. There were several issues discussed repeatedly in MPC's testimony that will be covered in my surrebuttal. These issues include the FEED study; MPC's initial cost estimate and contingency; project planning and project execution decisions made both before and after June 2010; the project schedule including resource loading; earned value management; commodity growth and forecasting lessons learned from both the Edwardsport IGCC Project and the Black and Veatch Readiness Report; risk management; beneficial capital; process development allowance; and the cost of inefficiencies resulting from MPC's management of the Kemper Project.

SCOPE OF REVIEW

Q. Galloway implied that BREI reviewed only a small collection of documents from an immense project record (p. 51). Please identify the categories of documents reviewed in preparation of your report.

A. BREI reviewed a significant amount of project records to evaluate the decisions and actions taken by the Company to draw its conclusions. To fulfill its obligations as the Independent Monitor to the Staff, BREI has been intimately involved in the Kemper Project for approximately 3 ½ years. For the past 1 ½ years, BREI has maintained full-time onsite representation which includes the review of onsite project documentation on an ongoing basis. To date, BREI has expended 21,688 man-hours on the review of the Kemper Project: 18,768 man-hours at the home office and 2,920 in the field.

BREI was retained in February 2011 to prepare an initial due diligence Independent Monitor's Baseline Report for the Staff which was dated January 6, 2012, and amended June 21, 2012. In development of that report, BREI reviewed an extensive list of project documentation which included MPC's responses to approximately 250 Requests for Information ("RFIs"). The list of document references was provided in Section 12 of the Independent Monitor's Baseline Report and is provided as Exhibit 2 to this testimony, showing the seventy-three (73) key documents in addition to an extensive project document database that BREI has access to on the Southern Company Services ("SCS") "Share Site," all of which were used to evaluate the Kemper Project through approximately December 2012.

BREI has attended each monthly Independent Monitor's site meeting since July 2011, with the exception of April 2013 when no meeting was scheduled. It reviewed the monthly Production Progress Reports issued by SCS, the monthly Public Service Commission reports issued by MPC, and a weekly construction status report issued by the MPC/SCS project execution team. During this prudency review process, BREI issued and reviewed the responses to over one hundred (100) additional RFIs. The data that was reviewed included documents, plans, schedules, drawings, procedures, correspondence, responses to BREI RFIs, etc. BREI has prepared a list of the key information that was reviewed and has included the list as Exhibit 3 to this testimony. This is not an all-inclusive catalog but provides an understanding of the voluminous record that was reviewed by BREI to evaluate information and draw conclusions.

BREI considers its ongoing involvement in the Kemper Project as well as the materials that have been provided by MPC and SCS during the RFI process to have provided its team with a clear picture of the issues that the MPC/SCS Project Team was facing, and the information that was available at the time to the Project Team, during development and execution of the Project.

Q. What was the purpose of limiting the number of documents referenced in the body of BREI's Independent Monitor's Prudency Evaluation Report ("BREI's Prudency Report")?

A. The list of "works cited" in BREI's Prudency Report only included documents which were referenced in the report. However, as indicated above, a significant amount of additional project documents, reports, construction status updates, and attendance at numerous meetings provided BREI with the means to fully understand the project history.

Q. Galloway states that BREI's testimony and report "only considered the prudency as to the project management – not executive decisions" (p. 53). Is this an accurate statement?

A. No. As explained in the errata sheet to our testimony and report dated April 15, 2014, BREI reviewed and evaluated the major decisions and actions of the Kemper Project team including MPC's senior management which have taken place up to and including March 2013 including, among others, the decision to go forward with the Kemper Project after the Commission established its cost caps; the decision not to use a third party EPC (engineering, procurement and construction) contractor under a lump-sum, fixed-fee arrangement; decisions related to the level of contingency; and the decision to compress the construction schedule in order to achieve certain tax benefits after gaining the Commission's approval to proceed. BREI also evaluated MPC/SCS management decisions after construction began to incur additional costs as they attempted to maintain the original (May 2014) commercial operation date ("COD") and the compressed schedule in the face of mounting evidence that meeting the COD was not achievable. This included decisions that were made by MPC executive management but did not at that time include evaluation of Southern Company executive management decisions. In addition, during its prudency review, BREI conducted interviews with Ed Day (former President and Chief Executive Officer of MPC) and Thomas Anderson (former Vice President of Generation Development at MPC).

FEED, COST ESTIMATE DEVELOPMENT AND CONTINGENCY

Q. Galloway states that the Kemper Project certification cost estimate should be considered a Class 3 estimate per AACE International ("AACE") classification, which would have been attributed to a -10% to +30% cost estimate accuracy based on the percentage of engineering completed (pp. 157-158). Can you summarize Galloway's justification for this statement?

A. Galloway's testimony states that the estimate classification is a "Class 3" estimate based on the assertion that 10% of engineering was completed at the time of the FEED. Galloway's justification for this statement is based on the following points as quoted from her Rebuttal Testimony (pp. 157-158):

- ***Project definition of 10% to 40%.*** *The estimated engineering definition was estimated at 10% for the Kemper Project Gasification Island.*
- ***Typically is used as a Budget, Authorization or Control estimate.*** *The Certification Estimate was used as an Authorization Estimate as presented to the MPSC with the request for a CPCN.*
- ***Consists of Semi-Detailed Unit Costs with Assembly Level Line Items.*** *The Certification Estimate was predicated on quoted indicative equipment prices from potential vendors; was based on initial PFD's and P&ID's; and utilized a 3D model.*

Q. Do you agree with Galloway that the certification estimate could be considered a Class 3 estimate per AACE standards based on the justification provided?

A. No. Although the FEED represented 10% of the total estimated engineering budget at the time the estimate was completed, the AACE classification system which Galloway references[1] (p. 158)

[1] AACE Recommended Practice No. 18R-97, "Cost Estimate Classification System – as Applied in Engineering, Procurement, and Construction for the Process Industries."

does not provide definitive guidance on the estimate classification based on the percentage of engineering alone.

Galloway and BREI have both referenced Table 1 below, in Direct Testimony.

	Primary Characteristic	Secondary Characteristic		
Estimate Class	Maturity Level of Project Definition Deliverables (Expressed as a % of complete of definition)	End Usage (Typical Purpose of Estimate)	Methodology (Typical Estimating Method)	Expected Accuracy Range (Typical variation in low and high ranges) [See Notes]
Class 5	0% to 2%	Concept Screening	Capacity Factored, Parametric Models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget Authorization or Control	Semi detailed unit costs with assembly level line items.	L: -10% to -20% H: +10% to + 30%
Class 2	30% to 75%	Control or Bid/Tender	Detailed unit cost with forced detail take-off	L: -5% to -15% H: +5% to + 20%
Class 1	65% to 100%	Check Estimate or Bid Tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to + 15%

Notes: The state of process technology, availability of applicable reference cost data, and many other risks affect the range markedly. The +/- value represents the typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for a given scope.

As can be seen above, at 10% of the total estimated engineering budget, the table points to the absolute low end of the engineering completion range required for a Class 3 estimate. BREI considers the estimate to be of Class 4 accuracy based not only on the estimated level of engineering completion, but also in consideration of other factors discussed below.

The AACE classification system states that the estimate accuracy range is driven by many other variables and risks, so the maturity and quality of the scope definition available at the time of the estimate is not the sole determinate of accuracy. The classification system identifies key risks which could affect the accuracy of the estimate. These include:

- Level of non-familiar technology in the project.
- Complexity of the project.
- Quality of reference cost estimating data.
- Quality of assumptions used in preparing the estimate.
- Experience and skill level of the estimator.
- Estimating techniques employed.
- Time and level of effort budgeted to prepare the estimate.

The first three factors noted are specific risk factors which were identified by MPC and SCS during independent risk analysis prior to and following certification, and which support BREI's conclusion that the accuracy of the cost estimate was also influenced by outside risk factors. For the Kemper Project, these risk factors would include the first-of-a-kind ("FOAK") nature of the Project, the fact that appropriate reference plant design and cost information was not available, and the fact that the Project would be executed within a fast track project schedule. Knowledge of these factors would have suggested a reduced confidence in the original cost estimate as compared to an estimate classification as defined by AACE. BREI assessed the level of maturity of the specific deliverables which were included in the August 2009 FEED estimate, the level of engineering completion, and the additional risk factors as defined above. BREI believes that the estimate should be considered as having Class 4 accuracy, with an appropriate level of contingency on the order of 30% to 35%.

Q. Do you agree with Galloway's claim that BREI's view of the 2009 FEED estimate and contingency is based on hindsight?

A. No. BREI conducted a thorough analysis of the August 2009 FEED package based on the information that was available to the Project Team at that time to arrive at its conclusions regarding contingency and Class 4 classification. If BREI had employed hindsight, it would have concluded that a contingency in excess of 50% would have been appropriate.

Q. What is the significance of whether the estimate is classified as either a Class 3 or Class 4?

A. The significance of the estimate classification is that the $2.4 billion budget (including contingency) was used as the basis for planning, resource allocation, and subsequent earned value measurements. Since there was little contingency in the $2.4 billion number and only a very high-level Basis of Estimate, the resulting basis for planning, scheduling, and earned value measurement was insufficient.

Q. Galloway claims that there are inconsistencies with BREI's findings on the Basis of Estimate. She states (p. 137):

> *The Basis of Estimate was created in 2008 and adjusted for scope changes through August 2009. However, on page 26 of its Prudence Report, BREI states that a detailed Basis of Estimate was not developed. This is inconsistent. In a project that has scope changing during the initial development of the project it is not always possible to keep all of the documentation in sync. Better documentation is always desirable but the absence of a Basis of Estimate that is 100% in sync with the estimate produced at a particular date is not an unreasonable or imprudent act.*

In addition, Huggins and Owen state that, "although a Basis of Estimate as defined by AACE was not maintained, sufficient information and data was maintained to support the development and presentation of the certified estimate" (p. 37). Do you agree?

A. No. There are no inconsistencies in BREI's statements on the August 2009 Basis of Estimate, and sufficient information wan not maintained for a valid cost estimate. BREI acknowledges its own previous statement and Galloway's statement that a summary level Basis of Estimate did exist in Section 7 of the August 2009 FEED document. The relevant issue, however, is the "completeness" of that estimate. Whether the Basis of Estimate follows AACE standards or less stringent standards, the purpose and need for a Basis of Estimate are the same: to document the estimator's and the engineers' knowledge of the inputs of the cost estimate, to alert the Project Team to potential cost risks and opportunities, and to "facilitate the review and validation of the cost estimate."[2] BREI reviewed the Basis of Estimate in the August 2009 FEED package to establish whether it served this purpose and need. It did not. The Basis of Estimate was a ½ page, high-level summary of the basis of the cost estimate. Given the magnitude of the Kemper Project, better documentation was not only desirable but was necessary.

Q. What purpose would a Basis of Estimate have served?

A. A Basis of Estimate would have identified estimate areas which were of high and low confidence. During the detailed design, a focused plan to update the estimate areas which had a low level of confidence should have been undertaken. The issue is not that the Basis of Estimate was 100% "in-sync" with the estimate at a particular date but that the Basis of Estimate did not exist at a level of detail that would adequately inform the Project Team of particular cost risks before and during the implementation of the Kemper Project.

Q. What is the significance of the Kemper Project cost estimate, contingency, and Basis of Estimate in terms of project planning, scheduling and earned value measurement, and did the low level of contingency negatively impact planning and scheduling?

[2] AACE Recommended Practice No. 34R-05, "Basis of Estimate TCM Framework: 7.3 – Cost Estimating and Budgeting" at p. 1.

A. Once an estimate is established as the baseline project cost estimate, it becomes the benchmark from which project planning can occur and against which progress is measured in an earned value system. For example, the quantities that form the basis of the cost estimate are used to establish commodity installation curves and the man-hour estimates are used to establish man-hour loading curves. These curves are used by the scheduler to establish whether the timelines that have been assumed by the scheduler are realistic, and then to develop discipline-specific staffing plans. The lack of appropriate contingency in the $2.4 billion estimate had a negative effect on the up-front planning of the Kemper Project and the development of reasonable baseline project plans which should have included an "allowance for indeterminates."[3] An example of this is commodity growth, which should have been recognized by the Project Team from the Edwardsport lessons learned.

As discussed elsewhere in this testimony, MPC and SCS used an earned value system to measure progress. In the Section "Earned Value Management," below, I elaborate on how the lack of documentation on the areas of high or low confidence in the cost estimate has led to planning challenges, inadequate resource forecasting, and earned value measurement errors. The ability to recognize problems was delayed without knowledge of the specific cost risks which were inherent in the original estimate. A detailed Basis of Estimate would have alerted the team to these cost risks so that they could be proactively addressed.

Q. Huggins and Owen testify that, although "in hindsight" the contingency amounts were insufficient, the Company's development of the project's contingency was "consistent with other successful Southern Company projects as well as with observed industry practice as

[3] "Allowance for indeterminates" is a component of the contingency budget for items that are known but cannot be quantified at the time the estimate was developed.

discussed by Dr. Patricia Galloway in her rebuttal testimony" (p. 67). Do you agree with their testimony? Please explain.

A. No. As noted in the above discussion of the AACE cost estimate accuracy, BREI considers the FEED package estimate to be of a Class 4 level of accuracy, considering both the level of engineering completion and the other risk factors and unknowns considered. In addition, the Kemper Project has FOAK features and a compressed schedule which would have dictated additional caution to be applied in arriving at a high confidence level estimate. The contingency that was applied was too small relative to the level of engineering that was completed. Regardless of prior SCS experience with combined cycle combustion turbine-based projects and air quality control projects, SCS apparently did not grasp the differences, complexity, and contingency required for a FOAK process plant of this magnitude.

Q. The terms FOAK Technology, First Movers, and Technology Risk is mentioned repeatedly in the Rebuttal Testimony of Huggins and Owen, Galloway, and Armstrong. Can you explain the differences between these terms?

A. Yes, FOAK and First Movers refer essentially to the same type of project where a new technology that has not been applied before at a commercial scale is executed for the first time. One of the more significant FOAK risks is that of commodity growth, which has occurred on the Kemper Project. Technology Risk is usually referred to on FOAK projects and is a measure of whether or not the technology being applied actually achieves the desired performance, availability, etc., which is typically extrapolated first from test results at a pilot facility (PSDF) and then at an intermediate-sized demonstration facility. The Kemper Project issues, to date, are the result of the FOAK application of the TRIG technology on a commercial scale. The Technology Risk (i.e., Will it work?) cannot be determined until the facility enters startup and testing, since, in the case of the Kemper Project, there was no intermediately-sized demonstration facility to first verify the performance of the pilot facility.

PROJECT EXECUTION DECISIONS

Q. In BREI's Prudency Report it is stated that "the coordination, oversight, expediting, extended fabrication duration, and other difficulties in managing fabricators resulted in inefficiencies which added to the project cost" (p. 74). Galloway asserts in her testimony that this statement contradicts a statement in BREI's Project Schedule and Cost Evaluation Report that "... the lead Pipe Fabricator for the project does not appear to be capable of pre-fabricating the quantities we have forecasted for the project" (pp. 247-8). Please explain why these statements do not contradict.

A. Galloway references BREI's Prudency Evaluation Report, page 74: "The coordination, oversight, expediting, extended fabrication duration, and other difficulties in managing multiple fabricators resulted in inefficiencies which added to the project cost." The entire paragraph should have been quoted:

> *BREI compared the original pipe spool fabrication strategy which would have used a single offsite fabricator to the actual need to use multiple fabricators to meet the production needs imposed by the compressed schedule and pipe quantity growth.* ***The coordination, oversight, expediting, extended fabrication duration, and other difficulties in managing multiple fabricators resulted in inefficiencies which added to the project cost.***

Galloway compared this partial quote to another BREI statement from the Independent Monitor's Schedule and Cost Evaluation Report, "...the lead Pipe Fabricator for the project does not appear to be capable of pre-fabricating the quantities we have forecasted for the project[]" and thus erroneously concluded that BREI's intent was that MPC suffered increased costs due to "managing multiple fabricators."

What Galloway failed to mention was that in the Section 1.2 of the Independent Monitor's Schedule and Cost Evaluation Report, "Recommendations and Remedial Actions," third bullet, BREI stated the following (p. 7): "SCS has developed a pipe fabrication plan, which is part of the overall pipe installation plan. SCS needs to continue to monitor and update the plan based upon conditions in the field, and continue to use the plan as a tool for success."

The inefficiencies experienced were not a result of SCS having to manage multiple fabricators, but a result of its failure to monitor and update its Piping Plan in a timely fashion. Proper monitoring of the piping plan would have shown the Project Team much earlier in the piping fabrication process that a single pipe fabricator could not meet the pipe spool fabrication schedule necessitated by the compressed schedule. The continued resistance to extending the COD coupled with the pipe commodity growth, continued late delivery of fabricated piping, and craft worker congestion during the installation period, resulted in the inefficiencies and added costs to the Kemper Project.

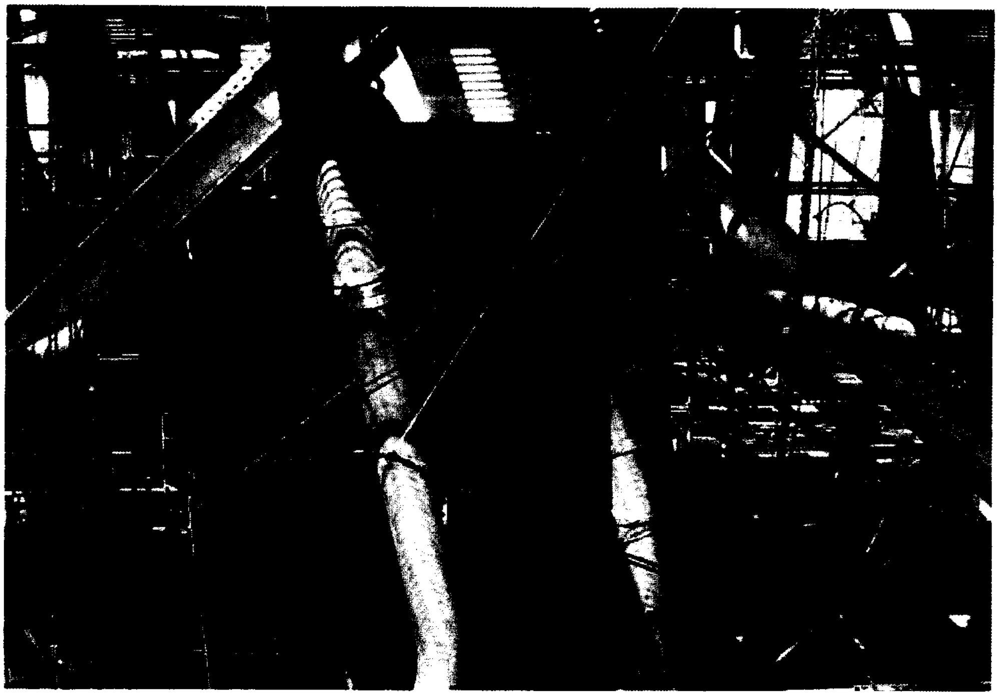
In contrast to Galloway's statement, BREI fully agrees that multiple fabricators were required to meet the installation demands of the Project. The root cause of the inefficiencies was that the decision to use multiple fabricators should have been made much earlier in the execution of the Project. If the pipe plan had been monitored as was suggested above, and also tracked as a line item in the SCS Risk Register, a decision to utilize multiple fabricators in the execution of the Kemper Project could have been made earlier, and MPC/SCS could have avoided or certainly lessened the inefficiencies and added costs to the Project.

Q. BREI questioned certain decisions by the Company relative to the fabrication of pipe supports. Galloway claims that BREI's Prudency Report contains "fundamental flaws" regarding its findings related to decisions regarding pipe support fabrication (p. 257). Please explain why these claimed "flaws" are incorrect.

A. Galloway's statement that BREI had "fundamental flaws" in its understanding of issues relative to pipe supports and hangers for the Kemper Project is incorrect. BREI understood the initial number of pipe supports which were required for the Project (approximately 16,000) as well as the growth in the total number of supports required as of the writing of the BREI's Prudency Report (approximately 59,000). Galloway also indicates that BREI did not recognize the complexities inherent in pipe supports relative to the numerous types of hangers and supports required.

Similar to pipe fabrication, SCS should have recognized the need for additional pipe support suppliers. While the single supplier was able to produce the total number of hangers required, it was unable to produce the correct mix of the different types of supports needed to meet the pipe installation schedule. Galloway correctly states there are some supports which require specific designs or engineering. However, this actually supports BREI's conclusion that SCS should have contracted with multiple suppliers.

Based on these factors, BREI takes exception to Galloway's statement that the "complexity lends to the support of a single pipe support vendor" (p. 257). With regard to the growth of the pipe quantities, which has a direct relationship to the number of hangers and supports required, SCS made the correct decision to expand the piping fabricators, but failed to see the wisdom in also expanding the suppliers of the supports and hangers. This failure created a need to support the piping using temporary lashing and cables, as seen in the photographs below, while waiting for a single supplier to deliver the correct supports to the site.



BREI believes that the decision to add pipe fabricators was correct, however, SCS failed to compliment this work-around by also assuring a timely delivery of the needed supports by utilizing additional suppliers. This caused inefficiencies resulting in additional man-hours expended, first to utilize temporary supports, and then to remove the temporary supports in order to install the permanent supports.

Q. Armstrong states that "[t]he magnitude of potential impacts resulting from design development was unforeseeable by the Project Team at the time of certification" (p. 20). Do you agree that the impacts were unforeseeable? Please Explain.

A. No. The Kemper Project Team visited the Edwardsport IGCC project on October 18, 2010.[4] During that visit, the team learned and reported that, "[a]ccording to Duke, 90% of their issues were design related" relative to commodity growth. In that same report, the team went on to describe many of the issues offered by Edwardsport as "lessons learned." The lessons learned from Edwardsport, as well as the very nature of a FOAK project, should have alerted the Project Team of the need to be very aware and conservative when forecasting and planning for the potential growth of commodities during the design development phase.

Q. Regarding Edwardsport, Galloway notes that BREI was one of four major engineering entities that were involved in the Edwardsport project (p. 423). Can you explain BREI's role and involvement in the Edwardsport project?

A. Galloway is mistaken. BREI had no involvement in the Edwardsport project.

Q. In their Rebuttal Testimony, Huggins and Owen state that BREI claims that the industry standard for engineering completion prior to the commencement of construction would be from 50% to 60% complete (p. 23). Do you agree with this statement?

[4] October 2010, Production Report, slide 74-83.

A. No. In BREI's Prudency Report, BREI was referring to engineering completion for cleaning and grubbing, site earthwork, and civil work - specifically major equipment piling and major underground facilities design. In the case of the Kemper Project, SCS began construction in June 2010. SCS struggled with design "issued for construction" (i.e., design drawings required to support the field construction schedule). In many cases the engineers modified their sequence of design effort to support and issue the needed drawings to construction, while in other areas construction did minor work-arounds until the design was available. In the early stages of the project design, the design was being conducted on a "just-in-time" basis to support construction. This was not the most effective manner to begin a project and BREI observed that, typically, a project would have 50% to 60% of any design discipline completed in a specific area before starting that phase of the project.

An example of the benefit of having at least 50% to 60% design completion in an area prior to starting construction in that area or discipline is the caisson piling (foundations) for the Kemper Project. The construction effort started in June 2010, in parallel with the detailed design. The caisson piling is part of the cleaning and grubbing, site earthwork, and civil work mentioned above. It was estimated that a total of 38,070 linear feet of caissons would be required for the Kemper Project at the start of construction and detailed design. Based upon the July 2010 Production Report, the Project forecasted a date of August 9, 2010, for "issue design for inquiry" for the caissons and drilled piling. In January 2011, the first caisson design was issued for construction. (The overall Project design effort reported a 26% complete status.) The initial load testing of the caissons took place on March 10, 2011. The initial testing failed, causing a redesign of the caisson and drilled piers lengths. Total lengths went from 38,070 linear feet to 48,460 linear feet for caissons and 84,980 linear feet to 146,380 linear feet for drilled piers. The first caissons were installed on April 19, 2011, ten months after the start of construction. This delay created the need for design personnel to realign their efforts, to provide construction with a sufficient amount of other work to continue the construction installation efforts until the caisson and drilled pier testing issues could be resolved and redesigned. Had a greater degree of design development been provided earlier in the design phase (approximately 50% to 60% for the piling design), additional costs and loss of schedule would have been precluded.

Q. In her Rebuttal Testimony, Galloway claims that fast-tracked execution of a project the size and scope of the Kemper Project is standard practice within the industry, stating that if such an approach was not used, the Project's execution would be substantially extended leading to significant risks and uncertainties facing the Project (pp. 11-14). Do you agree with this opinion?

A. No. MPC did not intend or initially plan to execute the Kemper Project on a fast track basis. BREI does not agree that fast track planning is typical for a FOAK project. Rather, the Kemper Project was forced into a modified fast track plan due to the imposed COD, in order to take advantage of the IRS Section 48A Phase I Investment Tax Credit and the nominal six month delay in achieving certification.

Although there are many definitions of fast track projects in the construction industry, the most common definition is simply that a project starts with less than a fully detailed design or something less than 50% design completion. The Kemper Project certainly fits this definition, however, it is BREI's opinion that many of the other elements of a fast track project were not implemented by SCS in its initial planning efforts. If fast track practices had been implemented at the outset, then:

- A much greater degree of detailed design would have been outsourced to multiple engineering firms, allowing SCS the ability to oversee and monitor the design efforts of multiple designers.

- Designs would have been performed by area, allowing a greater amount of work to be performed in parallel.
- A much more detailed execution plan would have been developed and imposed on the subcontractors for work performance. Detailed discipline execution plans would have been required, implemented, and monitored by SCS for compliance by the subcontractors.
- A Level IV detailed schedule would have been developed integrating the design, procurement and installation phases prior to the start of design and construction in parallel.
- A much greater detailed schedule would have been developed for the fabricators of the major equipment and more significant liquidated damages attached to the purchase orders.
- A greater presence of SCS personnel at the fabrication facilities for the major equipment suppliers would have been appropriate.
- Fast Track procedures would have been developed with accountability measures used to track progress of design and procurement.

In other words, the Kemper Project was placed on a fast track schedule, but industry standard practices to reduce the risk of a fast track project were not implemented.

BASELINE SCHEDULE, PROJECT SCHEDULE, RESOURCE LOADING, AND FOLLOWING PLANS/PROCEDURES

Q. Galloway states that it was incorrect for BREI to suggest that the lack of an early integrated schedule in the 2009 or 2010 timeframe was inadequate (p. 269). Did Galloway mischaracterize BREI's statements? If so, please explain.

A. Yes. BREI's concern was the lack of an integrated resource loaded schedule during the first 16 months of the Kemper Project following certification in June 2010.

The Kemper Project started with a very aggressive schedule, one that was shortened by six months. The schedule that did exist at the time was not established as the project baseline schedule that would be used later by the Project Team to measure planned progress against actual progress. As activities fell behind schedule, they were simply re-forecasted every month with new completion dates. Since the schedule was not well developed (i.e., baselined, logically tied, or resource loaded) at that point in time, the impact and severity of delays of those near term activities could not be used to measure the impacts on longer term activities. This continued month after month until the target or baseline schedule was developed and issued in September 2011.

For the first 16 months following issuance of the Certificate of Public Convenience and Necessity ("CPCN"), the schedule was loosely integrated (as reported by MPC) without either baseline or resource loaded schedule. Without a baseline schedule, there was no way for the Project Team to know how well the Project was performing against intermediate month to month milestones. Without a resource loaded schedule, there was no way to forecast the impacts of delays and what resources would be required in subsequent months in order to recover from the delays, or whether the resource forecasts were realistic. Early in the Kemper Project, it was common for activities to slip past their originally planned completion date. It was also common during that period for the Project Team to report that there were "no impacts on schedule." However, without a resource loaded, logically tied, baseline schedule during that 16 month period, the impact on schedule was impossible to determine.

Q. Galloway states that BREI failed to identify how MPC's procedures for project controls were implemented improperly (p. 272). Please explain and provide examples how these procedures were implemented incorrectly.

A. The following deficiencies in the implementation of project controls procedures and good scheduling/practices were observed by BREI.[5]

- Earned value procedures were not implemented correctly. SCS instructions on earned value require that "budgeted hours be extracted from the resource loaded schedule and/or the certified budget for each discipline, construction activity, etc." Contrary to this instruction, a resource loaded schedule was not used to develop a month-to-month plan for budgeted hours.
- Contrary to these instructions, actual expended hours were used to calculate earned value and not the physical measured or "earned hours" percent complete as BREI would have expected.
- Contrary to good scheduling practices, vendor drawing receipts were not logically tied back to engineering.
- The integration between construction, startup and commissioning was not completed until after March 2012.
- Work-around schedules were not incorporated into the master schedule. The impacts of the work-around schedules were not transparent or easy to identify/understand.
- The schedule did not reflect realistic relationships between piping completion and electrical commodities completion.
- The schedule did not logically tie the installation of equipment with the completion of mechanical and electrical work prior to testing.

[5] As previously identified in BREI's Prudency Evaluation Report (pp. 43-44).

- The project controls personnel lacked the necessary training to use Primavera, the software of choice for developing the schedule. This was eventually recognized by SCS, but not until the end of 2012. In response, SCS replaced its scheduling personnel by the end of 2012, nearly 1 ½ years into the execution of the Kemper Project.

Q. Galloway claims that "[t]he scheduling controls used at the Kemper IGCC Project were appropriate for the level of work at the site, and controls evolved as the Project work evolved" (p. 286). Do you agree that the scheduling controls were appropriate?

A. No. During the early stages of the Kemper Project, the schedule controls were not appropriate. Galloway qualifies her statement on the adequacy of the project schedule by stating that "[t]he scheduling controls used at the Kemper IGCC Project were appropriate **for the level of work at the site**, and controls evolved as the Project work evolved" (p. 286).

The purpose of a logically tied integrated project schedule is not only to plan, but to measure and react to the near term **level of work at the site**. It may well be that the project schedule that existed at the time the CPCN was issued was appropriate "**for the level of work at the site**". However, the purpose of this schedule should have been to establish a target against which progress could be measured, and an earned value applied. This early baseline schedule is also very important because it is used to conduct analysis and report progress so that the management team can take action when a problem or issue first develops.

To illustrate the issues with the early Kemper Project schedule, it is important to reiterate the specific project controls and scheduling deficiencies that existed during the execution of the Project.

As already discussed, one of the first deficiencies in the project management and project controls functions was the decision to allow the Kemper Project to go on for 16 months (from May 2010 to September 2011) without an integrated, resource loaded baseline schedule. As activities were falling behind schedule, the Project Team simply re-forecasted every month without the ability to gauge the impact of these delays on subsequent activities. The schedule that was used from May 2010 to September 2011 was loosely integrated and the schedule did not include all of the project scope. In addition, there were incomplete logical ties within this schedule. During this period, the impact on float[6] or activity end dates were not highlighted or managed proactively. As an issue emerged, the project would react in the short term. However, without a logically tied resource loaded baseline project schedule, there was not a tool to assess and react to mid-term and long-term consequences of these short-term delays. When an activity was late, one of the most frequent statements in MPC's monthly reports on monthly schedule slippages was that there was "no schedule impact" without regard to its criticality or impact on the rest of the Project. While this statement was made frequently, the Project Team did not have a baseline project schedule from which to draw these conclusions. As the Project Team was spending additional time and money to maintain the project schedule and May 2014 COD, MPC should have developed a simple cost benefit analysis to determine the incremental cost to maintain the scheduled May 2014 COD compared to $133 million IRS 48A Phase I Investment Tax Credit benefit. However, it appears that MPC management continued to push to maintain the May 1, 2014, COD with without a full understanding of the true costs or benefits.

Separately, the project controls group should have understood, predicted, and alerted the Project Team that both project costs and schedule overruns were likely due to the continuing

[6] Contingency included in the duration of individual scheduled activities.

increases in quantities and installation rates that were substantially higher than initially budgeted. Despite these facts, the overall cost and schedule projections continued to predict no overruns in schedule and no overruns in cost until the first cost overrun was acknowledged in May 2012, two years in to the Kemper Project. The first schedule delay was announced in October 2013, only ten months prior to the targeted COD of May 1, 2014. For illustration:

- On May 2012, MPC issued an outlook discussion report which forecasted a total of 698,630 linear feet of pipe, of which only 33,906 linear feet had yet to be included on the 3D model. This would indicate that 98% of all piping that was originally anticipated was modeled. This presentation provided assurances that the total linear feet forecasted at that time had a high-level of confidence and accuracy. However, the linear feet of pipe was further increased by an additional 30%, growing to 903,586 linear feet, and then continued to grow further.
- Estimates on piling, concrete and underground work increased by over 30% within the first six months of construction (from $67.5 million in August 2010 to $94.2 million in March 2011).

Q. Galloway states that BREI was incorrect in its assessment that SCS failed to develop a fully integrated baseline schedule in a timely manner and in accordance with SCS Procedure PC-02 (p. 295). Further, Huggins and Owen state that a meaningful, fully-integrated, resource-loaded schedule, as described by BREI, could not have been developed at 60-90 days following the notice to proceed (p. 60). Do you agree with these statements?

A. No. The project controls procedure which addresses schedule (PC-02) states that the schedulers shall "[d]evelop, issue, and maintain the project schedule **<u>and the baseline project schedule</u>**, and work with the Project Team and initiate the development of the schedules **<u>during the</u>**

project definition phase." Under the construction managers' responsibilities, the procedure continues to state that "[t]he **baseline project schedule** will be developed through a collaborative effort between the Project Team **during the project definition phase of the project.**" Section 4.5.3 of the PM-01 procedure under the title "Project Definition and Detailed Engineering and Procurement Phases" points out that project definition is the first of three (3) phases that are defined in the procedure.

Furthermore, this is not only BREI's assessment, as Galloway testified. This is also MPC/SCS's assessment from their lessons learned and formulated into their corporate procedure. Nevertheless, common sense dictates that timely issuance of such a critical project document should occur as close to the start of the project as possible. While BREI's suggested three (3) month (90 day) window to produce the initial baseline schedule may be considered by Huggins and Owen to be aggressive for a project as complex as Kemper, 16 months clearly does not meet the intent of the procedure, especially for producing a document so critical to assure the success of the Project.

Q. Galloway testifies that a Level III schedule was developed by June 26, 2010 (p. 308). In addition, Galloway maintains that there was no point in time that the Kemper Project was not under control or not managed effectively with those systems in place during the 2007 – 2011 periods. Furthermore, Huggins and Owen state that MPC used various other methods to track project status (e.g., look-ahead schedules, month-to-month variance reports) which "accurately" tracked schedule progress prior to being fully integrated into a Level III baseline (p. 60). Do you agree with these statements?

A. No. The June 26, 2010, date that Galloway references for development of a Level III schedule is inconsistent with MPC's monthly reporting on the schedule development or the schedules that

BREI reviewed. In the monthly reporting and discussion on the schedule, MPC acknowledges that a detailed Level III schedule was not completed until late in 2011. The August 2011 MPC/SCS Independent Monitor's report refers to major challenges that existed in integrating the schedule and there were discussions on resolving these issues prior to issuing the baseline schedule in September 2011. Galloway further states (p. 308):

> *Pegasus-Global' s review of the Project records shows that contrary to BREI's assertion, there was no point at which the Project work was not under control or not being managed effectively with those systems which were in place in the 2007-2011 time period.*

As noted earlier in this testimony, from June 2010 through September 2011, the Project Team had no baseline schedule to measure or gauge actual progress achieved against the baseline plan. Without this tool, Galloway cannot state with any level of confidence that the Kemper Project was under control and being managed effectively.

Further, the initial and incorrect application of the earned value management system presented misleading indicators of actual progress. The process of crediting actual hours expended to determine percent complete instead of correctly crediting earned hours provided misleading status and performance. These first months referenced by Galloway (June 2010 to September 2011) were critical in terms of base-lining the Project. Due to the deficiencies noted herein, management did not have a good handle on how poorly the Project was progressing.

Even with the eventual adoption of more reliable rules of credit[7] to measure progress, the Project continued to overstate performance and understate cost variances due to inconsistent methods used in the rules of credit. An example of the problems the Project Team was having (and continues to have) with determining engineering progress is that in December 2012 SCS reported engineering completion as 93% complete at a cost of $91 million. In April 2014, SCS

[7] "Rules of credit" refers to defined measurable milestones achieved during construction used to determine the percent complete or progress of a defined task or event.

reported a 94% complete status at a cost of $104 million. In summary, it took 16 months to accomplish the 1% progress as 13% of the budget was spent. This is largely the result of overstating performance early on due to the inappropriate use of rules of credit, along with the FOAK nature of the Kemper Project.

Q. Do SCS procedures specifically require resource loading of the project schedule?

A. Yes, the SCS procedures specifically require resource loading of project schedule. Procedure PC-02 Section 4.2.3 refers to the development of a detail Level III schedule and clearly states that "[t]his **schedule shall be resource loaded at the function resource level.**" Similarly, under the construction Section 4.2.4 PC-02, the procedure states that "detail construction shall be loaded with work hours and quantities." The same procedures state that this resource loaded schedule "becomes the basis of the construction curves" against which performance measurement will be reported.

Q. Is it BREI's contention that it was an unreasonable action by the Company to fail to resource load the integrated baseline schedule with P6, as asserted in Galloway's Rebuttal Testimony (pp. 310-313)?

A. No. The Company could have used an alternative method to resource loading the P6 schedule and that would have been reasonable depending on the alternative, including the level of detail that was used and how well the alternative method was linked to or integrated with the project schedule. However, the resource loading that was used by SCS, especially during the early phases of the Kemper Project, was inadequate.

Q. What approach did the Company use for labor resource allocation and monitoring and cost control?

A. BREI performed an Independent Engineering and Construction Cost Evaluation beginning in May 2012. During this review, MPC provided the basis of its resource allocation plan. It was in the form of an Excel spreadsheet. The spreadsheet provided a very low level of detail and was independent (i.e., not linked to the project schedule or tied to any construction activities.) The spreadsheet only tracked seven (7) commodities in three (3) work areas: the gasifier area, the gas cleanup area and the combined cycle area. Installation man-hours were assigned against each of these 27 line items. The spreadsheet was incomplete, excluded work that had already been completed or was already underway by October 2011 and excluded all non-craft related hours, such as all indirect labor which represented approximately an additional 50% of the craft hours. A copy of the spreadsheet for the gasifier area is attached as Exhibit 4 to illustrate the limited amount of information that was being reported.

Although imperfect, the schedule had enough detail to be used to support the required planning effort and would have highlighted many issues that needed to be addressed such as unrealistic staffing plans if it had been directly resource loaded. The Excel spreadsheet projected a peak of up to 1,500 full time equivalent construction workers. This was unrealistic at the time and a comparison with the Edwardsport project data, which SCS had, would have suggested this peak staffing projection was inadequate. In addition, resource loading of the schedule activities at a more detailed level would have shown early on that there were labor congestion issues which needed to be addressed in the installation of pipe. These congestion issues were not apparent with the Excel spreadsheet planning tools that were being used.

Since the Excel spreadsheet was only a snapshot in time and was not integrated or logically tied to a schedule of activities, it was of limited value. There was no correlation between materials available and what was needed for their installation. SCS recognized that the resource loading as initially developed was inadequate and later in the Project developed a more detailed Excel spreadsheet that was tied to the project schedule. In actuality, MPC proved that a more detailed Excel spreadsheet could be used instead of resource loading P6 to achieve more accurate trending and projections. However, this enhanced spreadsheet was not developed until after March 2013.

While BREI acknowledges that a Microsoft Excel spreadsheet can be used, it still has limitations when compared to directly resource loading the P6 schedule. The major disadvantage associated with resource loading an independent Excel spreadsheet as compared to P6 is an issue of integration. Since the separate P6 schedule and Excel spreadsheet are not integrated, there is some time lag between making modifications to the two spreadsheets. For instance, when specific activity durations changed due to re-baselining or re-forecasting, these changes needed to be manually updated in Excel. Then, they had to assess whether the resource loading from the Excel spreadsheet was realistic and achievable. If not, schedule dates would need to be adjusted and the iterative cycle would continue until a final plan was developed. If SCS had utilized P6's full capabilities, this iterative process would have been updated automatically.

Q. In your opinion, was the Company's approach reasonable?

A. No. The approach used in October 2011 during the first resource loading exercise was not reasonable. There were improvements made to the resource loading methods in late 2013 but there were limitations on this later method as compared to P6. Nevertheless, the initial resource loading that was used during the period from project certification through March 2013 was not appropriate for the size of the Project and level of detail needed to manage it. While the resource loading method improved, the period following March 2013 is outside the evaluation period of this prudency evaluation.

Q. Why was the resource loading methodology used by the Company inadequate?

A. Resource loading of activities in a project schedule (or in an alternative method such as a Microsoft Excel spreadsheet) allows the scheduler to develop staffing plans. These staffing plans indicate the number of craft that are required by each discipline. Developing a staffing plan needs to be one of the very first items addressed for a project. Management needs to know if the staffing levels that were assumed are sufficient to complete the project on schedule. The staffing plan also allows for a more comprehensive and accurate planning of the resources one will need. For example, if necessary, strategies can be developed to appropriately incentivize the labor force to assure that a sufficient amount of labor can be attracted to the project.

From the lessons learned at Edwardsport, it was well known that pipe related craft resources would be critical. With this knowledge, the Project Team could have developed a detailed plan for the piping craft. This was not done during the period prior to March 2013.

The Project Team did not develop a high level staffing plan until September 2011. At that point in time, a detailed staffing plan could have been effectively developed if adequate resource loading tools had been available. It was clear in mid May 2012, when BREI performed its cost and schedule audit, that the staffing of pipe fitters was the most critical resource which was crucial to the success of the Kemper Project; however, the Project Team did not develop a detailed staffing plan for piping until November 2012.

Q. Please explain.

A. The initial detailed staffing plan for pipe installation, developed in November 2012 called for 450 full time equivalent pipe workers. Eventually, MPC realized that staffing requirements for the piping would exceed 1,500 pipe workers; three times the November 2012 plan values. If the

Project Team had used a proven resource loading approach, with sufficient detail and integration, more accurate staffing requirements would have been projected in real time as piping quantities were added to the resourcing plan.

Q. Armstrong states that MPC failed to implement certain procedures (p. 5, Exhibit – (KPMG-2), pp. 49-50) but claims that there is no causation between MPC's failure to implement those procedures and their impact on the Kemper Project's costs and schedule, and that these failures did not cause a lack of dependable information. Do you agree that the failures did not affect the Project's cost, schedule, or MPC's ability to obtain dependable information as construction proceeded?

A. No. As I discuss in this Section of the testimony, these failures had a direct impact on the Kemper Project's cost and schedule. The alternative methods employed also failed to provide dependable information during construction.

Q. Do you have any concerns with the references made by Galloway, Armstrong, and Huggins-Owen regarding the challenges that SCS was experiencing in migrating from Primavera P3 to P6? If yes, please explain.

A. Yes. In BREI's experience, it does not take three to four years to migrate to an updated software package. Moreover, MPC/SCS hired numerous personnel with P6 experience specifically to run the software. With the resources correctly applied to transition to P6, SCS should have been quick, on the order of months, not years.

In addition, Galloway states on page 28:

> *Regarding BREI's conclusion that SCS did not resource load its Master Schedule in P6 and that failure to do so resulted in impacts to the Project, BREI fails to consider what the industry was experiencing in the time period of MPC's development of its Master Schedule with respect to the transition from Primavera P3 software to P6 software and what SCS learned regarding the problems of resource loading P6.*

Galloway suggests that the software was and continues to be problematic with "glitches" suggesting that issues with resource loading P6 schedules for large complex projects would have made the schedule unreliable (p. 26). This statement is misleading and incorrect.

The Southern Company project "Plant Vogtle Units 3 & 4" employs a resource loaded P6 schedule. Chicago Bridge and Iron (CBI) developed a resource loaded P6 schedule and is using the schedule for the management of this multi-billion dollar project, which will be operated and partially owned by Southern Company. Independently, BREI had reviewed this 80,000 activity fully Integrated and resource loaded schedule before Kemper started and found the software functioning satisfactory. P6 has long been established as the "Cadillac" of software for project scheduling, where literally thousands of people have the skills to use it.

In addition, if the Project Team prudently performed its due diligence and concluded that it could take four years to migrate from P3 to P6, a simple question which is worth asking is, "Why migrate?" The P3 tool was just as capable to allow the team to develop a fully integrated resource loaded schedule and would not have required new software, new tools and training.

Q. Huggins and Owen assert that schedule float, or contingency, was inherent in MPC's schedule even it if was not directly added to each activity in the schedule and states that May 2014 COD was achievable (p. 63). Do you agree? Please Explain.

A. No, BREI does not agree. Huggins and Owen state (p. 63):

> *The schedule was based on one shift of 5 – 10 hour work days with the ability to add a second shift and additional overtime as necessary to meet schedule milestones. This extra shift and additional overtime provide a significant amount of schedule contingency.*

BREI does not agree that a sufficient level schedule contingency existed or was inherent in the project schedule even when considering this alternative method of applying contingency to the project schedule. The Black & Veatch readiness review also recommended that schedule contingency be added to the schedule.

Specific contingency applied to individual schedule activity durations or groups of activities, known as float, is the customary practice for including contingency in a project schedule. The method of using nights and weekends for applying contingency to a project schedule is flawed in that such contingency has a time stamp on it and is not task dependent. That type of contingency expires with time. As an example, consider the scenario of a project that goes according to plan during the first year and requires no contingency during year one. While none of the first year's contingency was spent, all of it is gone by the end of the year. If contingency were applied at the activity level, the project would generate some float from not using its contingency, which would flow down for use in other activities later in the Project if needed. However, with the alternative approach of using nights and weekends, contingency is continuously lost throughout the project schedule whether it is used or not.

In addition, the schedule is a series of logically tied activities. If activities are late in the project execution, they have a direct impact on logically tied activities later on. If, for example, an equipment delivery is late, contingency to recover the delay in logically tied activities that are dependent on its delivery are affected and need to be accounted for.

With the compressed four year schedule, lessons learned from Edwardsport, and Black and Veatch's recommendation to add schedule contingency, SCS should have recognized that there was little margin for error or delay with respect to meeting the May 2014 COD. However, as early as October 2010, SCS had twice set targets for awarding equipment procurement packages and twice failed to meet those targets. This trend of late procurements continued through 2011 and in to 2012.

In addition to the procurement delays noted above, delays in pile, structural steel, and concrete installation were experienced during the early phases of construction, a trend which also continued. The Project experienced late engineering release for piping and hanger fabrication. Also, major equipment delivery delays were experienced. There was an unusually high percentage of activities that were taking much longer to complete than planned. Further, the schedule was not reflecting time lost due to inefficiencies for work-arounds. Eventually, weekend and second shifts were added to "keep up" with the scheduled activities. Also, actual installation rates were higher than planned which did not support the bulk installation durations used in the schedule. In its November 26, 2012, Independent Monitor's Project Schedule and Cost Evaluation Report, BREI predicted that the May 2014 COD was not achievable. Finally, in October 2013, MPC recognized and acknowledged that the original schedule was not achievable and at that time forecasted a new COD of December 2014. In summary, BREI did not believe adequate contingency was inherent in the schedule or that a May 2014 COD was achievable.

EARNED VALUE MANAGEMENT

Q. Galloway provides several criticisms of BREI's findings regarding earned value measurement (pp. 347-348). Please summarize her criticisms and provide your response.

A. Galloway states (p. 348):

> *The EVM system on the Project met common industry standards as used within the construction industry and provided Project Management with appropriate information with which to monitor the Project.*

Galloway further states that BREI did not provide a basis for its opinion that SCS was not measuring engineering progress against a baseline planned percentage. She referenced the use of two industry standard earned value measurement metrics - Labor Performance Indicators

(LPI) and Schedule Performance Indicators (SPI), which were used to substantiate her statement. She correctly states that SCS first included these metrics in the November 2010 monthly Independent Monitor's report and that beginning in early 2011, the earned value calculation guidelines were also included in the Independent Monitor's monthly report. However, at that time, SCS incorrectly applied the metrics as described below in determining earned hours by considering actual hours spent as the measure of percent complete rather than basing percent complete on physical progress. At the time, SCS had not yet developed its baseline schedule so there was no baseline to measure progress against. Therefore, the methodology Galloway testified to was not being applied, or was being incorrectly applied at the time. The chart below presents the data that was provided in SCS's September 2010 monthly Independent Monitor's report.

1 **Total Projected as of September 30, 2010**

Southern Company Generation Kemper County IGCC Project	Project to Date							Project Total
	Planned Work Hours	Actual Work Hours	Earned Work Hours	Planned % Complete	Actual % Complete	Labor Performance Indicator	Schedule Performance Indicator	Budgeted Work Hours
Status through September 2010	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(1)	(2)	(3)=(5)x(8)	(4)=(1)÷(8)	(2)÷(8)	(8) (3)÷(2)	(7)=(3)÷(1)	(8)
1. Total Project	550,636	461,404	440,604	7.8%	8.6%	0.97	0.82	6,970,457
1.1 Phase 1 - Project Definition	128,834	126,834	126,834	100.0%	100.0%	1.00	1.00	126,825
1.1.1 SCS Feed Engineering	78,745	78,745	78,745	100.0%	100.0%	1.00	1.00	78,745
1.1.2 KBR Feed Engineering	48,089	48,089	48,089	100.0%	100.0%	1.00	1.00	48,080
1.2 Phase 2 – Design	320,622	309,043	297,243	20.9%	20.2%	0.90	0.93	1,530,520
1.2.1 SCS Feed Engineering	171,203	188,483	165,434	21.0%	23.1%	0.88	0.97	814,735
1.2.2 KBR Feed Engineering	148,419	120,580	131,809	20.9%	18.3%	1.09	0.88	715,785
1.3 Phase 3 – Construction & Startup	103,180	25,527	25,527	1.9%	0.5%	1.00	0.25	5,313,112
1.3.1 SCS Construction	103,180	25,527	25,527	2.0%	0.5%	1.00	0.25	5,204,506
1.3.2 SCS Startup	0	0	0	0.0%	0.0%	1.00	1.00	108,807

On the left side of the chart, the project phases are identified (Phase I Project Definition, Phase II Design, and Phase III Construction and Start- Up). The columns represent the following:

- Planed Work Hours (1)
- Actual Hours (2)
- Earned Hours (3)
- Planned Percent Complete (4)
- Actual Percent Complete (5)
- Labor Performance Indicator (6)
- Schedule Performance Indicator (7)
- Budgeted Work Hours (8)

Under each column there are references as to how each category is calculated. The following provides an example from this data of how the LPI was incorrectly calculated and reported to management.

According to the formula provided, column 6 (LPI) is calculated by dividing earned hours over actual hours (column 3 over column 2). However, looking at column 3, which explains how the earned work hours are calculated, the calculation uses the actual percent complete (column 5) divided by total budgeted hours (column 8). The actual percent complete (column 5) is using **ACTUAL HOURS and NOT EARNED[8] HOURS.** Calculating earned hours using this method erroneously showed that every actual hour worked resulted in an earned hour, thereby overstating the percent complete. This example illustrates that, while SCS was using an LPI chart, which is a good metric, the basis for calculating the metric was incorrect. Similarly, the SPI metric was calculated the same way. It should be noted that this review considers MPC/SCS

[8] Actual Hours refer the actual hours that were expended regardless of whether progress was earned or achieved.

actions and methods employed through March 2013; the methods that are currently employed are more reasonable and accurate.

Q. In her Rebuttal Testimony, Galloway was asked how the construction industry defines a "trend" and she responded that "a trend is usually defined as a persisting condition for a period of at least three consecutive reporting periods" (p. 335). Do you agree with Galloway's response?

A. Yes. A trend is an identified general tendency of events, conditions or performance, which has occurred from the start of a project to a specific point in time during the execution of the project. A trend is established using historical data produced by the project. A trend (positive, negative or stable) is usually defined as a persisting condition, as Galloway states, for a period of at least three consecutive reporting periods.

Q. Using Galloway's definition, in your opinion, did the Project Team effectively identify and respond to trends on a timely basis?

A. No. Proper trending of historical data for quantity growth at Kemper (specifically in structural steel and concrete) starting in September 2011, and the slower than planned progress in engineering (including piping releases for fabrication), should have alerted the Project Team to the probability for schedule delays and cost overruns much earlier.

The September 2011 basis for the first baseline includes the following MPC projections with a trending history of approximately six times the durations of the three reporting periods that Galloway considers usual:

[redacted]

Site Excavation	cy	5,861,100	6,578,791	12.2%
Structural Steel	tons	28,168	34,643	23.0%
Concrete	cy	50,181	93,260	85.8%
cable	lf	3,218,675	12,860,407	299.6%
Cable Tray	lf	66,238	175,000	164.2%
Instrumnets	each	2,100	10,875	417.9%

In addition, it was reported in the September 2011 monthly Independent Monitor's report that MPC was projecting an overrun of its certification estimate for early construction work in underground and deep foundations of $124.1 million (The certification estimate was $105.1 million and MPC was forecasting a $229.2 million). These were all trends reported as early as September 2011, however, it was not until May 2012 that SCS/MPC acknowledged and reported that the Project would not be completed within the $2.4 billion certified estimate.

Q. Galloway further explains in her testimony that SCS used adequate techniques with regard to trending and forecasting (p. 334). Do you agree? Please explain.

A. No. In the preceding answer, it is clear that significant trends in quantity growth and in the early phases of construction costs were clearly identified as early as September 2011 at the time that the initial baseline schedule was completed. However, other data reported by MPC/SCS both before September 2011, and up until March 2012, did not evidence similar trends in the total project cost that would have been expected based on the data that was available.

The following table represents the total project cost as reported monthly by SCS in the Independent Monitor's monthly production reports. For illustration, BREI has broken out the reported cost of the Project, again as reported by SCS, into: engineering, major equipment, engineered procured, construction, and the overall Project, in millions of dollars from the period June 2010 through May 2014. While the chart clearly shows an upward trend in engineered procured materials, it shows a corresponding decreasing trend in construction costs. These trends are illogical and should have been examined by SCS and MPC management. In fact, MPC/SCS did not report a growth in total project cost until May 2012, when it was announced that the project cost would increase from the $2.4 billion certified cost to $2.76 billion.

	[redacted]				Total
Certified Estimate	345.3	607.6	[illegible]	[illegible]	2.4
Jun-10	268.0	607.6	500.0	725.6	2,340.6
Jul-10	268.0	607.6	500.0	725.6	2,340.6
Aug-10	[redacted]				2,340.6
Sep-10	[redacted]				2,340.6
Oct-10	[redacted]				2,340.6
Nov-10	[redacted]				2,340.6
Dec-10	[redacted]				2,340.6
Jan-11	[redacted]				2,340.6
Feb-11	[redacted]				2,340.6
Mar-11	[redacted]				2,340.6
Apr-11	[redacted]				2,340.6
May-11	[redacted]				2,340.6
Jun-11	[redacted]				2,340.6
Jul-11	[redacted]				2,340.6
Aug-11	[redacted]				2,340.6
Sep-11	[redacted]				2,340.6
Oct-11	[redacted]				2,340.6
Nov-11	[redacted]				2,340.6
Dec-11	[redacted]				2,340.6
Jan-12	[redacted]				2,393.4
Feb-12	[redacted]				2,393.4
Mar-12	[redacted]				2,395.1
Apr-12	[redacted]				2,395.1
May-12	[redacted]				[redacted]
May /9/ 2012 For	[redacted]				2,761.8
Jun-12	[redacted]				2,818.0
Jul-12	[redacted]				2,813.9
Aug-12	[redacted]				2,854.4
Sep-12	[redacted]				2,860.6
Oct-12	[redacted]				2,860.6
Nov-12	[redacted]				2,864.2
Dec-12	[redacted]				2,864.2
Jan-13	[redacted]				2,864.2
Feb-13	[redacted]				2,875.3
Mar-13	[redacted]				[redacted]
Apr-13	[redacted]				3,401.3
May-13	[redacted]				3,401.3
Jun-13	[redacted]				[redacted]
Jul-13	[redacted]				3,715.4
Aug-13	[redacted]				3,715.4
Sep-13	[redacted]				[redacted]
Oct-13	[redacted]				3,687.3
Nov-13	[redacted]				3,687.3
Dec-13	[redacted]				3,687.3
Jan-14	[redacted]				3,710.7
Feb-14	[redacted]				[redacted]
Mar-14	[redacted]				3,878.1
Apr-14	[redacted]				3,887.0

Table 2: Actual + Forecasted Budgets

Q. In Galloway's evaluation of BREI's Independent Monitor's Project Schedule and Cost Analysis, she states on p. 379 that "[t]he results of BREI's independent evaluation of the quantities found that the 'to-go' quantities were entirely similar to those forecasted by MPC, with one exception being piping quantity." Do you agree with this statement?

A. No. Galloway fails to understand how BREI conducted its analysis. While she is correct in her statement that BREI's "to-go" quantities were similar to those forecasted by MPC with the exception of piping, she failed to realize that this was just the first step in BREI's evaluation. In addition to quantities estimates, BREI also evaluated SCS's unit installation rates which were considered to be low, and were adjusted in BREI's analysis based on the labor costs and installation inefficiencies that BREI was expecting due to site construction congestion and difficulties in attracting sufficient craft labor. With BREI's adjusted quantities and unit rates, "to-go" installed costs were developed for each of the estimated remaining quantities, including indirects. At the time of BREI's evaluation, SCS was reporting that engineering was 93% complete. At 93% complete as reported, one would have expected the scope, cost and schedule to be well defined. Thus, BREI applied individual contingencies to each of the "to-go" commodity cost estimates based on accepted AACE criteria for a project with 93% engineering completion. At that point, risk analysis confidence levels were assigned to each component of BREI's independent cost analysis and a probabilistic "Monte Carlo" risk analysis was completed to develop the range of probable project costs included in BREI's cost analysis. A similar analysis of the project schedule was completed at the same time.

COMMODITY GROWTH AND FORECASTING

Q. Regarding growth in commodities, Galloway references (p. 373) certain statements made in BREI's Prudency Report on page 41. Please summarize and comment on the statements she made.

A. Galloway states (p. 373):

> *The impact of increased quantities was regularly monitored and reported throughout the execution of the Project. For example, in January 2012, the forecasted manhours for Combined Cycle Labor Broker, Gasifier and Gas Cleanup packages were all increased, also leading to an adjustment in the manhours measured for overall progress. Following the completion of the re-estimate, MPCO held a Kemper Project Cost Outlook Discussions presentation in May 2012 with the IMs to discuss the approximately $90M cost estimate increase (to $2.76B at the time). The cost increases were attributed to quantity increases of engineer procured equipment as well as $200M in increases due to the impact of those quantity increases on construction.*

Galloway points out the fact that SCS was capable of tracking commodity quantity increases. However, she fails to clarify the challenges related to SCS's inability to effectively forecast and track the impacts on costs, schedule and progress measurements. It is BREI's opinion that, had SCS utilized the full Primavera P6 ("P6") resource loading capabilities rather than relying on a standalone non-integrated spreadsheet, this data would have been added to the schedule database as the quantities increased, thereby allowing a "real time" look at the impacts to the cost, schedule and progress measurements.

Q. There has been much discussion about the 7% level of contingency included in the $2.4 billion certified estimate. How did SCS's methods for monitoring the project against the $2.4 billion baseline and its procedures for managing contingency affect project execution, tracking and controls?

A. There are typically two components included in a contingency budget, the first being an allowance for indeterminates (AFI) which is a component of the contingency budget for items that are known but cannot be quantified at the time the estimate was developed such as quantity growth. The second component is a budget for true unknowns or unexpected issues or events. The Company did not differentiate the two types of contingency. The critical issue is the implementation of the tracking and managing process of the contingency for the Project.

Baseline quantities and costs were set by FEED study results based on the initial $2.4 billion budget. SCS had a single contingency budget; tracking was done against this budget as a series of "credits and debits" taken from and to the contingency account. When a scope item was identified to exceed its budgeted allocation, contingency appeared to have been extracted from the contingency budget. When a scope item was identified to under-run its budget, the contingency budget apparently was increased. If the original estimate was based on a project which was not FOAK, this approach may have been adequate. However, in the case of Kemper, it gave the Project Team a false sense of security where some of the initial growth in quantities was masked by lower than expected procurement costs.

The original estimate with associated contingency was relied upon while the FOAK design was growing in magnitude and the quantities grew. The "Grand Total Forecast" for the EPC portion was presented as $2,340,551,325 from certification until March 2012, at which time it grew to $2,396,349,542 and grew again in April 2012 to $2,401,895,057. The estimated percent complete of the detailed design grew from 10% at certification to 73% in March 2012 and 77% in April 2012. In BREI's opinion there should have been a significant increase in the forecast of commodities growth over this period of time as the quantities grew for the Project. That increase would have far exceeded the contingency available in the budget. If another method of tracking quantity growth relative to contingency was used, it was not transparent to BREI. In August 2012, a total re-baseline (second re-baseline) to the schedule and budget was performed and repeated multiple times thereafter (May 2013/July 2013/ November 2013) until the present. After new senior leadership was established for the Project in June 2013, the Project Team has been more transparent, and detailed contingency costs are tracked and discussed in each Independent Monitor meeting on a monthly basis.

RISK MANAGEMENT

Q. In your report, BREI made several conclusions regarding MPC's risk management process (p. 45). Please summarize those conclusions.

A. In BREI's Prudency Report under "Risk Management," page 45, it states that "[t]he risk management process that was used by the Project Team evaluated risks affecting a rolling two quarters in a given period. This method of tracking risks and mitigation measures in the short term was suitable to track 'near term' risks but appeared to preclude the Project Team from the ability to clearly see longer term potential risks throughout the life of the Project."

BREI concluded that the areas of the Project affected by the lack of a proper implementation of an effective risk management program are summarized as follows, from page 46 of BREI's Prudency Report:

- Cost/Schedule (Did not complete a fully effective cost or schedule analysis to determine the levels of confidence in the cost estimates, schedule dates and activity durations that were being used.)
- Labor availability

- Labor productivity
- Overall construction durations and construction congestion (resulting from early identified growth in quantities)
- Labor resource requirements

Q. Did Galloway agree with BREI's conclusions summarized above? Please explain.

A. No. Galloway indicated that she disagreed with BREI's statements. However, she did not offer clarification for the elements cited by BREI. She did take exception to the first bullet above by stating the following (pp. 386-387): "[T]here are no industry standards for a 'complete cost or schedule risk analysis.'" It is BREI's opinion that this statement is irrelevant and does not add any definitive or objective facts regarding the performance of the Project Team with regard to risk analysis. There are many aspects about risk identification, analysis, assessment, and modeling that are documented in the industry by such organizations as PMI, AACE and CMI.

Q. Galloway also states that "the overriding aspect of risk is mitigation, which is an essential aspect of 'control' that follows" (p. 387). Please describe how Galloway's criticism is incorrect.

A. BREI agrees with Galloway's statement above with the exception of one word that should be added to her statement - BREI would add the word "**timely**" before mitigation so that the overriding aspect of risk is "**timely mitigation**," which is an essential aspect of "control" that follows.

BREI understands the elements and aspects of a properly developed and implemented risk management program, which Galloway described in her testimony. However, the program elements are only as effective as the proper implementation of those elements. BREI continues to believe that if the items cited in BREI's Prudency Report on page 46 had been mitigated in a more timely manner, through the effective use of SCS's risk management program, the Project should not have incurred as much added cost. As noted, a quality risk management program is not only achieved by having a well-defined program, but is also measured by the proper **timeliness** of the implementation of that program.

Q. Specifically, Galloway states on page 387 that the failure to look only two quarters ahead is a "small point." Do you agree that this is a small point?

A. No. Galloway states (p. 387):

> *The length of the risk "look ahead" of two quarters is a small point that pales in comparison to a project management team that does not identify or track risks and takes no action to mitigate risks, since they have not bothered to identify any risks. If no risk mitigation activities were instituted by MPCO, then this statement would have a deeper meaning.*

BREI agrees with the concept that, had MPC chosen not to have, nor implement, a risk management program, the statement would certainly have a much deeper meaning for the Project.

However, that is not what BREI has indicated. BREI recognized many of the effective elements of the Kemper Project's risk management program. BREI also recognized that the ineffective implementation of a risk management program may have had very detrimental effects on the costs of the Project. BREI has identified those elements and has requested clarification for those specific items, as referenced in BREI's Prudency Report on page 14.

Galloway, specifically referring to the two quarter period, later states on page 387 of her testimony that:

> *The continual identification, assessment and actions taken are indicative that the Kemper PMT was actively working to minimize the risk exposure on the Project, and was not limited to examining risks through a two quarter period.*

Despite the assertion that a risk look-ahead of two quarters is a "small point," Galloway appears to have taken exception to the fact that risks were only evaluated through a two quarter period. This is in contradiction to interviews which BREI conducted with Steven Owen and John Huggins concerning the method of risk management. During the interview sessions, Owen and Huggins described the two quarter risk look-ahead process in detail.

Q. Please provide some examples of how this failure negatively impacted the Project.

A. BREI believes that, had the Project Team looked at a timeframe greater than two quarters ahead, it would have been better prepared to manage the mitigation of the effects of lost schedule and added costs. A longer term horizon would have increased the Project Team's effectiveness and its ability to, for example:

- Understand long term risks and effectively manage the Project.
- Recognize in a timely manner that additional pipe fabricators would be required to meet the rigid installation schedule for the Project.
- Recognize in a timelier manner the impact of poorly installed refractory in some of the major components.
- Recognize earlier the need to more closely monitor CFI during the fabrication of the gasifiers.
- Recognize earlier the need to more closely manage the utility lines' modifications to allow delivery of major components from the port.
- Recognize the impacts of needing more scaffolding and scaffold workers on the Project.

- Recognize that a single major contractor would have been more manageable for the gasifier and gas clean up areas.
- Avoid many of the work-arounds.

BREI recognizes the limited effectiveness of the SCS risk management program, however it also recognizes that, had the program been implemented with a longer time horizon, many of the elements listed above, as well as numerous others, could have been better managed and thus lessened the added costs to the Project and the schedule impacts.

FORECASTING AND MANAGING PROJECT ISSUES IN LIGHT OF EDWARDSPORT AND BLACK & VEATCH READINESS REVIEW

Q. Huggins and Owen testified in their Rebuttal Testimony that "Edwardsport also had piping issues, including lay-up from receipt to final commissioning that led to additional time needed for repair and re-cleaning (p. 48). The Company implemented a plan to fabricate piping that included rigorous quality surveillance and control processes to minimize the need for repair and re-cleaning." However, despite these efforts, MPC still had major piping issues according to BREI's direct testimony. Can you explain?

A. Yes. There are actually two issues here. The first issue deals with the statement above that MPC implemented a plan to fabricate piping that included rigorous quality surveillance and control processes to minimize the need for repair and re-cleaning. This was done in an effort to preclude additional work after construction completion and to avoid additional cleaning during the startup phase of the Project. As of March 2013, there have been very few startup activities performed to verify the cleanliness and installation effectiveness during construction of the various piping systems. However, the Project recently completed the required pressure testing of the gasifiers in which multiple iterations were required to successfully test them. This was due to the improper installation of gaskets and misalignment of some pipe during the installation phase of the Project. Thus, the real effectiveness of the lessons learned is yet to be determined during the startup phase of the Project.

The second issue deals with other issues related to piping installations. MPC has experienced multiple constraints and roadblocks in the procurement and installation of the piping and the associated supports and hangers. These issues are discussed in detail in BREI's Prudency Report and are also recognized as issues by the Company. The installation of pipe was quickly becoming the focus of the construction efforts in the March 2013 timeframe and continues to this date. MPC has taken extensive measures to correct and monitor this phase of the Project.

Q. Huggins and Owen also testified that, although piping installation was a challenge at Edwardsport, the Kemper Project's circumstances were unique and not the same as those experienced by Edwardsport (p. 49). Do you agree with this claim and why?

A. Yes, with caveats. Senior personnel from the Kemper Project Team visited the Edwardsport site and developed a comprehensive list of lessons learned from that visit. One of the major issues was late procurement, due to late design development and the difficulties encountered during the pipe installation phase. The Edwardsport team recommended that piping be installed as the structures were being erected, which was the original plan for the Kemper Project, but, due to the late design development and procurement of the piping, the Project Team was not able to take advantage of this particular lessons learned.

BENEFICIAL CAPITAL

Q. Huggins and Owen assert in their Rebuttal Testimony that the Siemens combustion turbine did not form the basis of the certified cost estimate provided to the Commission (p. 108). Do you agree?

A. No. Huggins and Owen state that "the gasifier and gasifier island costs were based on the FEED study design" (p. 108). The August 2009 FEED study notes, in Section 3.15, that either the GE 7FB or the Siemens combustion turbine would be selected. However, Section 4.1.7 of the study states that the Siemens turbine was chosen as the basis for performance and Appendix G contains IGCC heat balances using the Siemens combustion turbine. BREI does not consider it uncommon to name two or more equipment suppliers in a FEED or similar conceptual design study prior to equipment procurement, even after a decision has been made, to maintain a competitive position during equipment procurement negotiations. It is also important to note that the performance metrics, including plant output and heat rate included in the CPCN, are based on the Siemens combustion turbine based heat balances. It is apparent to BREI that the decision to use the Siemens combustion turbine was made in the 2008 – 2009 timeframe during the FEED process.

However, given the lack of specific documentation within the FEED on the basis for the combustion turbine selection and gasification system sizing, BREI inquired as to the basis of the August 2009 FEED design during prudency interviews with KBR. KBR noted that the Siemens combustion turbine formed the basis for the 2009 FEED design and gasifier sizing.

Following the FEED, during the 3rd and 4th quarter of 2009, SCS issued an RFP, obtained bids, conducted a bid review and negotiated with combustion turbine suppliers.[9] In August of 2009, SCS presented the decision to proceed with the Siemens combustion turbine at the MPC Management Review Board Meeting. Ultimately the combustion turbine contract was signed between SCS and Siemens on April 30, 2010.

[9] This timeline is also consistent with what was reported in the Black & Veatch readiness review. The Black & Veatch readiness review documents meeting notes which are dated November 11-13, 2009, and they state "SCS expects that the gas turbines will be awarded to Siemens; an LOI on CTG to Siemens is in place."

As part of the presentation made at the MPC Management Review Board Meeting, SCS presented a performance comparison of the IGCC plant when configured with each of the GE and Siemens combustion turbines. BREI compared this performance comparison with the performance metrics that are listed in Thomas Anderson's phase II testimony[10] which confirmed that the performance metrics presented to the MPSC prior to certification were based on the Siemens combustion turbine.

As a result, BREI does not consider the capital cost of the Siemens combustion turbine to be beneficial capital since the performance metrics already included in the CPNC were based on, and not improved upon, by the selection of the Siemens combustion turbine.

PROCESS DEVELOPMENT ALLOWANCE

Q. Huggins and Owen state that the Process Development Allowance items, including the Sour Water Stripper Corrosion Stress Cracking Protection, were done to optimize the design and make the plant more economic and thus should be eligible for Process Development Allowance (p. 104). Do you agree?

A. No. SCS learned during detailed design that oxygen could be introduced into the sour water/wastewater system, especially during startup and that the materials specified for the sour water strippers were inappropriate and subject to stress corrosion cracking, a phenomenon that can lead to unexpected, undetected and catastrophic failure of the vessels. SCS presented its justification for changing the materials within the sour water system to the Independent

[10] MPC Commission Filing Exhibit (TOA-1), page 6 of Updated Design, Description and Cost of Kemper County IGCC Project (Filed December 7, 2009).

Monitors in a presentation dated March 19, 2013, titled "Review of Metallurgy in Sour/Wastewater Service." SCS elaborates on the concerns stating:

> *Some failures can be sudden and catastrophic. Of most concern are the syngas scrubbers which are directly coupled to the gasifier and syngas system at over 600 psig. Major loss of containment on the syngas scrubbers would likely result in explosion due to large release of toxic syngas and could cause rapid depressurization of the gasifier, causing ash to inflate/expand and violently push its way through the syngas coolers, PCD and syngas scrubbers, creating steam explosion and uncontrolled ejection of 1,800 deg. F ash into the gasifier structure and onto the plant site.*

The design changes were made out of necessity and were required to assure the safe operation of the facility. They were not driven by future operation and maintenance (O&M) cost savings. BREI does not consider this to be a Process Development Allowance modification, but a modification that was needed due to unknowns inherent in the FOAK nature of the process that were identified during detailed design and that should have been addressed by contingency.

BREI COST OF INEFFICIENCIES ANALYSIS

Q. Huggins and Owen offer criticisms of BREI's cost efficiency analysis, including its quantification of the cost impact of work-arounds and other inefficiencies identified in BREI's Prudency Report (pp. 93-94). Please respond.

A. BREI conducted a detailed analysis to evaluate the cost of inefficiencies that were identified in BREI's Prudency Report and that are highlighted in this surrebuttal testimony. MPC and SCS did not adequately address, execute or implement several aspects of the Project which have led to project execution inefficiencies and have resulted in additional project costs. These issues relate primarily to project planning and scheduling, including the use of a risk management program with insufficient detail and forward-looking time horizon; the delayed development of the original integrated EPC schedule with adequate resource loading; the inadequacy of commodity cost estimating and monitoring;[11] and the failure to implement certain processes and procedures. BREI determined that these planning and scheduling shortcomings resulted in additional costs in the areas of engineering; project support, controls and scheduling; and construction. BREI's evaluation of these costs, and the methods utilized to quantify them, is detailed below.

Engineering

Inefficiencies resulted from the just-in-time engineering, design, and construction activities occurring simultaneously on the Project. These challenges were created when the design team was faced with a compressed engineering schedule[12] for delivery of approved designs and drawings to support construction. The issues, resulting from the compressed schedule, were exacerbated by the typical challenges associated with the FOAK nature of this Project. A large percentage of the delays in issuing design and construction drawings resulted from the FOAK nature of the design as well as typical and customary errors and omissions in design work. As a consequence, the SCS engineering and design group lost a significant amount of time in trying to support and maintain a sufficient inventory of "issued for construction" design documents to avoid impacting or delaying construction activities in the field. This caused much of the work to be performed out of the normal sequence of designing the plant, thus creating inefficiencies. The more notable of these inefficiencies are discussed below.

BREI reviewed all available four-week look-ahead schedules through the March 2013 window (roughly 12,000 activities from the integrated project schedule). These schedules were

[11] The Project Team attempted to control actual cost against budget by reference to the $2.4 billion certification budget until the original low contingency was depleted which impaired its ability to foresee major cost overruns.
[12] This schedule was compressed in order to meet the May 2014 COD.

distributed by MPC monthly,[13] and provided a basis for estimating the inefficiencies that the engineering group experienced. From this evaluation, BREI has categorized the more significant areas where engineering inefficiencies were incurred through the period ending March 2013 as follows:

- Late receipt of vendor drawings led to partially complete drawings being issued in an attempt to maintain the construction schedule and priorities. This resulted in multiple revisions and delays in the issuance of critical drawings including gas cleanup equipment layouts, Lignite Development Facility foundation, electrical, and steel drawings, gasifier and gasifier piping isometric drawings and inline instrumentation drawings.
- Redesigns due to changes in engineering assumptions: BREI sampled multiple structural steel, mechanical and electrical drawings in critical plant areas including the gasifier, gas cleanup and pipe rack areas. From these reviews it was determined that, due to the late receipt of vendor drawings and information, engineering assumptions were made to complete the drawings, and those assumptions frequently turned out to be inaccurate. This resulted in additional changes in construction sequencing and equipment being incorporated on a just-in-time basis. This chain of events resulted in the need to validate or change the original assumptions resulting in additional drawing revisions and engineering costs.
- For related reasons, the engineering budget and schedule duration were completed much later than planned. Additional engineering management and support resources were required to deliver engineering work and work-arounds in time to accommodate

[13] The four week look-ahead schedule is a Primavera-generated report that shows progress achieved to date plus the expected plan and schedule for the next four weeks.

construction priorities. These engineering work-arounds were exacerbated by the FOAK nature of the Project. They were also the direct result of inefficiencies resulting from the Project Team's decision to schedule design work based on the timing of construction needs rather than on efficiently delivering completed engineering packages. The engineering schedule delays that resulted from these decisions were: process, electrical, and instrument and controls disciplines (4 months each), civil (6 months) and mechanical (14 months).

BREI estimated the cost impacts of the engineering schedule overruns as reported in MPC's monthly reports as noted in the table below. BREI estimated the costs attributed to the overruns based on an estimate of the additional engineering man-hours resulting from the overruns.

	Baseline Completion	Actual Completion	Duration Overrun
Civil	February 2012	Fall 2012	6 months
Mechanical	December 2011	January 2013	14 months
Electrical	November 2012	March 2013	4 months
I&C	November 2012	March 2013	4 months

Project Support/Controls and Scheduling

The project support and controls area of the Project also experienced inefficiencies due to poor initial planning and execution. As discussed in BREI's Prudency Report, these issues included:

- Timely development of an effective integrated baseline schedule
- Inadequate implementation of SCS project controls procedures which required the development of a resource loaded and integrated project schedule
- Inadequate forecasting techniques
- The lack of an adequate risk management plan

While these issues were significant, the actual incremental cost incurred by the project controls function, as a result of these deficiencies, was minimal. Although BREI did not include these incremental costs as part of its analysis, these deficiencies were a major contributing factor in both the engineering and construction cost inefficiencies discussed herein.

Procurement of Materials and the Cost of Replacement of Materials

BREI also compared the original pipe spool fabrication strategy which would have used a single offsite fabricator to the actual need to use multiple fabricators to meet the production needs imposed by the compressed schedule and piping quantity growth. The late recognition of the need for, and decision to retain, multiple suppliers resulted in additional costs associated with coordination, oversight, expediting, and extended fabrication duration. The premium costs associated with the late decision to bring in multiple fabricators was a significant cost adder.

Due to design changes that were experienced at a point in time after materials were already delivered to the site, there were materials (pipe spools) which needed to be discarded and replaced with new materials. Estimated costs of these new materials were included in BREI's evaluation.

Construction

Many of the construction inefficiencies, shortcomings, and inadequacies were the result of poor planning to meet the aggressive schedule necessitated by the planned COD. The initial execution of the Project included limited critical procurement releases (with the exception of certain long lead time equipment) and an insufficient amount of the appropriate detailed engineering and design. This had a direct negative effect on the development of a reasonable and cost efficient construction plan, particularly for timely component and equipment delivery and installation.

The initial schedule was poorly integrated, the baseline schedule was established late, and activities were not effectively resource loaded. These deficiencies impaired the Project Team's ability to accurately forecast additional commodity quantities needed and the related craft labor requirements. These limitations further compounded the challenges that the Project Team faced.

The construction team generally responded with viable work-around measures to lessen additional schedule impacts, thereby mitigating some of the lost time and related costs. Even with that mitigation, however, the cost and schedule impacts were significant.

BREI also considered the impact of late engineering and design drawing releases, partial drawing releases, re-issuing of construction drawings, and the resulting delays to construction. BREI reviewed all project schedules through the March 2013 window (over 20,000 activities). These schedules and the four-week look-ahead schedules were also reviewed to identify specific reasons for the construction delays and construction challenges that were being reported. Many activities listed on the schedule included notations stating "need design information." The following are a number of construction activities that were either on hold or needed to be re-scheduled while they were waiting for design information:

- Underground piping designs (were not available prior to pouring foundations)
- Gasifier Cooling Tower CT Bull Horn Piping (not available)
- Install Concrete Foundations - Fire Protection Valve House (North)
- Install Concrete Foundations - Fire Protection Valve House (South)
- Install Concrete Foundations - Fire Protection Valve House No. 8

- Install Concrete Foundations - Fire Protection Valve House No. 9
- Install Concrete Foundations - Misc. Fire Protection Valve House No. 10
- Design releases of Various Foundations
- Install Cable Tray - Area 190 Design for Cable Tray
- Install Conduit - Area 110 Pending Steel Release dates
- Engineering modifications on pipe supports and penetrations
- Lignite Development Facility Site work, Steel and Foundation Drawing issue and then revised

In addition, BREI reviewed logic ties from the engineering and procurement schedules and was able to identify additional delays due to construction. Only the significant delays judged to have a material impact on project costs were included in BREI's analysis.

BREI evaluated bulk commodity installation rates[14] to identify the commodities most affected by delays and inefficiencies. To do this, BREI compared planned installation rates against the March 2013 actual rates to determine the delta. This difference in installation rates is a measure of inefficiencies resulting from lack of engineering support, lack of materials availability, and craft labor congestion. BREI specifically evaluated commodity installations (piping, steel and concrete) that were well under way during the period up to and including March 2013. Specifically, concrete, steel and piping installation rates through March 2013 were running approximately 30% to 40% higher than plan. It should be noted that in this analysis, BREI did

[14] Bulk commodity installation rates refer to the craft labor requirements expressed in man-hours to install a given unit of material, such as linear feet of piping or cubic yards of concrete. As such, it is a measure of labor productivity.

not penalize the Project for the incremental labor costs due to the growth in commodities. In conducting the analysis, the original budgeted labor rates were compared against March 2013 actual rates in the following categories:

- Storm drains
- Underground piping
- Underground pipe excavation / fill
- Ductbank
- Piling / caissons
- Concrete
- Area excavation / fill
- Buildings
- Combined cycle, gasifier and gas clean-up steel
- Equipment
- Grouting
- Above ground piping
- Treated effluent piping

Poor and late planning of required offsite electric utility lines relocation (required for transport of large components to the site) added to construction delays and added to the cost to complete the utility line relocations. The incremental utility line relocation costs reported by MPC are attributed to poor and late planning of this required work.

Indirect costs were also impacted by the lack of a fully integrated project plan. These indirect costs included:

- Construction management and support labor costs as extended area by area for:
    - Site Clearing / Grubbing
    - Piling / Caissons Completion
    - Concrete Foundations Completion
    - Steel
    - Piping Installation
    - Electrical Installation
    - Equipment Installation
    - Instrumentation
- Scaffolding erection attributed to duplication and inefficiencies
- Additional per diems for the extended periods required
- Added night shift and or weekend and safety support services
- Use of extended hours
- Additional costs associated with project controls

- Logistical support
- Piping engineering support
- Electrical engineering support
- Additional SCS labor beyond the budgeted amounts was compared against actual labor hours used
- Additional cost for coordination of heavy lift

Project Management and Support and Construction Indirects

Extension in the schedule activity durations required that indirect labor needed to be increased coincident with the schedule delays. This resulted in additional construction management and oversight labor as well as the other construction indirect costs identified below.

BREI reviewed the heavy rigging plan, specifically the plan to move large cranes around the site. The delays in delivery of major equipment required changes in the heavy rigging plan and the need to delay removing several large cranes from the job site, especially the Lampson Crane which was required to be onsite roughly five months longer than planned, to complete installation of the gasifiers and gasifier structure.

Startup

Startup priorities needed to be shifted from the baseline plan to accommodate construction work that was complete and could support startup. The startup sequence had to accommodate startup of partial systems to allow the startup team to begin startup activities on systems that had not reached construction completion. This resulted in inefficiencies in the implementation of the work.

Startup staff was mobilized earlier than needed and, due to the delays in construction completion on some systems, the startup staff will be kept on-site for a much longer time than originally planned.

BREI reviewed the original baseline plan durations and manpower requirements relative to actual startup durations and manpower plans through March 2013 to establish incremental costs incurred due to these inefficiencies.

The May 2012 cost outlook, presented by MPC and based on actual costs reported through March 2012, announced a $250 million cost increase which was attributed to construction. MPC stated that approximately 80%, or $200 million, of that increase was due to commodity growth, and that approximately 20%, or $50 million, was due to schedule compression and construction work-arounds. In an RFI, BREI has requested that MPC estimate the added costs of work-arounds from the beginning of construction through March 31, 2013.

Based on incomplete information that was available at the time of this analysis, and based on the methods described above, BREI estimated that the incremental construction costs related to the inefficiencies identified above are in the range of $85 million to $123 million through March 31, 2013. It should be noted that BREI considers this estimate to be conservative, preliminary and partial, in that BREI believes that the actual costs resulting from these inefficiencies are likely to be significantly greater. Final determination will be made during the prudency hearing to be scheduled six months after the Kemper Project achieves COD.

Kemper Issues for Monetary Consideration to Prudency		
Engineering	$11,300,000	$14,400,000
Procurement (Pipe fabrication and cost of replacing Materials)	$8,950,000	$10,900,000
Construction	$29,950,000	$45,500,000
Start-up	$3,100,000	$6,950,000
Project Management and Support (includes indirects)	$32,000,000	$45,250,000
	$85,300,000	$123,000,000

Q. Does this conclude your testimony?

A. Yes.

STATE OF NEW JERSEY)

COUNTY OF BERGEN)

GREGORY F. ZOLL, P.E., Director, with POWER Burns and Roe, a Division of Power Engineers, Inc., being first duly sworn, deposes and says that the statements contained in the foregoing Surrebuttal Testimony to the Mississippi Public Service Commission, Re: Mississippi Power Company's Petition for Finding of Prudence in the Kemper County IGCC Generating Facility are true and correct to the best of his knowledge, information and belief.

Greg Zoll

Gregory F. Zoll, P.E., Director
Burns and Roe Enterprises, Inc.

Subscribed and sworn to before me this the 21 day of July, 2014.

Carolyn Meola

Notary Public

My Commission Expires: May 4, 2016

CAROLYN MEOLA
Notary Public
State of New Jersey
My Commission Expires May 4, 2016

CERTIFICATE OF SERVICE

I, Chad Reynolds, General Counsel for the Mississippi Public Utilities Staff, hereby certify that a copy of the foregoing Sur-Rebuttal Testimony to the Mississippi Public Service Commission Re: Mississippi Power Company's Petition for Finding of Prudence in the Kemper County IGCC Generating Facility Sur-Rebuttal Testimony of Gregory F. Zoll on behalf of the Mississippi Public Utilities Staff has been served by electronic mail, in MPSC Docket No. 2013-UA-189, to the Mississippi Public Service Commission.

This the 21st day of July, 2014.

Chad Reynolds

Chad Reynolds

EXHIBIT "1"

GREGORY F. ZOLL, PE
Director – Strategic Consulting

Mr. Zoll has over 35 years of experience in the development, design, engineering, environmental permitting, and construction of independent power projects, combined cycle cogeneration plants, refinery, utility, and bulk materials handling facilities. As Director of the Strategic Consulting Division at Burns and Roe, Mr. Zoll has overall responsibility for project development support including both fossil and renewable energy projects which include project conceptual planning and design, environmental permitting, contract development, and project execution oversight following financial closing. Mr. Zoll is also responsible for the oversight of Burns and Roe's Owners Engineering and Independent Engineering Due Diligence support groups.

He has extensive experience in conducting Independnet Engineering Due Diligence reviews; and in the evaluation, development and negotiation of EPC Contracts, Fuel Supply Contracts, Power Purchase and Energy Services agreements for both IPP and Industrial projects; and project management and the oversight of construction and commissioning of IPP and Cogeneration facilities designed to fire both natural gas, low BTU synthetic gas, coal, petroleum coke and biomass. Prior to Burns and Roe, Mr. Zoll worked for GPU International as Director of IPP Project Engineering and Permitting; and for the Exxon Research and Engineering Company in the design of refinery utility systems.

Education
BSME in Mechanical Engineering, University of Vermont

Registration
Professional Engineer in the state of NJ

Affiliations
Member, American Society of Mechanical Engineers (ASME) and National Society of Professional Engineers

Experience – Burns and Roe (2001 – Present)

Independent Monitor, Kemper County 585 MW IGCC Project, Meridian MS

As Independent Monitor for the Mississippi Public Staff (MPUS), Mr. Zoll is Project Manager responsible for providing design, construction and start-up monitoring; and will provide oversight during an initial 5 to 7 year operating period of the nominal 585 MW Kemper County IGCC Project. The project is being developed by Mississippi Power Company near Meridian, MS, and will utilize a first-of-a-kind "TRIG" gasification process that has been developed jointly by the Southern Company, Kellogg Brown and Root and the US DOE. The Kemper Project will also remove CO2 from the syngas to reduce greenhouse gas emissions. The CO2 will be transported by pipeline for use in Enhanced Oil Recovery (EOR). BREI's scope of work includes the independent review and monitoring of the project's construction, schedule and cost, development of independent cost and schedule estimates, review of technology development issues and support at cost prudency hearings to ensure that the project is being executed in the best interest of the Mississippi Power Company rate payers.

Confidential Utility Client – Queensland, Australia
Integrated Gasification Combined Cycle (IGCC)
Feasibility Study

As Project Manager, Mr. Zoll led an IGCC development program which has included an engineering feasibility study for a 400 MW commercial scale IGCC project with the added feature of a CO → CO2 shift reaction for CO2 (carbon) separation, removal, and offsite sequestration. The study included technology and commercial readiness assessments, development of both the gasification process and combined cycle blocks, performance estimates, capital and operating cost estimates, and availability / reliability projections; and a sensitivity analysis of the technical and commercial feasibility of developing a 60 MW demonstration scale project. The study also included an evaluation of existing combustion turbine experience and technical readiness for combustion of high hydrogen syngas following carbon removal for sequestration. Most recently, Mr. Zoll has been responsible for a program to assist the client in selecting a gasifier technology provider for the nominal 200 MW "ZeroGen" IGCC demonstration project which will be partially funded by the Australian government.

IE Technical Advisor, DOE Loan Guarantee Review
Christian County, Illinois Taylorville IGCC Project

As part of BREI's, Independent Engineering Due Diligence team, Mr. Zoll provided independent verification as to whether the engineering, technical, construction, and operational aspects of the Project were viable and achievable, including with respect the DOE's Loan Grant Criteria. The proposed facility was to be an integrated gasification combined cycle plant utilizing local Illinois coal with carbon capture and sequestration technology. The Christian County IGCC facility was intended to produce pipeline quality Synthetic Natural Gas (SNG) to either fuel a combined cycle power plant or to be sold directly depending on market conditions. Mr. Zoll was directly responsible for the review of the adequacy of the Front End Engineering and Design (FEED) study and the associated project cost estimate.

Waterbury Generation Center, 100 MW LMS100 Simple Cycle Plant, Waterbury, CT

As Independent Engineer for the project lenders, Mr. Zoll was responsible for project development due diligence including review of permits; fuel supply and electrical interconnection agreements; Power Purchase Agreement; EPC Contract structure including technical scope, commercial terms, and adequacy of contractors

Liquidated Damages; LMS100 technical risk assessments; and adequacy of the Owner's Long Term Service Agreement (LTSA) with GE Energy. Following project financing, Mr. Zoll monitored construction progress, witnessed performance testing, and assisted Owner is resolving initial operational issues.

Sempra Generation, Norton Ohio – Owners Engineer, Compressed Air Energy Storage (CAES) Plant, Project Development Support

Mr. Zoll was responsible for the conceptual design and development of this unique 2,800 MW CAES project which is now in the process for filing for DOE grant funding and loan guarantees under the American Reinvestment and Recovery Act (ARRA). Project responsibilities include site grading and equipment layout studies to support the Owner's air quality permit application; working with expander equipment suppliers to support their development of air emissions control strategies, the development of plant water balances and estimates of water discharge quality and quantity, and the development of open air and gas insulated switchyard layouts and cost estimates to support a staged project execution at multiple electrical export voltages.

El Paso Merchant Energy – Lee County, Mississippi, Owners Engineer, Project Development Support

As Owner's Engineer, Mr. Zoll was responsible for the technical and commercial development of the project which consists of two MHI 501G CTG's totaling 750 MW. Support activities included negotiation of the MHI turbine purchase contract and LTSA; development and negotiation of a PPA Tolling Agreement, assisting Owner in development of EPC technical specifications, review of contractor documentation including P&ID's and equipment specifications, and environmental permit expediting.

Severnaya, Republic of Azerbaijn, 400 MW Combined Cycle Power Plant – Owners Engineering Support

As Project Manager, Mr. Zoll was responsible for all EPC contract close-out activities for this MHI 701F based facility including review of performance and emissions testing protocols and test results, negotiation of the final "punch list", turnover of "as-built" documentation to the Owner, and for negotiating a set of mutually acceptable provisions allowing the Owner to accept the Contractor's certificate of Final Completion.

Tractebel Power, Inc. – 1,200 MW Combined Cycle Project, Linden NJ, Owners Engineering Project Development Support

Mr. Zoll was Project Manager responsible for the overall technical development of a 1,200 MW combined cycle project consisting of three Siemens Westinghouse 501G 1X1 combined cycle power blocks. Project responsibilities included technical support for the Owners environmental permitting work, development of the overall power cycle and performance estimates, complete balance of plant design, development of a dual voltage level electrical switchyard for electrical interconnections to two independent electric grids, and detailed overall project schedule and cost estimates. The project also included the design of gray water treatment facilities for plant makeup water, and over 3 miles of horizontal directional-drilled borings for underground electrical and water interconnections.

Calpine Corporation – Stony Brook University, NY Project Manager, Expansion Feasibility Study and Conceptual Design

Mr. Zoll acted as Project Manager in evaluating the feasibility of expanding an existing 45 MW GE LM6000 based cogeneration facility. The study included development of heat balances, general arrangements, and cost estimates for the addition of a second GE LM6000 and an extraction/condensing steam turbine which will increase the facility electrical output to 125 MW. The study also included an assessment of the project's impact on the existing university electrical system load flow and short circuit levels, defining required upgrades to the university infrastructure, and the development of a second utility electrical interconnection.

Competitive Power Ventures – Smyth County, Virginia Owners Engineer, Permitting Support

As Project Manager, Mr. Zoll was responsible for supporting the Owner in obtaining environmental, State Department of Transportation (DOT) and local building permits for the project which contains three GE 7FA CTG's configured in one-on-one power blocks totaling 780 MW. Activities included fast track development of sedimentation and erosion control plans, detailed foundation designs, and detailed highway road designs to support Owner's critical year-end permit application deadlines.

CMS Generation – Dearborn Industrial Generation LLC Owners Engineer, Commissioning, Startup, and Performance Testing Program Development

Mr. Zoll has been the Project Manager supporting Owner in evaluating the project's EPC Contractor developed performance testing protocol, test correction procedures, and conducting an independent evaluation of facility and equipment performance during performance testing. The facility includes three GE 7FA combustion turbine generators, and a 250 MW Alstom extraction/condensing steam turbine. One combustion turbine operates as a simple cycle peaking unit; the other two combustion turbines are configured as a two-on-one combined cycle power block. In addition to the combined cycle HRSG's, the facility includes three industrial boilers designed to fire low BTU blast furnace off-gas which is produced and provided by the industrial host facility. Mr. Zoll also provided technical support to the Owner during the start-up, commissioning, and testing of blast furnace gas fired boilers.

Experience - GPU International (1986 – 2001)

Lee County, Mississippi, 750 MW Combined Cycle Power Plant, Project Engineering Director

Developed and negotiated equipment supply contract for a \$160,000,000 combined cycle advanced technology MHI 501G based combustion turbine power block. This contract represented first of its kind with a Japanese equipment supplier for a non-merchant United States IPP facility. Mr. Zoll was also responsible for project environmental permitting which included a novel air permit application approach which resulted in the granting of a PSD permit to construct "envelop" which allowed for the final selection and installation of combustion turbines from either GE, Siemens Westinghouse, or MHI.

Magellan 300 MW PC Coal Fired Power Project , Batangas, Philippines, Project Engineering Director

Led technical design and EPC contract development efforts for a first-of-its-kind project in the Philippines that was being executed by a Chinese EPC Contractor using a Chinese sourced powerblock and BOP equipment.

Mid-Georgia Cogeneration Facility, Houston County, Georgia 300 MW Cogeneration Facility

Led technical development and permitting efforts for GPU International's 300 MW Mid-Georgia cogeneration project which consists of a two-on-one Siemens Westinghouse 501D5A power block, stand-by auxiliary boiler with back pressure STG, and a one half mile high pressure steam line to connect the facility with its thermal host. Responsibilities included facility design and equipment selection, EPC contract development and negotiation, environmental permitting, regulatory approvals, and negotiation of

Power Purchase, Gas Supply and Energy Service agreements. Project was named Penewell Publishing's Power Magazine 1999 "Project of the Year" for excellence in design, construction and operation. Secured local water, sewer, and gas infrastructure upgrades to support the project. This work included in excess of 40 miles of right-of-way development and permitting, for pipeline installation; valued in excess of $8,000,000.

Onondaga Cogeneration Facility, Syracuse, NY, Project Manager
Managed project development, permitting, and EPC contract execution for an 80 MW cogeneration facility which included both a GE LM2500 and GE LM 5000 in a combined cycle configuration. Responsible for design, and construction reviews, project schedule and progress monitoring, and evaluation/resolution of contract compliance issues. Developed performance test protocols with EPC contractor, managed oversight and evaluation of performance test results and negotiation of bonus payments. Obtained necessary Federal and New York State Environmental Permits, successful filing for an Environmental Impact Statement "Negative Declaration" which resulted in an abbreviated 6-month permitting schedule.

Aquila – Confidential Location, Project Manager, Owners Engineer, Due Diligence Support
Mr. Zoll has been the Project Manager assisting Owner in due diligence evaluations of a confidential project acquisition based on Siemens Westinghouse V84.3A combustion turbine technology.

Empressa Guaracachi S.A., Santa Cruz, Bolivia, 110 MW Simple Cycle Combustion Turbine Facility, Project Engineering Director
Managed successful development of a 110 MW GE 6FA based simple cycle CTG facility in Bolivia. Project included facility design and siting, development and execution of a $51,000,000 EPC contract, and stability modeling of the entire Bolivian national electrical transmission grid to assess project impacts. Developed Environmental Impact Assessment report and obtained first of its kind regulatory approval under newly promulgated Bolivian environmental law.

Experience – Exxon Research and Engineering Co., 1977 - 1986

Led design development teams and provided technical support to worldwide affiliated organizations during design and construction of petroleum refining systems. Specific experience includes:

- Planning and conceptual design of integrated refinery cogeneration facilities.
- Bulk materials handling and storage systems.
- Oil movement, storage, and blending systems
- Utility systems including steam raising and distribution and energy conversion optimization.

Completed one year assignment as resident start-up engineer at a West German refinery and two years as resident engineer in contractor offices providing design review and quality assurance oversight.

EXPERIENCE HISTORY:

- Burns and Roe, Oradell, New Jersey February, 2001 - Present
- GPU International, Parsippany, NJ 1986 - 2001
- Exxon Research and Engineering Company, 1977 - 1986

[redacted] 2: REFERENCES OF PROJECT DOCUMENTS REVIEWED FOR JANUARY 2012 INDEPENDENT MONITOR'S BASELINE REPORT

Document Name/Filename	Revision	Date
Kemper County IGCC Project FEED Document		August 2009
Southern Company Generation – Engineering and Construction Services. Technical Services – Mechanical Systems and Field Support. Plant System Design Manual	0	6/30/2010
Mississippi IGCC Project (2x1) Mass Energy Balance Cases: 2SEC65, 2SEC95, S17565, 2SSF65, 2SSF95	AL	Aug. 13, 2009
Aquatech (Drawing # 09-1087-DW-AE-ICD001PFD4-1-H) Preliminary Process flow Diagram for Water Treatment System	1	Oct. 25, 2010
Southern Company Generation – Engineering and Construction Services scope of Work for the Design of the CO_2 Pipeline and Natural Gas Pipeline for Plant Kemper county IGCC (Mississippi Power Company)	1	Dec. 23, 2010
Power Systems Development Facility, Summary Report, Gasification Test Campaign TC22 (March 24, 2007 – April 17, 2007 DOE Cooperative Agreement Number DE-FC21-90MC25140		Sept. 2007
Power Systems Development Facility, Summary Report, Gasification Test Campaign TC22 (July 4, 2008 – August 12, 2007) DOE Cooperative Agreement Number DE-FC21-90MC25140		February 2009
Agreement for the Purchase and Sale of Combustion Turbines-Generators and Auxiliaries for Kemper County IGCC Plant (By and Between Mississippi Power Company and Siemens Energy Inc.		May 3, 2010
SGS Contract No. 5012682 for the Kemper County IGCC Project between southern Company Services Inc. and Toshiba International Corp. for a Steam Turbine/Generator		Nov. 15, 2008
MPC Contract No. 5019768: Project Agreement for the Purchase and Sale of Heat Recovery Steam Generators by and between Mississippi Power Company and Nooter/Eriksen Inc.		Aug. 11, 2010
Contract for Heat Exchangers at Kemper County IGCC Project between Mississippi Power Company and Thermal Engineering International (USA), Inc.		Jan. 24, 2011
Engineering and Ancillary Support Services Agreement By and Between Southern Company Services Inc. and Kellogg Brown and Root LLC		June 25, 2009
Front End Engineering and Design Services Agreement Between Southern Company Services, Inc. and Kellogg Brown and Root LLC		May 9, 2007
Selexol™ Process License Agreement Between Mississippi Power Company and UOP LLC For Two Identical Selexol Process Units, Kemper County Mississippi		May 29, 2009
MPC Contract No. 16948 for Kemper County Between Mississippi Power Company and Andritz Separation Inc. for Coal Drying System		Sept. 30, 2010
2010-05-27 Kemper County IGCC Level III schedule.pdf		May 14, 2011
2011 06 15 DonGuan Update.pdf (presentation)		June 15, 2011
Copy of SAM RV v8 Kemper County IGCC Project Financials.xls	Ver. 8	

Document Name/Filename	Revision	Date
(Financial Model)		
Asset Purchase Agreement between Mississippi Power Company and South Mississippi Electric Power Association		July 27, 2010
Joint Ownership and Operating Agreement between Mississippi Power Company and South Mississippi Electric Power Association. "Approved Management Version"		No date
Carbon Dioxide Off-take Agreement between Mississippi Power Company and Denbury Onshore, LLC		March 4, 2011
Carbon Dioxide Off-take Agreement between Mississippi Power Company and Treetop Midstream Services, LLC		May 19, 2011
Water Use Agreement Between City of Meridian and Mississippi Power Company		June 30, 2009
Mississippi Department of Environmental Quality (MDEQ) Office of Air Pollution Control Prevention of Significant Deterioration (PSD) Permit No. 1380-00017;		Oct. 16, 2008
"Kemper County IGDD Project, Final Environmental Impact Statement DOE/EIS-0409, May 2010"		May 2010
Review of on-line resources/websites such as the Mississippi Department of Environmental Quality (MDEQ) website, Kemper County (Mississippi) Local Government, web search sites for local news stories (i.e., support or opposition), and the Federal Aviation Administration (FAA).		
Mississippi Power Company Additional Response to Sierra Club Comments on the Kemper IGCC Facility – Draft PSD Permit		
Lignite Mining Agreement between Liberty Fuels Company, LLC and Mississippi Power Company – Effective as of June 1, 2010.		June 1, 2010
Liberty Fuels Company, LLC – "Liberty Mine – Leasehold Interest Map" as of November 9, 2010.		Nov. 9, 2010
Tetra Tech – "Slope Stability Evaluation" – September 1, 2010		Sept 1, 2010
Liberty Fuels Company, LLC – "Equipment and Hours Summary" – September 22, 2010		Sept. 22, 2010
Liberty Fuels Company, LLC – "Life of Mine Plan - Summary of Mining Volumes"		
Liberty Fuels Company, LLC – "Life of Mine Plan – Coal Quality" – September 22, 2010		Sept. 22, 2010
Liberty Fuels Company, LLC – "Life of Mine Plan – Exhibit 2 – Mining Sequence Map"		
Liberty Fuels Company, LLC – "Life of Mine Plan – computer files":		
Liberty Fuels Company, LLC – "Conceptual Site Plan Map"		
Liberty Fuels Company, LLC – "Lignite Delivery Facility description"		
Roberts & Schaefer Company – "Coal Handling Facilities – Site Plan"		
Liberty Fuels Company, LLC – "Equipment Procurement Table"		
Liberty Fuels Company, LLC – "Timelines" for various activities:		
Liberty Fuels Company, LLC – Mining Permit Application to the Mississippi Department of Environmental Quality – Office of Geology		
Liberty Fuels Company, LLC – "Identification of Liberty Fuels Mine (Kemper		

Document Name/Filename	Revision	Date
Project) Licenses and Permits"		
Liberty Fuels Company, LLC – "Life of Mine Plan – Equipment Data Sheet - Machine capital and operating costs"		
Geological Survey Circular 891, Coal Resource Classification System of the U.S. Geological Survey		
The Society of Mining Engineers (SME) Guide for Reporting Exploration Results, Mineral Resources and Mineral Reserves (The 2007 SME Guide), September 2007		Sept. 2007
Liberty Fuels Company, LLC - Geological structural and lignite quality database		
Liberty Fuels Company, LLC - Coal Core Boring Logs supplied by LFC		
Liberty Fuels Company, LLC - Geophysical logs supplied by LFC		
Liberty Fuels Company, LLC - Grids produced in Vulcan Geological Modeling software supplied by LFC		
Geological model produced by BOYD in Survcadd modeling software using the LFC database		
Marston Letter Report, dated: October 6, 2008 RE: Mississippi Power IGCC		Oct. 2006
U.S. EPA, e-mail correspondence from Donna Weiss (U.S. EPA) to Thomas Huynh (City of Philadelphia, Department of Public Health, Air Management Services) specific to Dependency Issues regarding the Florida Power and Light combined cycle facility proposed for construction at the Sunoco South Philadelphia Refinery. Original e-mail dated October 15, 1999 with subsequent forwarding.		Oct. 15, 1999
Mississippi Power Company, "Additional Response to Sierra Club Comments on the Kemper IGCC Facility – Draft PSD Permit", June 2011.		June 2011
State of Mississippi Department of Environmental Quality, Air Pollution Control Permit and Prevention of Significant Deterioration Authority to Construct Permit No. 1380-00017, issued to Mississippi Power Company for the Kemper IGCC Facility, original issue date of October 22, 2008 and modified March 9, 2010.		March 2, 2010
Ratcliff IGCC Project, MPSC & MPUS Project Review (Power point presentation)		Feb. 7-8 2011
Kemper County IGCC Cost Tracking, Kemper County IGCC Cost Tracking		July 30, 2010
BRE 1-117_Property Flowchart Effective through July 2010		
BRE 1-117_Expenditure CMT Manual Controls Effective July 2010 rev 2		
BRE 1-117_Financial Reporting Flowchart Effective through August 2010 revised		
Southern Company Services Internal Controls over Financial Reporting Governance Review, Report No. SCS201038		Jan. 28, 2011
Accounting for Capital Assets Overview (Attachments 1 through 14)		
Lignite Mining Agreement between Liberty Fuels Company, LLC and Mississippi Power Company		June 1, 2010
Liberty Fuels Company, LLC – "Liberty Mine – Leasehold Interest Map"		November 9, 2010
Tetra Tech – "Slope Stability Evaluation"		September 1, 2010
Liberty Fuels Company, LLC – "Equipment and Hours Summary"		September 22, 2010
Liberty Fuels Company, LLC – "Life of Mine Plan - Summary of Mining Volumes"		
Liberty Fuels Company, LLC – "Life of Mine Plan – Coal Quality"		September 22, 2010

Document Name/Filename	Revision	Date
Liberty Fuels Company, LLC – "Life of Mine Plan – Exhibit 2 – Mining Sequence Map"		
Liberty Fuels Company, LLC – "Life of Mine Plan – computer files": a) Equipment List.pdf b) Major Equipment Availabilities.pdf c) Summary – Volumetrics and Hours.pdf d) Equipment Units on Hand. pdf e) Additional equipment productivities and hours assumptions.pdf f) Hours assumptions.pdf g) Truck Shovel productivity.pdf h) Number of Salaried employees.pdf i) Number of Non-Salaried employees.pdf j) Labor Assumptions.pdf		
Liberty Fuels Company, LLC – "Conceptual Site Plan Map"		
Liberty Fuels Company, LLC – "Lignite Delivery Facility description"		
Roberts & Schaefer Company – "Coal Handling Facilities – Site Plan"		
Liberty Fuels Company, LLC – "Equipment Procurement Table"		
Liberty Fuels Company, LLC – "Timelines" for various activities: a) Major Mine Permitting & Environmental Constraints b) Development of the Mine Infrastructure and Boxcut c) Summary of LDF design and construction schedule d) Development of the Dragline Assembly e) Development of the Electrical Facilities & Estimated Demands f) Development of the Site Facilities		
Liberty Fuels Company, LLC – Mining Permit Application to the Mississippi Department of Environmental Quality – Office of Geology		
Liberty Fuels Company, LLC – "Identification of Liberty Fuels Mine (Kemper Project) Licenses and Permits"		
Liberty Fuels Company, LLC – "Life of Mine Plan – Equipment Data Sheet - Machine capital and operating costs"		
Geological Survey Circular 891, Coal Resource Classification System of the U.S. Geological Survey		
The Society of Mining Engineers (SME) Guide for Reporting Exploration Results, Mineral Resources and Mineral Reserves (The 2007 SME Guide), September 2007		
Liberty Fuels Company, LLC - Geological structural and lignite quality database		
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Liberty Fuels Company, LLC - Geophysical logs supplied by LFC		
Liberty Fuels Company, LLC - Grids produced in Vulcan Geological Modeling software supplied by LFC		
Geological model produced by BOYD in Survcadd modeling software using the LFC database		
Marston Letter Report, RE: Mississippi Power IGCC		October 6, 2008
U.S. EPA, e-mail correspondence from Donna Weiss (U.S. EPA) to Thomas Huynh (City of Philadelphia, Department of Public Health, Air Management Services) specific to Dependency Issues regarding the Florida Power and Light combined		October 15, 1999

Document Name/Filename	Revision	Date
cycle facility proposed for construction at the Sunoco South Philadelphia Refinery.		
Mississippi Power Company, "Additional Response to Sierra Club Comments on the Kemper IGCC Facility – Draft PSD Permit".		June 2011
State of Mississippi Department of Environmental Quality, Air Pollution Control Permit and Prevention of Significant Deterioration Authority to Construct Permit No. 1380-00017, issued to Mississippi Power Company for the Kemper IGCC Facility.	Rev 1	March 9, 2010
State of Mississippi Department of Environmental Quality, Air Pollution Control Permit and Prevention of Significant Deterioration Authority to Construct Permit No. 1380-00017, issued to Mississippi Power Company for the Kemper IGCC Facility.	Rev 0	October 22, 2008

[redacted] INFORMATION/REFERENCES REVIEWED IN SUPPORT OF PRUDENCY REVIEW

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
1.	SCS corporate procedures, which are used in the management of the project. They have 240 total procedures. 37 procedures which were considered applicable to current activities.
2.	We have produced a detail "Audit" of the practices, procedures, and status of the project in May of 2012 and issued the final version of the Audit Report to the Staff in December of 2012.
3.	The initial SCS Kemper Project Execution Plan as well as the latest revised plan with a revision 4, dated in July of 2013.
4.	The Kemper Risk Management program and attended the quarterly reviews of the plan in the Independent Monitor meetings.
5.	The SCS Site Specific QA/QC Procedure (GEP-A-00)
6.	Numerous Organizational Charts depicting the various organizations which make up the staff for the Kemper Project.
7.	"Kemper County IGCC Operating/Maintenance Procedures and Training Overview", which was a draft at the time and it was dated June 22, 2010.
8.	The MPC Petition for a CPCN dated April 2, 2012.
9.	The Affidavit of Thomas O. Anderson relative to the Petition for Certification of Public Convenience and Necessity dated April 2, 2012.
10.	The Dissenting Opinion of Commissioner Brandon Presley dated March 30, 2012.
11.	The Final Order on Remand Granting a Certification of Public Convenience and Necessity dated April 24, 2012.
12.	The Design Model in the Birmingham Office.
13.	The 14 page Labor Study Update presented in January 2011.

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
14.	Inquiry No. 3540 Dated January 4, 2011 titled, Crane and Heavy Haul Services. This was the specification that was sent all potential bidders.
15.	SCS Change Order Log (initially on 11-1-2011) and periodically based upon need.
16.	Weekly (used to be monthly) the project work off curves, now called Weekly Progress Matrix.
17.	The weekly construction 4 week look-ahead schedule.
18.	Kemper County IGCC Project FEED Document dated August 2009
19.	Southern Company Generation – Engineering and Construction Services. Technical Services – Mechanical Systems and Field Support. Plant System Design Manual dated June 30, 2010
20.	Mississippi IGCC Project (2x1) Mass Energy Balance Cases: 2SEC65, 2SEC95, S17565, 2SSF65, 2SSF95, dated August 13, 2009.
21.	Aquatech (Drawing # 09-1087-DW-AE-ICD001PFD4-1-H) Preliminary Process flow Diagram for Water Treatment System, dated October 25, 2010.
22.	Southern Company Generation – Engineering and Construction Services scope of Work for the Design of the CO_2 Pipeline and Natural Gas Pipeline for Plant Kemper county IGCC (Mississippi Power Company), dated December 23, 2010.
23.	Power Systems Development Facility, Summary Report, Gasification Test Campaign TC22 (March 24, 2007 – April 17, 2007 DOE Cooperative Agreement Number
24.	DE-FC21-90MC25140, dated September 2007.
25.	Power Systems Development Facility, Summary Report, Gasification Test Campaign TC22 (July 4, 2008 – August 12, 2007) DOE Cooperative Agreement Number
26.	DE-FC21-90MC25140, dated February 2009.

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
27.	Agreement for the Purchase and Sale of Combustion Turbines-Generators and Auxiliaries for Kemper County IGCC Plant (By and Between Mississippi Power Company and Siemens Energy Inc., dated May 3, 2010.
28	SGS Contract No. 5012682 for the Kemper County IGCC Project between southern Company Services Inc. and Toshiba International Corp. for a Steam Turbine/Generator dated November 15, 2008.
29	MPC Contract No. 5019768: Project Agreement for the Purchase and Sale of Heat Recovery Steam Generators by and between Mississippi Power Company and Nooter/Eriksen Inc., dated August 11, 2010.
30.	Contract for Heat Exchangers at Kemper County IGCC Project between Mississippi Power Company and Thermal Engineering International (USA), Inc., dated January 24, 2011.
31.	Engineering and Ancillary Support Services Agreement By and Between Southern Company Services Inc. and Kellogg Brown and Root LLC., dated June 25, 2009.
32.	Front End Engineering and Design Services Agreement Between Southern Company Services, Inc. and Kellogg Brown and Root LLC., dated May 9, 2007.
33.	Selexol™ Process License Agreement Between Mississippi Power Company and UOP LLC For Two Identical Selexol Process Units, Kemper County Mississippi, dated May 29, 2009.
34.	MPC Contract No. 16948 for Kemper County Between Mississippi Power Company and Andritz Separation Inc. for Coal Drying System, dated September 30, 2010.
35.	2010-05-27 Kemper County IGCC Level III schedule.pdf, dated May 14, 2011.
36.	2011 06 15 DonGuan Update.pdf (presentation), dated June 15, 2011.
37.	SAM RV v8 Kemper County IGCC Project Financials.xls

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
38.	(Financial Model) version 8.
39.	Asset Purchase Agreement between Mississippi Power Company and South Mississippi Electric Power Association, dated July 27, 2010.
40.	Joint Ownership and Operating Agreement between Mississippi Power Company and South Mississippi Electric Power Association. "Approved Management Version"
41.	Carbon Dioxide Off-take Agreement between Mississippi Power Company and Denbury Onshore, LLC. dated, March 4, 2011.
42.	Carbon Dioxide Off-take Agreement between Mississippi Power Company and Treetop Midstream Services, LLC. dated May 19, 2011.
43.	Water Use Agreement Between City of Meridian and Mississippi Power Company, dated June 20, 2009.
44.	Mississippi Department of Environmental Quality (MDEQ) Office of Air Pollution Control Prevention of Significant Deterioration (PSD) Permit No. 1380-00017, dated October 16, 2008.
45.	Kemper County IGCC Project, Final Environmental Impact Statement DOE/EIS-0409, May 2010, dated May 2010.
46.	Review of on-line resources/websites such as the Mississippi Department of Environmental Quality (MDEQ) website, Kemper County (Mississippi) Local Government, web search sites for local news stories (i.e., support or opposition), and the Federal Aviation Administration (FAA).
47.	Mississippi Power Company Additional Response to Sierra Club Comments on the
48.	Kemper IGCC Facility – Draft PSD Permit
49.	Mississippi Power Company, "Additional Response to Sierra Club Comments on the Kemper IGCC Facility – Draft PSD Permit", June 2011.

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
50.	State of Mississippi Department of Environmental Quality, Air Pollution Control Permit and Prevention of Significant Deterioration Authority to Construct Permit No. 1380-00017, issued to Mississippi Power Company for the Kemper IGCC Facility, original issue date of October 22, 2008 and modified March 9, 2010.
51.	Ratcliff IGCC Project, MPSC & Staff Project Review (Power point presentation) Dated February 7-8, 2011.
52.	Kemper County IGCC Cost Tracking, Kemper County IGCC Cost Tracking, dated July 30, 2010.
53.	Southern Company Services Internal Controls over Financial Reporting
54.	Governance Review, Report No. SCS201038, dated January 28, 2011.
55.	Accounting for Capital Assets Overview (Attachments 1 through 14)
56.	Mississippi Power Company, "Additional Response to Sierra Club Comments on the Kemper IGCC Facility – Draft PSD Permit", dated June 2011.
57.	State of Mississippi Department of Environmental Quality, Air Pollution Control Permit and Prevention of Significant Deterioration Authority to Construct Permit No. 1380-00017, issued to Mississippi Power Company for the Kemper IGCC Facility, Revision 1, dated, March 9, 2010.
58.	State of Mississippi Department of Environmental Quality, Air Pollution Control Permit and Prevention of Significant Deterioration Authority to Construct Permit No. 1380-00017, issued to Mississippi Power Company for the Kemper IGCC Facility, Revision 0, and dated October 22, 2008.
59.	CO2 Capture at the Kemper County IGCC Project presentation, dated September 16, 2010.
60.	Project Management Plan, Rev 0, dated, and September 7, 2010.
61.	Interconnection Facilities StudyIC-235 – Kemper County, MS – 690 MW

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
62.	November 19, 2010.
63.	Interconnection System Impact Study IC-235 – Kemper County 590 MW IGCC August 03, 2010
64.	EPC Certificate Estimate, Rev 1.
65.	KBR Earned Value Management Work Measurement System (WMS) September 10, 2012
66.	KBR Engineering Progress Measurement Procedure, PR-GL-ECD-EM-0516, dated, September 5, 2007.
67.	Kemper IGCC Electrical Installation Plan, dated, September 24, 2012.
68.	Kemper IGCC Piping Installation Plan, dated, September 24, 2012.
69.	Engineering and Construction Services Project Controls Procedures PC-02 Project Schedules Rev. 1
70.	Construction Services Procurement Control Procedures PR-07 "Receipt, Storage, and Handling of Products", Rev 5.
71.	Engineering and Construction Services Construction Quality Control Procedures PR-CS-03 "PRODUCT IDENTIFICATION AND TRACEABILITY", Rev 2.
72.	Engineering and Construction Services Construction Control Procedures PR-3 "Warehouse Inventory and Control", Rev 0.
73.	Kemper Project Cost Outlook Discussions MPSC/URS & Staff/BREI, presentation on May 10 & 11, 2012.
74.	Kemper Drawing List as of June 1, 2012.
75.	Kemper Vendor Drawing List as of June 1, 2012.
76.	McAbee Pipe Spool Status as of May 29, 2012.

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
77.	Engineering and Construction Services Startup Procedures SU-04 "Turnover Package Processing", Rev 5.
78.	Turnover Package Status Rev 0, dated, February 8, 2011.
79.	Monthly Project Status and Cost Report from Balch and Bingham to the Commission dated, January 4, 2011.
80.	Monthly Project Status and Cost Report from Balch and Bingham to the Commission dated, February 1, 2011.
81.	Kemper IGCC Cost Schedule Expenditures as of November 30, 2010.
82.	Key Contracts Over $10 million MPSC Docket No. 2009-UA-0014 Monthly Status Report Through December 2010.
83.	Concrete Status and Riles of Credit, dated May 29, 2012.
84.	Structural Steel Status and Rules of Credit, dated June 6, 2012.
85.	Pipe Fabrication and Delivery Schedule, dated, June 7, 2012.
86.	Total Hours Forecasted by Contractor, dated, May 9, 2012.
87.	Project Controls Procedures: - PC-02 Schedule - PC-03 Cost - Primavera Usage Instructions
88.	Schedules issued for the project including initial Level I and Level II schedules issued prior to notice to proceed and since then
89.	First baseline schedule issued in October 2011

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
90.	All monthly reports issued by the project since December 2011 and identify major decisions made that effect cost and schedule
91.	Procurement issues, schedules and track critical deliveries
92.	Visited the Pipe Fabricator and analyze capabilities to fabricate per sequence of work released
93.	Track open engineering issues and analyze significant engineering impacts on construction
95.	Transmission schedules and financial status since first issued
96.	Mine schedules and financial status since first issued
97.	Key Project Critical milestones, the relationship to each other and their movement since original issue
98.	Schedule variances from baseline to baseline and resolutions offered
99.	Construction progress for each critical area of the various phases of the project
100.	Work around plans and its effects on construction cost and schedule
101.	Reasons and rate of scope growth on quantities
102.	Pipe and electrical installation package and analyze fabrication capabilities of selected vendor on pipe, hangers and cable
103.	Earned Value Implementation for engineering and construction and startup.
104.	Rules of credit and determined accuracy of EV Reporting, including selection of metrics and Key Performance Indicators
105.	Basis of reporting all aspects of percent complete including Procurement, which was not EV based
106.	Excel spreadsheet used to determine labor craft congestion factors
107.	Risk register and mitigation of risks

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
109.	Weekly project metrics package which includes quantity tracking for all commodities
110.	Cost reporting on a monthly basis
111.	Contingency line items
112.	Weekly construction 4 week look-ahead schedule.
113.	Start up 4 week look ahead schedules
114.	Startup sequence and validate effectiveness of partial turn over packages
115.	Progress on PSM Program Development Plan
116.	Progress on Operator Training Simulator
117.	Aug. 2009 FEED Package Contents. (also reviewed portions of this initially in 2011)
118.	Test Reports from PSDF pertaining to MS Lignite Test Campaigns.
119.	Site visit to the National Carbon Capture Center (formerly Power Systems Development Facility (PSDF)) and given a tour by PSDF (Southern Company) Staff.
120.	KBR Engineering Change Notice for the Ammonia System Process Design Changes that were made by KBR.
121.	Bid Award justification for the award of a cryogenic nitrogen production system (Air Liquide), Siemens CTG, Andritz Fluid Bed Dryer
122.	Black & Veatch Readiness Report.
123.	Internal Southern Company Readiness Reviews.
124.	Beneficial Capital Justification that was submitted with the vendor award recommendation letters.
125.	Process Development Allowance submittals.

Item #	Document(s) Reviewed and Meetings and Site Visits to Establish Conclusions
126.	CO_2 pipeline Design Basis and CO_2 pipeline contractor award recommendation. (Review continues in the CO_2 area).
127.	Attended review meetings and reviewed project manuals prepared by the client for the time period of February 7 & 8, 2011 and May 10/11, 2012 as well as numerous other documentation including monthly reports concerning the project.

EXHIBIT 4

LABOR RESOURCE ALLOCATION SPREADSHEET

GASIFIER AREA

Production	Area Number	Category	Sep-11	Oct-11
0609A - Gasifier				
	150			
		02-Structural Steel	0.00	0.00
		04-Equipment	0.00	14.70
		06-Instrument	0.00	0.00
		07-Piping	0.00	0.00
		08-Electrical	0.00	0.00
	150 Total		**0.00**	**14.70**
	250			
		02-Structural Steel	0.00	0.00
		04-Equipment	0.00	14.70
		06-Instrument	0.00	0.00
		07-Piping	0.00	0.00
		08-Electrical	0.00	0.00
	250 Total		**0.00**	**14.70**
	150A			
		02-Structural Steel	0.00	0.00
		04-Equipment	0.00	0.00
		06-Instrument	0.00	0.00
		07-Piping	0.00	0.00
		08-Electrical	0.00	0.00
	150A Total		**0.00**	**0.00**
	250A			
		02-Structural Steel	0.00	0.00
		04-Equipment	0.00	0.00
		06-Instrument	0.00	0.00
		07-Piping	0.00	0.00
		08-Electrical	0.00	0.00
	250A Total		**0.00**	**0.00**
[redacted]				

NOTES:

1. Excludes all work prior to October 2011.
2. Only five major trades were identified:, Structural steel, Equipment, Instruments, Piping and Electrical; however, reporting was incomplete showing activity in the "Equipment" area only.
3. Baseline Schedule dates do not support the dates shown in the spreadsheet.
4. Many discrepancies were identified. Craft labor reports show more than 29.4 full time equivalent craft workers in the gasifier area in October, 2011.